Issues/Reports

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

August 18, 2016

MEMORANDUM **SCFL 8-16**

TO: Marine Fisheries Commission

FROM: Stephanie McInerny, License and Statistics Section Chief

SUBJECT: Standard Commercial Fishing License Eligibility Pool Determination

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An individual who does not hold a Standard Commercial Fishing License but wants to purchase a license through the Division of Marine Fisheries can apply to receive the license through the Eligibility Pool process. The application goes before a board which determines if the applicant is qualified based on criteria set out in rule. The number of licenses available in this pool is set annually by the commission.

Session Law 1998-225, Section 4.24(f) states that "the number of SCFLs in the pool of available SCFLs in license years beginning with the 2000-01 license year is the temporary cap less the number of SCFLs that were issued and renewed during the previous license year." The temporary cap was set at the number of valid Endorsements to Sell as of June 30, 1999 (8,396 licenses), plus an extra 500 licenses to be included in the Eligibility Pool (8,896 total licenses).

When the number of available licenses in the Eligibility Pool was first determined, the extra 500 licenses added to the temporary cap were tracked separately from Standard Commercial Fishing Licenses issued and renewed from previous years. In the past, after accounting for the 500 extra licenses, the division erroneously subtracted the cumulative number of licenses approved through the Eligibility Board from July 1, 1999 to the present from each year's Eligibility Pool. After the first year, these licenses were also counted in those renewed, so they were subtracted from the Eligibility Pool twice.

This calculation has been corrected this year so that only Eligibility Board approvals from the previous license year that are still eligible to be purchased are subtracted from the Eligibility Pool. For this reason, the number of licenses available through the pool is much higher than in years past.

For the 2016-2017 license year, the number of licenses available through the Eligibility Board is 2,417. This number accounts for licenses issued in the 2015-2016 license year and the number of approvals from the Eligibility Board from 2015-2016 that still have the

option to purchase a license before June 30, 2017. Individuals approved in the fall (September/October) must purchase their license by June 30 of the same license year, but those approved in the spring (March) have until June 30 of the following license year to purchase their license.

Session Law 1998-225, Section 4.24(f) also states "the Commission may increase or decrease the number of SCFLs that are issued from the pool of available SCFLs. The Commission may increase the number of SCFLs that are issued from the pool of available SCFLs up to the temporary cap. The Commission may decrease the number of SCFLs that are issued from the pool of available SCFLs but may not refuse to renew a SCFL that is issued during the previous license year and that has not been suspended or revoked. The Commission shall increase or decrease the number of SCFLs that are issued to reflect its determination as to the effort that the fishery can support, based on the best available scientific evidence."

In 2015-2016, there were 6,463 Standard Commercial Fishing Licenses and Retired Standard Commercial Fishing Licenses issued and only 36 percent (2,317 licenses) sold their catch to a licensed seafood dealer at least once during the year. In February 2016, as part of the deliberation of Amendment 4 to the Oyster Fishery Management Plan, the commission adopted a management strategy to pursue elimination of the Shellfish License for oysters only and require all oyster harvesters to have a Standard Commercial Fishing License or a Retired Standard Commercial Fishing License with a shellfish endorsement to harvest oysters commercially. Legislative action will be required to enact this recommendation before it can become effective. In 2015-2016, there were 1,320 Shellfish Licenses issued. For the same time period, only 351 of these licenses (27 percent) reported oyster landings. If the proposed management strategy is approved by the legislature, an average of 382 licensees (2011-2015) will need to get a Standard Commercial Fishing License or Retired Standard Commercial Fishing License to commercially harvest oysters. The vast majority of these licensees will have to go through the Eligibility Board to obtain this license, increasing the number of applicants to the Eligibility Pool. On average, about 85 percent of the applications reviewed each year are approved. From July 1, 2015 to June 30, 2016, the eligibility board approved 45 applications.

In conclusion, there are 2,417 licenses available to the Eligibility Board. The commission needs to determine the number of licenses it wants to place in the pool for the upcoming year. Considerations the commission should keep in mind include:

- Statutory guidance that increasing or decreasing the number of licenses should reflect the commission's determination as to the effort that the fishery can support, based on the best available scientific evidence;
- The average number of licenses issued by the Eligibility Board; and
- Potential number of fishermen that may shift from the Shellfish License to the Standard Commercial Fishing License in order to harvest oysters.

Eligibility Pool
Commission Report for 2016-2017
August 17-19, 2016

How the Pool Number is Determined:

Session Law 1998-225, Section 4.24(f).

(f) Adjustment of Number of SCFLs. The number of SCFLs in the pool of available SCFLs in license years beginning with the 2000-01 license year is the temporary cap less the number of SCFLs that were issued and renewed during the previous license year. . .

Role of the Marine Fisheries Commission:

Session Law 1998-225, Section 4.24(f).

(f). . . The Commission may increase or decrease the number of SCFLs that are issued from the pool of available SCFLs. The Commission may increase the number of SCFLs that are issued from the pool of available SCFLs up to the temporary cap. The Commission may decrease the number of SCFLs that are issued from the pool of available SCFLs but may not refuse to renew a SCFL that is issued during the previous license year and that has not been suspended or revoked. The Commission shall increase or decrease the number of SCFLs that are issued to reflect its determination as to the effort that the fishery can support, based on the best available scientific evidence.

Temporary Cap:

The maximum number of SCFLs that can be issued is the number of valid Endorsements to Sell as of June 30, 1999 plus 500 for the first eligibility pool, for a total of 8,896.

Eligibility Board Pool Determination 2016-2017:

There are 2,417 SCFLs available through the Eligibility Board for the 2016-2017 license year.

Attachments:

2016-2017 Eligibility Pool Determination Calculations

FY2016 License Sales Report

Licenses Available and Approved Summaries

Eligibility Board Meeting Summary

Eligibility Board Open Files

Eligibility Pool Determination Calculations
For
2016-2017 License Year

Corrections were made to the calculation used to determine the number of licenses available in the Eligibility Pool. Below is the current revised calculation showing the removal of items from prior reports that were found to be in error. Also included were Eligibility Board approvals from the spring meeting. Those approved by the Eligibility Board in the spring have until the following license year to purchase their SCFL. These licenses were subtracted from the pool because they are currently obligated to someone and represent potential licenses available for purchase.

Current calculation:

Total Number of SCFLs Available in 2016-2017 License Year (Data run date: 7/15/2016)

1)	Total original SCFLs available (Cap)……..	**8,896**
2)	Less total number of SCFLs issued and renewed in 2015-2016……..	**- 6,463**
3)	Total number of SCFLs available in the pool for 2016-2017……....	**2,433**
4)	~~Plus total number of SCFLs not renewed in 2014-2015~~……...	~~+ 213~~
~~5)~~	~~Total number of SCFLs available in the pool for 2016-2017~~……...	~~2,646~~
~~6)~~	~~Less total number of approvals through Eligibility Pool (July 1, 1999-June 30, 2016)~~……..	~~– 1,187~~
~~7)~~	~~Total number of SCFLs available in the pool for 2016-2017~~……...	~~1,459~~
~~8)~~	~~Plus total number of 2015-2016 approvals through Eligibility pool not purchased by June 30, 2016[1]~~…..	~~+ 7~~
~~9)~~	~~Total number of SCFLs available in the pool for 2016-2017~~……...	~~1,466~~
10)	Less total number of 2015-2016 approvals through Eligibility Pool not yet issued[2]……....	**- 16**
11)	**Total SCFLs available for the 2016-2017 license year**……	**2,417**

~~[1] Individuals approved in the fall (Sept/Oct) have until June 30 of the current license year (2016) to purchase their SCFL.~~

[2] Individuals approved in the spring (March) have until June 30 of the following license year (2017) to purchase their SCFL.

North Carolina Division of Marine Fisheries
Licenses Sold Year to Date by License Type
FY2016 License Year

Data Run Date: 7/15/2016

Blanket For-Hire Captain's Coastal Recreational Fishing License:	**118**
Blanket For-Hire Vessel Coastal Recreational Fishing License:	**482**
Commercial Fishing Vessel Registration:	**7,775**
Fish Dealer License:	**713**
Land or Sell License:	**102**
License to Land Flounder from Atlantic Ocean:	**157**
NC Resident Shellfish License without SCFL:	**1,110**
Non-Blanket For-Hire Vessel License:	**129**
Ocean Pier License:	**20**
Recreational Fishing Tournament License:	**19**
Retired Standard Commercial Fishing License:	**1,323**
Standard Commercial Fishing License:	**5,140**
TOTAL LICENSES FOR ALL LICENSE TYPES:	**17,088**

5,140	**SCFL**
+ 1,323	**RSCFL**
6,463	**Total Number of SCFL's issued for FY2016**

Licenses Available from the Eligibility Pool
Annual Summary

License Year	Number of Licenses Available
1999-2000	500
2000-2001	1,314
2001-2002	1,423
2002-2003	1,458
2003-2004	1,421
2004-2005	1,423
2005-2006	1,536
2006-2007	1,596
2007-2008	1,562
2008-2009	1,557
2009-2010	1,507
2010-2011	1,420
2011-2012	1,375
2012-2013	1,358
2013-2014	1,368
2014-2015	1,257
2015-2016	1,238
2016-2017	2,417

Licenses Approved and Denied by the Eligibility Pool Board
Annual Summary

License Year	Approved	Denied
1999-2000	166	133
2000-2001	110	75
2001-2002	46	37
2002-2003	38	23
2003-2004	56	11
2004-2005	35	13
2005-2006	31	9
2006-2007	32	4
2007-2008	49	7
2008-2009	83	5
2009-2010	109	11
2010-2011	63	2
2011-2012	68	17
2012-2013	99	9
2013-2014	96	14
2014-2015	61	13
2015-2016	45	6
Totals	**1,187**	**389**

Eligibility Pool Board Meeting Summary

HEARING DATE	APPRVLS	DENIALS	TABLED **	TOTAL REVIEWED	INCOMP. ***	NON-RESIDENTS TABLED	NON-RESIDENTS APPRV'D	NON-RESIDENTS DENIED
5/5/1999	2	0	2	4		0	0	0
5/19/1999	5	0	1	6		0	1	0
6/17/1999	2	5	3	10		0	0	0
7/1/98-6/30/99	**9**	**5**	**6**	**20**		**0**	**1**	**0**
7/7/1999	12	10	0	22		0	3	0
7/8/1999	23	25	0	48		0	7	0
07/15/1999 MFC	N/A	N/A	N/A	N/A		N/A	N/A	N/A
8/11/1999	18	20	4	42		0	3	0
8/27/1999	17	33	0	50		0	0	1
09/09/1999 MFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9/29/1999	18	11	1	30		0	0	0
11/3/1999	13	12	4	29		1	2	0
11/08/1999 MFC	N/A	N/A	N/A	N/A		N/A	N/A	N/A
1/26/2000	9	5	5	19		1	1	0
02/18/2000 MFC	N/A	N/A	N/A	N/A		N/A	N/A	N/A
4/19/2000	19	6	8	33		2	1	0
5/18/2000	18	3	9	30		2	0	1
6/7/2000	10	3	2	15		1	0	0
7/1/99-6/30/00	**157**	**128**	**33**	**318**		**7**	**17**	**2**
7/12/2000	11	1	4	16		0	2	0
7/21/2000 MFC	N/A	N/A	N/A	N/A		N/A	N/A	N/A
9/20/2000	24	15	7	46		0	1	0
10/27/2000	16	8	3	27		0	1	0
12/1/2000	5	16	2	23		0	0	0
1/24/2001	10	14	3	27		0	0	2
3/9/2001	12	12	8	32		0	0	0
4/4/2001	32	9	1	42		0	0	1
7/1/00-6/30/01	**110**	**75**	**28**	**213**		**0**	**4**	**3**
7/26/2001	18	10	2	30		1	3	0
08/21/2002 MFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
11/14/2002	12	15	3	30		0	2	1
2/21/2002	16	12	2	30		0	1	0
7/1/01-6/30/02	**46**	**37**	**7**	**90**		**1**	**6**	**1**
9/11/2002	28	14	6	48		1	2	0
08/19/2003 MFC	N/A	N/A	N/A	N/A		N/A	N/A	N/A
3/5/2003	10	9	1	20		0	2	0
7/1/02-6/30/03	**38**	**23**	**7**	**68**		**1**	**4**	**0**
08/19/2003 MFC	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
7/9/2003	16	3	1	20		0	2	0
11/4/2003	17	2	0	19		0	3	0
3/19/2004	22	6	0	28		0	2	0
6/22/2004	1	0	0	1		0	0	0
7/1/03-06/30/04	**56**	**11**	**1**	**68**		**0**	**7**	**0**
11/1/2004	22	4	1	27		0	0	0
2/28/2005	11	2	0	13		0	0	1
4/18/2005	2	7	0	9		0	0	0
7/1/04-6/30/05	**35**	**13**	**1**	**49**		**0**	**0**	**1**
9/27/2005	17	7	1	25		0	1	0
3/15/2006	14	2	2	18		0	1	0
7/1/05-6/30/06	**31**	**9**	**3**	**43**		**0**	**2**	**0**

HEARING DATE	APPRVLS	DENIALS	TABLED	TOTAL	INCOMP.	NON-RESIDENTS		
			**	REVIEWED	***	TABLED	APPRV'D	DENIED
10/4/2006	16	**3**	**2**	21		**0**	1	**0**
3/14/2007	16	1	**2**	19		**0**	1	**0**
7/1/06-6/30/07	**32**	**4**	**4**	**40**		0	**2**	**0**
9/10/2007	26	2	4	32		0	**0**	**0**
3/19/2008	23	**5**	**3**	31		**0**	**0**	**0**
7/1/07-6/30/08	**49**	**7**	**7**	**63**		**0**	**0**	**0**
9/30/2008	39	0	3	42		0	4	0
3/24/2009	44	5	1	50		0	3	0
7/1/08-6/30/09	**83**	**5**	**4**	**92**		**0**	**7**	**0**
10/6/2009	52	6	1	59		0	2	1
3/10/2010	36	2	1	39		0	1	0
6/2/2010	21	3	0	24		0	0	0
7/1/09-6/30/10	**109**	**11**	**2**	**122**		**0**	**3**	**1**
9/21/2010	40	2	1	43		0	2	0
3/24/2011	23	0	0	23		0	4	0
7/1/10-6/30/11	**63**	**2**	**1**	**66**		**0**	**6**	**0**
10/4/2011	39	7	0	46		0	2	0
3/15/2012	28	10	0	38		0	2	0
1/13/2012	1	0	0	1		0	0	0
7/1/11-6/30/12	**68**	**17**	**0**	**85**		**0**	**4**	**0**
9/12/2012	53	7	3	63		0	1	1
3/19/2013	46	2	4	52		0	2	0
7/1/12-6/30/13	**99**	**9**	**7**	**115**		**0**	**3**	**1**
9/18/2013	56	7	0	63		0	2	0
3/19/2014	40	7	1	48		0	0	0
7/1/13-6/30/14	**96**	**14**	**1**	**111**		**0**	**2**	**0**
09/17/2014	32	9	0	41		0	1	0
03/18/2015	25	3	5	33		1	0	0
05/12/2015	4	1	0	5		0	1	0
7/1/14-6/30/15	**61**	**13**	**5**	**79**		**1**	**1**	**0**
10/21/2015	16	4	1	21		0	3	0
03/23/2016	29	2	2	33		0	0	0
7/1/15-6/30/16	**45**	**6**	**3**	**54**		**0**	**3**	**0**
TOTALS ALL	**1,187**	**389**	**120**	**1,696**		**10**	**70**	**9**

**TABLED files are presented again at the next Board meeting for a final decision of approval or denial and are then accounted for in the Approved or Denied categories. TOTAL REVIEWED does not equal total approved or denied because some files are reviewed in multiple meetings (tabled, etc.).

Standard Commercial Fishing License Eligibility Pool Office
Summary of Open Files beginning July 1, 2016

File Description	Total Number of Files
To be researched/ready for the next board meeting	3
New/being processed	0
Pending responses to letters mailed requesting more information	2
Incomplete – no response to letters	0
Total Open/Pending Applications	**5**

Pat McCrory, Governor

Donald R. van der Vaart, Secretary

Release: Immediate	Contact: Patricia Smith
Date: June 21, 2016	Phone: 252-726-7021

Commercial seafood landings increased last year

MOREHEAD CITY – Mild weather allowed North Carolina's commercial fishermen to work into late autumn and early winter in 2015, resulting in more seafood caught and sold for the second year in a row.

Commercial fishermen sold 66 million pounds of finfish and shellfish to seafood dealers last year, 6.8 percent more than in 2014 and higher than the five-year average of 60.5 million pounds. The dockside value of these landings rose slightly to an estimated $95 million, topping the five-year average annual value of $83.8 million.

Most notable among 2015 commercial fishing statistics were increases in shrimp and hard crab landings during the latter months of the year.

Shrimp landings increased by 94 percent in 2015 to 9.1 million pounds, the highest since 2008. Shrimp landings in 2015 had an estimated ex-vessel value (fisherman sale to fish house) of $16.8 million, a 19 percent increase over 2014.

The effects of milder weather can be seen in late-season landings and in fishing effort. November 2015 shrimp landings increased by 307 percent from November 2014, and December 2015 shrimp landings were 10 times the amount of the previous year. The number of shrimp trawl fishing trips taken in December 2015 increased by 642 percent compared to 2014.

Hard blue crab landings increased by 23 percent to 31 million pounds. With an estimated ex-vessel value of $29.5 million, hard blue crab remained atop the list of the state's commercial marine fisheries annual rankings in both pounds caught and sold and dockside value.

Milder weather also impacted late season landings and fishing effort for crab. November 2015 crab landings increased by 198 percent from 2014, and December 2015 landings were 387 percent higher than in 2014. The number of crab pot fishing trips taken in December 2015 increased by 150 percent and resulted in December landings 386.5 percent higher than in 2014.

With the exception of shrimp and crabs, the remaining species in the top five species landed were lower in 2015 than in 2014. Spiny dogfish landings dropped 25 percent to 4.2 million pounds; summer flounder dropped 1 percent to 2.9 million pounds; and Atlantic croaker dropped 31 percent to 1.8 million pounds.

The N.C. Division of Marine Fisheries collects commercial fishing landings statistics through legislatively-mandated reporting of all fisherman to dealer transactions. The Trip Ticket Program began in 1994.

For a full landings report, click on the 2015 Annual Fisheries Bulletin link at http://portal.ncdenr.org/web/mf/marine-fisheries-catch-statistics.

Pat McCrory, Governor

Donald R. van der Vaart, Secretary

Release: Immediate	Contact: Patricia Smith
Date: June 21, 2016	Phone: 252-726-7021

Coastal recreational fishermen hooked more fish in 2015

MOREHEAD CITY – Coastal recreational fishermen hooked more fish in 2015 than they did in 2014.

Anglers brought an estimated 10.2 million fish to the docks in 2015, an increase of 6.8 percent over 2014. The estimated weight of these landings rose by 32 percent to 11.6 million pounds. Anglers also released 6 percent more fish in 2015 than in 2014.

The top five recreational species harvested, by pounds, were dolphin, bluefish, yellowfin tuna, cobia and wahoo. Landings increased for three of these five species.

The number of dolphin taken increased by 132 percent over the previous year to 430,296 fish (3.2 million pounds), the highest since 2011. Recreational wahoo and cobia harvest rose, as well. Anglers hooked 66 percent more wahoo (19,284 fish or 534,787 pounds) and 62 percent more cobia (15,875 fish or 675,859 pounds). Cobia harvests were the highest since 2013 and the average weight of the cobia nearly doubled from 2014 (a fluctuation that is not uncommon from year-to-year).

A likely reason dolphin, wahoo and cobia harvests rose was that fishermen redirected efforts to catch them in the absences of yellowfin tuna harvests. Anglers brought 10.7 percent fewer yellowfin tuna to the docks (24,205 fish or 723,127 pounds).

Rounding out the top five recreational species, bluefish harvests decreased by16 percent to 911,983 fish (769,262 pounds).

Also notable in recreational fisheries, estimated spotted seatrout harvests for 2015 were the lowest on record. One likely contributing factor to the low catches was the back to back cold stuns in 2013 and 2014. The Division of Marine Fisheries closed spotted seatrout harvest Feb. 5 to June 15 in 2014 to allow the fish that survive the cold stun event the maximum chance to spawn in the spring. Another factor may have been the abnormal amount of rainfall in eastern North Carolina in the fall and winter of 2015 that flushed the creeks with freshwater, causing fish to move to higher salinities.

Even though catches were very low, spotted seatrout remained the second highest target species following flounder. Also, while spotted seatrout harvest was down in 2015, estimates of recreational released catch (undersized) were at near record levels.

The Division of Marine Fisheries estimates recreational fishing harvests through broad-based intercept surveys, where port agents talk to fishermen on the beach, at the piers and at boat ramps, and through mail surveys to license holders.

For a full landings report, click on the 2015 Annual Fisheries Bulletin link at http://portal.ncdenr.org/web/mf/marine-fisheries-catch-statistics.

NORTH CAROLINA DIVISION OF MARINE FISHERIES

Annual Fisheries Bulletin

2015 Commercial and Recreational Statistics

License and Statistics Section, PO Box 769, Morehead City, NC 28557 June 2016

The Annual Fisheries Bulletin contains the North Carolina commercial and recreational fisheries harvest statistics for 2015. Included in this bulletin are the 2015 landings and harvest information from the commercial and recreational fisheries programs, along with the 2011 to 2014 landings for comparison. The bulletin also contains a summary of commercial fishing trips by major gears.

The North Carolina Trip Ticket Program collects commercial fishery landings and effort statistics. This program mandates trip level fish dealer reporting of all finfish and shellfish landed in the state. Recreational fishery harvest and effort statistics are derived from the Marine Recreational Information Program (MRIP) that conducts recreational angler interviews at public access points and telephone/mail surveys.

Total Pounds Harvested in 2015

Commercial	Recreational
65,953,991 pounds	11,631,370 pounds

Top Five Species Caught in Each Fishery

Commercial	
Species	**Pounds**
Blue Crabs, Hard	31,047,438
Shrimp (Heads On)	9,097,660
Dogfish, Spiny	4,247,213
Flounder, Summer	2,878,753
Croaker, Atlantic	1,819,066

Recreational	
Species	**Pounds**
Dolphin	3,157,964
Bluefish	769,262
Tuna, Yellowfin	723,127
Cobia	675,859
Wahoo	534,787

Issued by the North Carolina Division of Marine Fisheries, Department of Environmental Quality.

For additional information regarding Commercial and Recreational Statistics, please contact:

Alan Bianchi, Commercial Statistics
252-726-7021 or 800-682-2632
alan.bianchi@ncdenr.gov

Doug Mumford, Recreational Statistics
252-948-3876 or 800-338-7804
doug.mumford@ncdenr.gov

2015 North Carolina Commercial Landings 2015

Issued: June 2016

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Amberjacks[1]	146,498	$161,768
Anglerfish (Monkfish Including Monklivers)	112,863	$106,081
Bluefish	804,336	$445,293
Bonito	20,989	$32,905
Butterfish	62,658	$28,237
Carp	37,791	$3,071
Catfishes	917,965	$262,840
Cobia	52,684	$113,176
Croaker, Atlantic	1,819,066	$1,646,374
Cutlassfish, Atlantic	178,077	$309,752
Dogfish, Smooth	268,429	$98,113
Dogfish, Spiny	4,247,213	$532,180
Dolphinfish	321,300	$975,020
Drum, Black	51,089	$43,146
Drum, Red	80,390	$196,136
Eel, American	57,791	$142,826
Flounder, Southern	1,202,871	$3,823,512
Flounder, Summer	2,878,753	$9,092,527
Flounders, Other	7,638	$26,179
Garfish	37,651	$5,648
Grouper, Gag	127,151	$580,727
Grouper, Red	35,203	$138,453
Grouper, Scamp	36,382	$161,440
Grouper, Snowy	47,121	$184,206
Groupers, Other	15,234	$57,065
Grunts	32,661	$33,198
Hakes	1,407	$685
Harvestfish (Starbutters)	164,046	$221,595
Herring, River (Alewife and Blueback)	0	$0
Hogfish (Hog Snapper)	8,113	$32,992
Jacks (Crevalle and Blue runner)	7,607	$4,692
Mackerel, Atlantic (Boston)	1,861	$796
Mackerel, King	391,774	$801,747
Mackerel, Spanish	561,423	$1,034,243
Menhaden, Atlantic	896,891	$152,237
Mullet, Sea (Kingfishes)	786,515	$860,461
Mullet, Striped	1,247,044	$804,675
Perch, White	161,596	$124,499
Perch, Yellow	41,655	$54,013
Pigfish	20,765	$7,508
Pinfish	845	$304
Pompano	22,085	$39,973
Porgies	54,450	$92,754
Pufferfish	9,578	$5,861
Sharks[2]	795,831	$338,283
Scup	229,696	$130,029
Sea Basses	467,935	$1,366,767

2015 North Carolina Commercial Landings

(continued)

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Seatrout, Spotted	128,762	$318,307
Shad, American	98,118	$93,657
Shad, Gizzard	97,970	$4,899
Shad, Hickory	148,714	$42,916
Sheepshead	124,836	$139,237
Skates	44,848	$8,349
Skippers	16,736	$4,636
Snapper, Red[3]	0	$0
Snapper, Vermilion (Beeliner)	225,479	$781,204
Snappers, Other	6,552	$22,778
Spadefish	15,994	$8,176
Spot	377,358	$322,198
Striped Bass	141,293	$448,639
Swordfish	593,258	$1,277,355
Tilefish	45,354	$135,228
Triggerfish	131,536	$331,805
Tuna, Bigeye	369,347	$1,277,767
Tuna, Bluefin	118,159	$200,380
Tuna, Yellowfin	515,094	$1,191,214
Tunas, Other	152,716	$128,529
Tunny, Little (False Albacore)	165,018	$85,520
Unclassified Fish for Bait	68,023	$8,069
Unclassified Fish for Food	138,485	$107,175
Wahoo	18,380	$65,475
Weakfish (Grey Trout)	80,235	$115,834
TOTAL FINFISH	23,293,184	$32,393,336
SHELLFISH		
Blue Crabs, Hard	31,047,438	$29,633,881
Blue Crabs, Peeler	706,688	$2,106,196
Blue Crabs, Soft	380,375	$2,247,306
Clams, Hard (Meats)	414,991 *(21,124,397 numbers)*	$5,038,539
Oysters (Meats)	631,087 *(119,298 bushels)*	$3,898,358
Octopus	209	$388
Scallop,Sea (Meats)	198,393	$2,213,074
Shrimp (Heads On)[4]	9,097,660	$16,835,205
Squid	25,516	$22,212
Stone Crabs	8,158	$22,925
Unclassified Shellfish	85,070	$168,483
Whelks/Conchs (Meats)	65,221	$137,526
TOTAL SHELLFISH	42,660,807	$62,324,093
GRAND TOTAL	65,953,991	$94,717,429

[1] Includes species from the genus *Seriola* (amberjacks, almaco jacks, and banded rudderfish.)
[2] Includes shark fins and the following sharks: blacknose, blacktip, bonnethead, bull, finetooth, hammerhead, shortfin mako, spinner, thresher, tiger, and Atlantic sharpnose.
[3] The red snapper fishery closed on January 4, 2010 with restricted openings occurring in some years.
[4] Includes brown, pink, white and rock shrimp.
* Units and value not shown to avoid disclosure of private enterprise.

2014 North Carolina Commercial Landings 2014

Updated: June 1, 2016

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Amberjacks[1]	193,001	$198,899
Anglerfish (Monkfish Including Monklivers)	76,392	$85,364
Bluefish	2,019,279	$889,710
Bonito	9,081	$14,386
Butterfish	53,607	$27,287
Carp	16,435	$1,555
Catfishes	521,267	$158,435
Cobia	41,798	$87,931
Croaker, Atlantic	2,629,908	$1,865,595
Cutlassfish, Atlantic	165,375	$221,870
Dogfish, Smooth	498,904	$213,763
Dogfish, Spiny	5,650,285	$566,615
Dolphinfish	423,676	$1,242,648
Drum, Black	51,217	$32,298
Drum, Red	90,647	$208,288
Eel, American	60,755	$164,797
Flounder, Southern	1,673,511	$4,839,672
Flounder, Summer	2,911,750	$8,225,282
Flounders, Other	4,413	$8,926
Garfish	10,621	$3,611
Grouper, Gag	168,036	$739,793
Grouper, Red	53,096	$202,112
Grouper, Scamp	42,207	$187,776
Grouper, Snowy	27,553	$102,830
Groupers, Other	9,125	$33,799
Grunts	39,312	$40,117
Hakes	652	$293
Harvestfish (Starbutters)	155,357	$187,901
Herring, River (Alewife and Blueback)	989	$1,319
Hogfish (Hog Snapper)	9,767	$37,920
Jacks (Crevalle and Blue runner)	9,151	$6,220
Mackerel, Atlantic (Boston)	1,761	$658
Mackerel, King	549,981	$1,203,503
Mackerel, Spanish	673,974	$1,230,410
Menhaden, Atlantic	917,375	$145,587
Mullet, Sea (Kingfishes)	955,071	$1,007,496
Mullet, Striped	1,828,351	$1,112,465
Perch, White	172,293	$148,576
Perch, Yellow	67,454	$82,336
Pigfish	38,572	$15,334
Pinfish	1,431	$561
Pompano	12,923	$31,176
Porgies	82,809	$145,061
Pufferfish	1,611	$886
Sharks[2]	1,005,858	$473,375
Scup	160,508	$110,203
Sea Basses	529,075	$1,413,708

2014 North Carolina Commercial Landings

(continued)

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Seatrout, Spotted	242,245	$579,343
Shad, American	193,130	$160,977
Shad, Gizzard	113,841	$5,692
Shad, Hickory	109,407	$27,394
Sheepshead	173,376	$159,274
Skates	18,907	$6,137
Skippers	19,884	$5,207
Snapper, Red[3]	4,826	$23,007
Snapper, Vermilion (Beeliner)	242,259	$829,916
Snappers, Other	4,002	$11,695
Spadefish	22,761	$10,652
Spot	766,224	$619,643
Striped Bass	96,233	$283,241
Swordfish	694,911	$2,109,549
Tilefish	91,074	$238,808
Triggerfish	116,782	$262,199
Tuna, Bigeye	337,269	$1,222,610
Tuna, Bluefin	114,037	$375,975
Tuna, Yellowfin	816,077	$1,798,031
Tunas, Other	155,033	$115,186
Tunny, Little (False Albacore)	225,797	$107,605
Unclassified Fish for Bait	24,635	$4,196
Unclassified Fish for Food	122,116	$132,944
Wahoo	22,715	$71,612
Weakfish (Grey Trout)	105,246	$140,573
TOTAL FINFISH	29,448,997	$37,019,811
SHELLFISH		
Blue Crabs, Hard	25,242,648	$29,954,605
Blue Crabs, Peeler	621,040	$1,935,462
Blue Crabs, Soft	367,277	$2,137,335
Clams, Hard (Meats)	430,816	$2,866,096
	(22,440,617 numbers)	
Oysters (Meats)	727,775	$4,544,236
	(137,576 bushels)	
Octopus	217	$276
Scallop, Sea (Meats)	92,976	$1,011,221
Shrimp (Heads On)[4]	4,691,067	$14,145,616
Squid	16,156	$13,493
Stone Crabs	7,451	$19,882
Unclassified Shellfish	74,081	$146,515
Whelks/Conchs (Meats)	53,546	$112,102
TOTAL SHELLFISH	32,325,043	$56,886,801
GRAND TOTAL	61,774,040	$93,906,612

[1] Includes species from the genus *Seriola* (amberjacks, almaco jacks, and banded rudderfish.)
[2] Includes shark fins and the following sharks: blacktip, bonnethead, bull, finetooth, hammerhead, shortfin mako, spinner, thresher, tiger, and Atlantic sharpnose.
[3] The red snapper fishery closed on January 4, 2010 with restricted openings occurring in some years.
[4] Includes brown, pink, white and rock shrimp.
* Units and value not shown to avoid disclosure of private enterprise.

2013 North Carolina Commercial Landings 2013

Updated: June 1, 2016

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Amberjacks[1]	90,180	$90,035
Anglerfish (Monkfish Including Monklivers)	10,566	$9,053
Bluefish	1,159,580	$564,377
Bonito	10,506	$15,460
Butterfish	93,146	$53,369
Carp	14,133	$1,360
Catfishes	548,913	$92,497
Cobia	35,456	$73,142
Croaker, Atlantic	1,927,938	$1,723,578
Cutlassfish, Atlantic	145,362	$204,869
Dogfish, Smooth	783,053	$344,182
Dogfish, Spiny	3,010,958	$302,248
Dolphinfish	178,922	$534,228
Drum, Black	127,170	$79,480
Drum, Red	371,949	$715,685
Eel, American	33,980	$88,649
Flounder, Southern	2,186,273	$5,672,904
Flounder, Summer	541,661	$1,386,627
Flounders, Other	*	*
Garfish	5,893	$1,208
Grouper, Gag	167,334	$704,382
Grouper, Red	72,259	$259,861
Grouper, Scamp	42,711	$180,679
Grouper, Snowy	20,274	$72,067
Groupers, Other	8,856	$31,637
Grunts	44,702	$47,062
Hakes	614	$231
Harvestfish (Starbutters)	221,168	$253,604
Herring, River (Alewife and Blueback)	743	$743
Hogfish (Hog Snapper)	7,847	$30,640
Jacks (Crevalle and Blue runner)	14,492	$10,639
Mackerel, Atlantic (Boston)	154	$61
Mackerel, King	345,177	$877,497
Mackerel, Spanish	620,752	$1,015,965
Menhaden, Atlantic	454,172	$73,490
Mullet, Sea (Kingfishes)	603,186	$668,480
Mullet, Striped	1,549,157	$1,402,914
Perch, White	275,652	$255,633
Perch, Yellow	31,481	$40,546
Pigfish	62,099	$28,093
Pinfish	1,536	$463
Pompano	15,423	$41,351
Porgies	72,671	$116,780
Pufferfish	5,846	$2,858
Sharks[2]	553,665	$282,318
Scup	28,691	$13,323
Sea Basses	329,731	$868,920

2013 North Carolina Commercial Landings

(continued)

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Seatrout, Spotted	367,610	$818,078
Shad, American	257,869	$307,475
Shad, Gizzard	112,295	$4,492
Shad, Hickory	71,326	$29,144
Sheepshead	180,225	$145,794
Skates	2,286	$429
Skippers	15,780	$4,652
Snapper, Red[3]	2,686	$11,942
Snapper, Vermilion (Beeliner)	267,260	$886,596
Snappers, Other	6,587	$19,449
Spadefish	20,369	$9,246
Spot	768,592	$690,035
Striped Bass	96,935	$303,486
Swordfish	1,058,089	$2,935,940
Tilefish	217,079	$522,652
Triggerfish	160,861	$342,228
Tuna, Bigeye	243,637	$939,909
Tuna, Bluefin	106,197	$608,952
Tuna, Yellowfin	648,039	$1,434,318
Tunas, Other	96,937	$113,429
Tunny, Little (False Albacore)	189,746	$114,416
Unclassified Fish for Bait	24,389	$2,565
Unclassified Fish for Food	119,041	$116,451
Wahoo	23,380	$75,577
Weakfish (Grey Trout)	120,188	$150,725
TOTAL FINFISH	22,003,433	$29,821,170
SHELLFISH		
Blue Crabs, Hard	21,438,077	$26,465,523
Blue Crabs, Peeler	447,120	$1,449,542
Blue Crabs, Soft	317,426	$2,091,382
Clams, Hard (Meats)	347,073	$2,295,366
	(17,855,759 numbers)	
Oysters (Meats)	586,625	$3,353,126
	(110,893 bushels)	
Octopus	1,205	$2,069
Scallop, Sea (Meats)	36,445	$402,717
Shrimp (Heads On)[4]	4,859,833	$12,947,004
Squid	12,090	$10,703
Stone Crabs	6,839	$18,479
Unclassified Shellfish	91,283	$124,799
Whelks/Conchs (Meats)	50,079	$123,236
TOTAL SHELLFISH	28,194,093	$49,283,945
GRAND TOTAL	50,197,526	$79,105,116

[1] Includes species from the genus *Seriola* (amberjacks, almaco jacks, and banded rudderfish.)
[2] Includes shark fins and the following sharks: blacktip, bonnethead, bull, finetooth, hammerhead, shortfin mako, spinner, thresher, tiger, and Atlantic sharpnose.
[3] The red snapper fishery closed on January 4, 2010 with restricted openings occurring in some years.
[4] Includes brown, pink, white and rock shrimp.
* Units and value not shown to avoid disclosure of private enterprise.

2012 North Carolina Commercial Landings 2012

Updated: June 1, 2016

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Amberjacks[1]	124,325	$104,212
Anglerfish (Monkfish Including Monklivers)	21,649	$25,286
Bluefish	758,858	$349,288
Bonito	11,343	$15,833
Butterfish	127,536	$65,553
Carp	6,199	$586
Catfishes	489,492	$116,379
Cobia	31,972	$61,603
Croaker, Atlantic	3,106,616	$2,135,458
Cutlassfish, Atlantic	50,867	$61,601
Dogfish, Smooth	980,275	$379,946
Dogfish, Spiny	2,728,882	$640,820
Dolphinfish	249,020	$756,346
Drum, Black	94,352	$54,133
Drum, Red	66,519	$138,833
Eel, American	64,110	$160,275
Flounder, Southern	1,646,137	$4,451,482
Flounder, Summer	1,090,218	$2,969,370
Flounders, Other	0	$0
Garfish	18,490	$2,339
Grouper, Gag	187,483	$758,371
Grouper, Red	111,781	$363,767
Grouper, Scamp	49,556	$195,370
Grouper, Snowy	25,740	$78,235
Groupers, Other	7,542	$26,152
Grunts	49,734	$50,044
Hakes	280	$100
Harvestfish (Starbutters)	161,751	$202,146
Herring, River (Alewife and Blueback)	678	$678
Hogfish (Hog Snapper)	8,256	$28,738
Jacks (Crevalle and Blue runner)	16,200	$13,414
Mackerel, Atlantic (Boston)	1,374	$567
Mackerel, King	297,423	$831,297
Mackerel, Spanish	916,439	$1,374,648
Menhaden, Atlantic	538,783	$82,974
Mullet, Sea (Kingfishes)	596,249	$645,607
Mullet, Striped	1,859,587	$1,041,659
Perch, White	189,448	$150,940
Perch, Yellow	20,511	$23,446
Pigfish	37,555	$19,834
Pinfish	1,017	$257
Pompano	22,525	$43,376
Porgies	83,918	$132,025
Pufferfish	5,531	$2,799
Sharks[2]	701,924	$376,171
Scup	3,954	$2,768
Sea Basses	256,007	$687,905

2012 North Carolina Commercial Landings

(continued)

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Seatrout, Spotted	265,016	$522,130
Shad, American	235,861	$257,748
Shad, Gizzard	123,813	$4,333
Shad, Hickory	65,645	$22,389
Sheepshead	109,881	$92,837
Skates	5,738	$1,433
Skippers	21,998	$5,804
Snapper, Red[3]	445	$1,898
Snapper, Vermilion (Beeliner)	276,172	$889,691
Snappers, Other	2,751	$8,036
Spadefish	24,238	$9,043
Spot	489,676	$465,750
Striped Bass	144,555	$368,516
Swordfish	903,178	$3,009,107
Tilefish	361,094	$753,966
Triggerfish	143,114	$278,968
Tuna, Bigeye	232,943	$1,036,747
Tuna, Bluefin	130,496	$1,017,958
Tuna, Yellowfin	855,006	$2,130,454
Tunas, Other	105,893	$123,039
Tunny, Little (False Albacore)	157,849	$89,798
Unclassified Fish for Bait	34,775	$7,615
Unclassified Fish for Food	111,190	$111,452
Wahoo	23,521	$73,998
Weakfish (Grey Trout)	91,383	$111,461
TOTAL FINFISH	22,734,334	$31,016,802
SHELLFISH		
Blue Crabs, Hard	25,991,387	$20,198,891
Blue Crabs, Peeler	468,855	$1,112,025
Blue Crabs, Soft	325,426	$1,496,021
Clams, Hard (Meats)	396,429	$2,091,067
	(20,074,457 numbers)	
Oysters (Meats)	440,063	$2,572,073
	(83,188 bushels)	
Octopus	248	$382
Scallop, Sea (Meats)	58,882	$567,230
Shrimp (Heads On)[4]	6,141,480	$13,333,150
Squid	11,921	$10,885
Stone Crabs	5,221	$17,125
Unclassified Shellfish	77,602	$79,721
Whelks/Conchs (Meats)	39,078	$75,705
TOTAL SHELLFISH	33,956,592	$41,554,275
GRAND TOTAL	50,928,418	$80,300,692

[1] Includes species from the genus *Seriola* (amberjacks, almaco jacks, and banded rudderfish.)

[2] Includes shark fins and the following sharks: blacktip, hammerhead, lemon, shortfin mako, thresher, and Atlantic sharpnose.

[3] The red snapper fishery closed on January 4, 2010 with restricted openings occurring in some years.

[4] Includes brown, pink, white and rock shrimp.

* Units and value not shown to avoid disclosure of private enterprise.

2011 North Carolina Commercial Landings 2011

Updated June 1, 2016

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Amberjacks[1]	72,797	$62,815
Anglerfish (Monkfish Including Monklivers)	38,892	$48,702
Bluefish	1,897,408	$848,327
Bonito	11,039	$20,041
Butterfish	59,951	$31,176
Carp	24,367	$2,485
Catfishes	444,445	$85,039
Cobia	19,924	$34,908
Croaker, Atlantic	5,054,186	$3,164,034
Cutlassfish, Atlantic	8,439	$9,397
Dogfish, Smooth	1,241,252	$401,178
Dogfish, Spiny	2,557,923	$383,748
Dolphinfish	94,210	$244,752
Drum, Black	56,083	$26,432
Drum, Red	91,980	$166,966
Eel, American	61,960	$123,920
Flounder, Southern	1,247,450	$2,753,128
Flounder, Summer	2,854,122	$6,136,614
Flounders, Other	*	*
Garfish	25,933	$2,334
Grouper, Gag	201,467	$790,710
Grouper, Red	154,277	$481,431
Grouper, Scamp	37,321	$143,336
Grouper, Snowy	8,999	$24,680
Groupers, Other	6,454	$22,869
Grunts	33,443	$34,344
Hakes	873	$591
Harvestfish (Starbutters)	106,660	$102,927
Herring, River (Alewife and Blueback)	1,611	$1,611
Hogfish (Hog Snapper)	10,793	$37,688
Jacks (Crevalle and Blue runner)	1,068	$706
Mackerel, Atlantic (Boston)	6,512	$3,286
Mackerel, King	408,162	$1,062,081
Mackerel, Spanish	871,217	$1,188,154
Menhaden, Atlantic	3,529,967	$336,528
Mullet, Sea (Kingfishes)	486,853	$520,413
Mullet, Striped	1,627,894	$1,015,852
Octopus	327	$501
Perch, White	245,636	$223,248
Perch, Yellow	27,838	$38,554
Pigfish	39,838	$12,838
Pinfish	905	$252
Pompano	17,016	$42,724
Porgies	90,792	$133,648
Pufferfish	1,490	$916
Sharks[2]	584,238	$327,802
Scup	308,907	$126,875
Sea Basses	272,280	$627,825

2011 North Carolina Commercial Landings

(continued)

	POUNDS (Whole/Round Weight)	VALUE
FINFISH		
Seatrout, Spotted	75,239	$144,596
Shad, American	204,085	$182,894
Shad, Gizzard	101,025	$5,051
Shad, Hickory	85,096	$23,607
Sheepshead	120,976	$90,068
Skates	19,204	$7,730
Skippers	24,510	$6,594
Snapper, Red[3]	0	$0
Snapper, Vermilion (Beeliner)	323,389	$997,623
Snappers, Other	2,982	$7,077
Spadefish	21,535	$6,839
Spot	936,970	$728,475
Striped Bass	410,685	$1,164,426
Swordfish	803,725	$2,617,201
Tilefish	133,824	$314,600
Triggerfish	220,204	$411,373
Tuna, Bigeye	277,659	$1,094,276
Tuna, Bluefin	48,358	$270,637
Tuna, Yellowfin	526,238	$944,099
Tunas, Other	76,661	$68,578
Tunny, Little (False Albacore)	131,549	$66,986
Unclassified Fish for Bait	55,218	$9,304
Unclassified Fish for Food	113,326	$145,410
Wahoo	15,870	$44,685
Weakfish (Grey Trout)	65,897	$78,522
TOTAL FINFISH	29,739,093	$31,278,533
SHELLFISH		
Blue Crabs, Hard	28,964,633	$18,016,736
Blue Crabs, Peeler	624,362	$1,186,286
Blue Crabs, Soft	446,397	$2,079,242
Clams, Hard (Meats)	295,466 *(15,088,757 numbers)*	$1,896,627
Oysters (Meats)	800,543 *(151,331 bushels)*	$4,486,741
Octopus	327	$501
Scallop, Sea (Meats)	91,077	$883,772
Shrimp (Heads On)[4]	5,140,360	$10,885,795
Squid	1,267,192	$291,060
Stone Crabs	7,630	$21,926
Unclassified Shellfish	90,932	$83,407
Whelks/Conchs (Meats)	34,002	$73,456
TOTAL SHELLFISH	37,762,594	$39,905,049
GRAND TOTAL	67,502,014	$71,184,083

[1] Includes species from the genus *Seriola* (amberjacks, almaco jacks, and banded rudderfish.)

[2] Includes shark fins and the following sharks: blacktip, bull, hammerhead, shortfin mako, sandbar, thresher, tiger, and Atlantic sharpnose.

[3] The red snapper fishery closed on January 4, 2010 with restricted openings occurring in some years.

[4] Includes brown, pink, white and rock shrimp.

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North Carolina Commercial Fishing Trips by Major Gears

(2011 – 2015)

	Trips				
Gear	**2011**	**2012**	**2013**	**2014**	**2015**
Beach Seine	102	68	57	21	23
By Hand	15,931	15,188	16,446	18,019	17,154
Cast Net	612	804	703	627	690
Channel Net	538	1,508	1,626	1,078	968
Clam Dredges	400	492	344	388	251
Clam Trawl Kicking	286	188	180	155	74
Crab Dredge	69	4	1	3	14
Crab Pot	48,144	48,039	48,120	50,526	51,749
Crab Trawl	228	21	85	180	470
Eel Pot	93	177	70	143	97
Fish Pot	538	613	623	678	583
Flounder Trawl	344	108	71	257	276
Flynet	190	14	4	40	11
Fyke Net	266	329	424	404	639
Gigs	2,183	3,148	2,585	2,804	2,739
Gill Net – Anchored	30,072	31,258	36,948	27,940	23,440
Gill Net – Drift	182	392	236	296	401
Gill Net – Runaround	2,606	3,589	3,785	3,379	3,252
Haul Seines[1]	369	177	273	204	45
Longlines	529	578	719	634	519
Oyster Dredge	7,400	2,264	3,763	5,705	4,031
Peeler Pot	2,908	3,516	3,334	4,006	4,743
Peeler Trawl[2]	41	24	29	26	21
Pound Nets	2,267	2,697	2,625	2,356	2,850
Rakes	9,437	9,403	9,988	11,779	12,488
Rod-n-Reel	1,986	2,151	2,066	2,266	1,991
Shrimp Trawl	4,372	6,195	5,650	4,598	6,053
Skimmer Trawl	330	1,088	1,194	712	1,035
Spears (Diving)	57	134	159	195	167
Tongs	6,020	5,527	4,092	3,896	3,688
Trolling	1,866	1,888	2,184	2,245	1,905
Trotline	20	50	38	49	39
Other Gears[3]	89	94	238	169	166
Total trips [4]	140,475	141,726	148,660	145,778	142,572

A **trip** is defined as the time period beginning when a vessel or fisherman leaves port to conduct fishing activities and ending when that vessel or fisherman returns to land the catch. The duration of a trip can vary from a few hours, as in hand clamming, to several days, as in ocean flounder trawling. An assessment of the number of trips gives an indication of the amount of effort conducted by commercial fishermen within that fishery.

[1] Includes long hauls, common seines, and swipe nets.
[2] A new code to distinguish peeler trawl gear was put into effect in 2010.
[3] Includes greenstick trolling, butterfly nets, conch pots, dip nets, purse seines, bay scallop dredges, scallop scoops and trawls, shrimp pots and turtle pots.
[4] Total trips are not equal to the sum of trips by gear due to multi-gear trips.

Source: North Carolina Division of Marine Fisheries Trip Ticket Program (May 2016).

North Carolina Marine Recreational Finfish Harvest

(2014 – 2015)

SPECIES	NUMBER 2014	NUMBER 2015	POUNDS 2014	POUNDS 2015
Amberjacks	3,098	9,878	60,260	235,760
Barracudas	852	2,037	10,737	12,455
Bluefish	1,084,292	911,983	966,003	769,262
Bonito	6,700	5,513	30,988	34,692
Cobia	9,804	15,875	247,386	675,859
Croaker, Atlantic	541,657	463,867	227,949	187,590
Dolphin	185,077	430,296	1,329,353	3,157,964
Drum, Red	116,601	36,170	596,447	186,040
Drum, Black	24,058	35,053	60,406	108,279
Flounder, Southern	69,956	106,420	149,723	236,416
Flounder, Summer	45,708	39,827	67,791	63,096
Groupers	1,729	1,573	18,973	21,603
Grunts	26,257	24,108	39,265	32,545
Jacks	8,871	21,554	28,167	25,556
Kingfishes	1,143,212	1,430,478	451,073	471,500
Mackerel, King	23,374	34,327	366,128	279,898
Mackerel, Spanish	398,398	382,619	449,709	421,121
Perch, Silver	11,519	4,758	2,519	964
Pigfish	293,523	489,571	83,741	167,935
Pinfish	332,185	325,117	74,085	112,981
Pompano	166,888	141,408	83,190	72,065
Porgies	7,812	6,966	15,657	8,403
Puffers	49,269	1,069,543	25,416	470,115
Sea Bass, Black	74,648	66,423	132,351	91,445
Seatrout, Spotted	234,045	96,430	433,978	168,533
Sharks	3,340	5,569	23,102	88,050
Sharks, Dogfish	853	8,905	4,296	42,748
Sheepshead	61,379	75,119	143,782	216,307
Snappers	9,110	13,083	15,017	16,931
Spot	2,111,880	1,035,020	704,445	375,642
Striped Bass[1]	0	0	0	0
Tuna, Bluefin[2]	69	44	14,492	7,747
Tuna, Yellowfin	27,248	24,306	873,536	723,127
Wahoo	11,639	19,284	322,468	534,787
Weakfish	26,308	39,103	25,957	43,141

[1] Striped Bass landings reflect Atlantic Ocean catches only.

[2] Landings for Atlantic Bluefin Tuna (ABT) reflect the Highly Migratory Species fishing year (January 1 through December 31).

NOTE: The number and pounds of finfish listed represent estimated harvest; finfish released alive are not included. Headboat landings are not included but are available upon request from NOAA Beaufort Lab's Southeast Region Headboat Survey.

North Carolina Marine Recreational Finfish Harvest

(2011 – 2013)

SPECIES	NUMBER 2011	NUMBER 2012	NUMBER 2013	POUNDS 2011	POUNDS 2012	POUNDS 2013
Amberjacks	5,752	8,976	10,078	112,991	154,734	172,647
Barracudas	916	683	224	10,882	8,535	1,276
Bluefish	1,152,105	888,888	1,183,627	999,240	1,010,575	988,664
Bonito	11,144	4,281	9,219	147,403	38,551	133,163
Cobia	4,478	2,050	19,224	145,796	104,106	506,067
Croaker, Atlantic	246,676	288,813	411,882	99,298	105,530	141,880
Dolphin	472,174	327,116	212,388	3,538,922	2,559,382	1,562,755
Drum, Red	45,143	52,948	164,218	212,245	238,312	676,050
Drum, Black	211,396	139,363	363,466	151,407	243,965	713,047
Flounder, Southern	152,557	118,614	178,178	380,158	298,043	409,086
Flounder, Summer	60,422	63,135	44,941	100,543	101,642	70,874
Groupers	9,676	10,198	5,390	107,853	126,567	54,418
Grunts	27,490	62,734	16,374	44,214	95,724	26,769
Jacks	15,548	19,239	25,164	25,712	20,463	24,835
Kingfishes	587,151	1,050,826	1,377,835	246,886	383,427	343,454
Mackerel, King	14,220	27,353	22,613	180,014	333,614	235,436
Mackerel, Spanish	367,086	491,238	497,329	470,541	665,201	625,035
Perch, Silver	33,909	22,053	13,345	6,261	3,988	2,366
Pigfish	225,472	334,052	299,065	73,538	117,021	101,014
Pinfish	143,300	259,674	355,871	27,601	40,471	61,148
Pompano	122,819	107,260	471,156	47,406	57,882	171,860
Porgies	6,683	15,857	8,460	11,117	26,249	16,720
Puffers	156,916	268,515	209,770	91,384	134,113	126,039
Sea Bass, Black	95,004	75,638	49,258	143,234	127,621	68,225
Seatrout, Spotted	215,922	500,522	369,265	403,517	817,551	649,158
Sharks	5,831	2,350	13,426	21,241	44,170	20,386
Sharks, Dogfish	4,334	316	4,986	12,086	1,454	10,143
Sheepshead	66,689	119,899	273,211	180,145	293,570	500,096
Snappers	13,376	27,822	9,852	25,167	60,163	14,013
Spot	1,207,335	784,272	1,464,592	410,317	230,250	460,928
Striped bass[1]	94,182	0	0	2,042,981	0	0
Tuna, Bluefin[2]	329	189	201	53,941	31,861	40,979
Tuna, Yellowfin	25,039	57,100	44,688	811,673	1,579,260	1,441,122
Wahoo	14,798	30,885	9,370	396,775	854,568	255,306
Weakfish	13,464	40,299	33,851	17,621	46,081	34,731

[1] Striped bass landings reflect Atlantic Ocean catches only.

[2] Landings for Atlantic Bluefin Tuna represent Highly Migratory Species fishing year January 1 through December 31.

NOTE: The number and pounds of finfish listed represent estimated harvest; finfish released alive are not included. Headboat landings are not included but are available upon request from NOAA Beaufort Lab's Southeast Region Headboat Survey.

North Carolina Coastal Angling Program

North Carolina Marine Recreational Finfish Harvest and Release Catch Estimates

Year	Number Harvested	Pounds Harvested	Number Released
2011	8,564,946	13,240,808	15,865,229
2012	8,472,954	12,059,556	18,536,492
2013	11,479,525	11,968,710	20,963,650
2014	9,572,612	8,788,702	19,765,129
2015	10,222,704	11,631,370	20,934,805

North Carolina Marine Recreational Fishing Trip Estimates (number)

Year	Beach/Bank	Charter Boat	Manmade	Private Boat	Total
2011	1,404,886	151,681	1,284,670	1,898,507	4,739,744
2012	1,599,759	160,097	1,482,635	2,060,989	5,303,480
2013	1,212,558	111,366	1,543,314	2,100,515	4,967,753
2014	1,665,273	96,620	1,484,850	1,707,330	4,954,073
2015	1,187,482	114,521	1,298,254	2,006,268	4,606,525

Coastal Recreational Fishing License (CRFL) Sales by Residency, 2011 - 2015.

Year	In State	Out-of-State	Total
2011	289,925	149,321	439,246
2012	304,840	155,457	460,297
2013	317,650	162,351	480,001
2014	320,662	165,623	486,285
2015	316,380	164,474	480,854
Grandfathered[1]	250,239	6,460	256,699

[1] All lifetime inland state fishing licenses sold prior to 2007 were grandfathered into the new CRFL requirement on January 01, 2007.

Survey Methods

The survey consists of telephone/mail and on-site angler interviews. Telephone/mail interviews are used to collect data on number of trips, fishing location, and when these trips were made. Information on actual catch (species, number, weight, and length) is collected through on-site angler interviews. Information from both types of interviews is combined to produce estimates of total number and pounds of finfish caught.

Precision of Estimates

Numbers and pounds presented are estimates, not actual counts, therefore having varying levels of precision.

Coastal recreational fishery statistics are provided through participation in the Marine Recreational Information Program. In North Carolina, this project is supported in part by the U.S. Fish and Wildlife Service through the Sport Fish Restoration Program, Grant F-31.

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **SSR 8-16**

TO: Marine Fisheries Commission

FROM: Lee Paramore, Fisheries Management Section

SUBJECT: 2016 Stock Status Report

Attached is the Division of Marine Fisheries' 2016 Stock Status Report. This annual report is intended to serve as an overview of the overall health of North Carolina's fisheries resources. The information contained in the stock status report is used to prioritize development of state fishery management plans and subsequent plan reviews. In the 2016 report, there were no changes to any species under state fishery management plans. One species, summer flounder, listed under the Interjurisdictional Fishery Management Plan, moved from "viable" to "concern."

The downgrade to "concern" for summer flounder was based on the 2015 National Marine Fisheries Service Northeast Fisheries Center benchmark stock assessment for U.S. waters north of Cape Hatteras. The assessment indicated that the stock was not overfished but that overfishing was occurring. To prevent overfishing, the annual Acceptable Biological Catch for this species was lowered by 29 percent in 2016 to 16.26 million pounds. North Carolina receives 27.4 percent of the Acceptable Biological Catch.

The complete 2016 Stock Status Report can be found on the division's website at http://portal.ncdenr.org/web/mf/stock-status-reports. Attached is a table that summarizes the report and includes information about which fisheries management authorities manage the stock in parenthesis under each species name. It is intended to help the public better understand the various state and federal management agencies involved in the management of many of North Carolina's fisheries.

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Stock Status Report 2016

(Based on 2015 statistics)

Species and Stock	Status					
Bass, Black, Sea						
	Viable	Recovering	Concern	Depleted	Unknown	Comments
 North of Hatteras Species managed by Atlantic States Marine Fisheries Commission and by Mid-Atlantic Fishery Management Council						The stock was declared rebuilt in 2009 based on a 2008 stock assessment. However, due to unique life history characteristics (e.g., the species changes sex from female to male) and other data concerns, the 2011 and 2012 assessments were not formally accepted for stock status determination. From 2010 to 2015, black sea bass have been managed under a constant catch approach. In a departure from this strategy, the Atlantic States Marine Fisheries Commission and Mid-Atlantic Fishery Management Council recently approved a 21-percent increase in the Acceptable Biological Catch for 2016 and 2017. The increase is based on updated catch and survey information. A new benchmark stock assessment is scheduled for late 2016.
 South of Hatteras Species managed by South Atlantic Fishery Management Council						Black sea bass, south of Hatteras, are part of the the South Atlantic Fishery Management Council's snapper grouper complex. The stock is recovered and considered viable after going through a federally-managed rebuilding plan, which went into place in 2006. The 2013 stock assessment indicated the stock is not overfished and had met the rebuilding plan's target prior to its 2016 deadline.

Bass, Striped						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Albemarle Sound and Roanoke River Species managed by North Carolina Division of Marine Fisheries, North Carolina Wildlife Resources Commission and by Atlantic States Marine Fisheries Commission						The 2014 Albemarle/Roanoke striped bass benchmark stock assessment indicates the resource is not overfished or experiencing overfishing relative to new reference points. Although the stock is not overfished, female spawning stock biomass has declined steadily since its peak in 2003. Landings in all sectors have also continued to decline since the peak in 2004. Fishing mortality is estimated at just above the target.
 Atlantic Ocean Migratory Stock Species managed by Atlantic States Marine Fisheries Commission						The 2015 Atlantic striped bass stock assessment update indicates the resource is not overfished or experiencing overfishing. Although the stock is not overfished, female spawning stock biomass has continued to decline since the peak in 2006. Spawning stock biomass remains above the threshold that would require management action.
 Central/Southern Species managed by North Carolina Division of Marine Fisheries and by North Carolina Wildlife Resources Commission						The lack of adequate data causes the Central Southern Management Area stocks to be quantitatively assessed as unknown and listed as “concern.” The need for continued conservation management efforts is supported by the truncated size and age distributions, low overall abundance, and the absence of older fish in spawning ground surveys.
Bluefish						

	Viable	Recovering	Concern	Depleted	Unknown	Comments
 Bluefish Species managed by Atlantic States Marine Fisheries Commission and by Mid-Atlantic Fishery Management Council						A new benchmark stock assessment, completed in 2015, indicates that bluefish are not experiencing overfishing and are not overfished. The Atlantic States Marine Fisheries Commission Bluefish Technical Committee continues to work on improving bluefish age data and refining the bluefish stock assessment.
Croaker, Atlantic						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Croaker, Atlantic Species managed by Atlantic States Marine Fisheries Commission						Based on the results of the 2010 stock assessment, Atlantic croaker is not experiencing overfishing. Estimates of spawning stock biomass were too uncertain to precisely determine overfished stock status. However, given that biomass was increasing and the age structure of the population has been expanding since the late 1980s, it is unlikely the stock is in trouble. The Atlantic croaker Traffic Light Analysis, used to monitor the stock between stock assessments, did not indicate management action is needed at this time. However, analysis shows declining trends in indexes of abundance and commercial and recreational harvest. The next benchmark stock assessment is scheduled for completion in late 2016..
Dolphin						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Dolphin						The status of dolphin is based on trends in landings data. The South Atlantic Fishery Management Council's Dolphin Wahoo Fishery Management Plan is currently

Species managed by South Atlantic Fishery Management Council						managed under recent Amendment 8 (2016). Amendment 8 revises commercial and recreational sector allocations for dolphin in the Atlantic.
Drum						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Drum, Black (D) Species managed by Atlantic States Marine Fisheries Commission						The 2015 Atlantic States Marine Fisheries Commission Black Drum Stock Assessment determined that the stock is not overfished and not experiencing overfishing. Based on the results of the stock assessment, the median biomass was estimated to be well above the median biomass that produces maximum sustainable yield, thus no additional management measures are needed beyond those established in the 2013 Atlantic States Marine Fisheries Commission fishery management plan.
 Drum, Red Species managed by North Carolina Division of Marine Fisheries and by Atlantic States Marine Fisheries Commission						The regional benchmark stock assessment (North Carolina and all states north), conducted by the Atlantic States Marine Fisheries Commission in 2009, indicated that regulations have been effective at preventing overfishing. However, the overfished status for the stock remains undetermined. A new benchmark stock assessment aimed at determining the overfished status, scheduled for completion in the fall of 2015, has been delayed until the fall of 2016.
Eel, American						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Eel, American						The stock was declared depleted by the 2012 Atlantic States Marine Fisheries Commission benchmark stock assessment. Stock status is poorly understood due to

Species managed by Atlantic States Marine Fisheries Commission						non– standard sampling protocols across the species' range. Reliable indexes of abundance of this species are scarce. The Atlantic States Marine Fisheries Commission approved Addendum IV to the American Eel Interjurisdictional Fishery Management Plan to address issues with the glass eel fishery, glass eel aquaculture and establish a coast-wide catch cap for yellow eels.
Flounder						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Flounder, Southern Species managed by North Carolina Division of Marine Fisheries						The Division of Marine Fisheries 2014 stock assessment of southern flounder in North Carolina Waters was not approved for management due to mixing of the stock on a regional scale (i.e. the U.S. South Atlantic). There are concerns about the sustainability of current harvest levels due to coastwide trends in juvenile and adult abundance and the high percentage of immature fish in the harvest. A regional stock assessment is underway including partners from Florida, Georgia, South Carolina and North Carolina and is scheduled to be completed in 2017.
 Flounder, Summer Species managed by Atlantic States Marine Fisheries Commission and by Mid-Atlantic Fishery Management Council						The 2015 National Marine Fisheries Service's Northeast Fisheries Science Center benchmark stock assessment for U.S. waters north of Cape Hatteras indicated the stock was not overfished but overfishing was occurring. The annual fishing mortality rate was estimated to be 16 percent above the overfishing threshold in 2014. As a result of the overfishing status, the Acceptable Biological Catch in 2016 was reduced by approximately 29 percent.

Grouper, Gag						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Grouper, Gag Species managed by South Atlantic Fishery Management Council						Gag are part of the the South Atlantic Fishery Management Council's snapper grouper complex. A federal management plan is in place restricting harvest to prevent overfishing from occurring, and the stock is currently considered to be recovering.
Herring						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Herring, River Species managed by North Carolina Division of Marine Fisheries, North Carolina Wildlife Resources Commission and by Atlantic States Marine Fisheries Commission						The coastwide stock assessment, completed in 2012, found that river herring stocks are depleted to near historic low levels. Many factors contribute to the stock's failure to recover, including bycatch in offshore fisheries, degraded water quality and reductions in spawning habitat due to dams and other blockages. Despite a fishing moratorium implemented in 2007, river herring in North Carolina are still considered depleted. The Division of Marine Fisheries continues to monitor all stock recovery indicators and conduct sampling to identify and enhance spawning and nursery area habitats.
Other Areas						No current sampling program.
Kingfishes						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Kingfishes (A) Species managed by						Trends in relative fishing mortality and fishery independent data are used to track the stock condition because a regional stock assessment is not currently available. Commercial landings and recreational landings were above their series average. In

North Carolina Division of Marine Fisheries						2015 all management triggers were at acceptable levels for sustainability.
Mackerel						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Mackerel, King Species managed by South Atlantic Fishery Management Council						Based on the 2014 South Atlantic Fishery Management Council stock assessment, the South Atlantic king mackerel stock is not overfished and overfishing is not occurring. The 2014 stock assessment is an improvement from the 2008 stock assessment where overfishing could not be determined.
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Mackerel, Spanish Species managed by South Atlantic Fishery Management Council and by Atlantic States Marine Fisheries Commission						Based on the 2012 South Atlantic Fishery Management Council stock assessment, the Spanish mackerel stock in the South Atlantic is not overfished and is not undergoing overfishing.
Menhaden, Atlantic						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Menhaden, Atlantic Species managed by Atlantic States Marine Fisheries Commission						Commercial landings were comparable to 2014 landings, valued above the 10-year average. The 2015 benchmark stock assessment indicated that Atlantic menhaden are neither overfished nor experiencing overfishing. Atlantic Menhaden are managed under Amendment 2 to the Atlantic States Marine Fisheries Commission Fishery Management Plan, approved in

						2012, which established total allowable catch managed landings.
Mullet, Striped						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Mullet, Striped Species managed by North Carolina Division of Marine Fisheries						Based on the results of the 2013 stock assessment the stock is not experiencing overfishing, the overfished status could not be determined. Landings for 2015 were within management limits established in Amendment 1 to the fishery management plan. However, 2015 landings were the lowest since 1994. Declining landings, and declining trends in population indicators will continue to be closely monitored.
Seatrout, Spotted						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Seatrout, Spotted Species managed by North Carolina Division of Marine Fisheries and by Atlantic States Marine Fisheries Commission						The 2014 North Carolina Spotted Seatrout Stock Assessment indicated that the North Carolina and Virginia stock is not overfished and overfishing is not occurring. However, there is uncertainty about the current stock status because two cold stun events occurred during the assessment process, and were not included in the analysis. The next fishery management plan review is scheduled to start in 2017.
Scup						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Scup Species managed by Atlantic States Marine Fisheries Commission						The 2015 stock assessment update for U.S. waters north of Cape Hatteras indicates that the stock is not overfished and overfishing is not occurring. Fishing mortality rates have been greatly reduced since 1998, and the stock was considered

and by Mid-Atlantic Fishery Management Council						rebuilt in 2009. Given the success of the latest modeling approach, the stock is no longer considered data poor.
Shad						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Shad, American Species managed by Atlantic States Marine Fisheries Commission						Commercial landings decreased in 2015 under the Sustainable Fishery Management Plan enacted in 2013, and were below the 10-year average due to changes in management. A coastwide stock assessment for American shad was completed in August 2007, which indicated stocks in the Albemarle Sound and tributaries were low but remained stable, and stock status in other systems of the state was unknown.
 Shad, Hickory Species managed by Atlantic States Marine Fisheries Commission						Commercial landings increased in 2015 and the price per pound is consistent with the 10-year average. The Division of Marine Fisheries has not conducted any directed sampling for hickory shad since 1993.
Sharks						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Sharks Species managed by Atlantic States Marine Fisheries Commission						In North Carolina coastal fishing waters, sharks are included in the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Coastal Sharks, implemented in August 2008. This plan was implemented to compliment the National Marine Fisheries Service Consolidated Atlantic Highly Migratory Species Fishery Management Plan that include sharks in federal waters. Recent assessment results indicate great

						uncertainty about the various shark species. The current status is concern because of the overfished, overfishing, or unknown status of sandbar, dusky, blacknose, blacktip, porbeagle and bonnethead sharks.
Sheepshead						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Sheepshead Species managed by North Carolina Division of Marine Fisheries						The stock status of sheepshead is currently unknown, but landings trends and other biological information prompted the Marine Fisheries Commission to implement new harvest restrictions effective June 1, 2015. In 2015, recreational landings were below their 10-year average, while commercial landings were slightly above their 10-year average.
Snapper-Grouper Complex						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Snapper- Grouper Complex (B) (Reef Fish) Species managed by South Atlantic Fishery Management Council						Of the 59 species in the South Atlantic Fishery Management Council unit, some stocks are sustainable, but several stocks are overfished or are undergoing overfishing. The overfished stocks, common to North Carolina, include snowy grouper, red porgy and red snapper. Stocks experiencing overfishing are red snapper, blueline tilefish, speckled hind and Warsaw grouper.
Spiny Dogfish						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Spiny Dogfish						Spiny dogfish are currently managed under a joint Mid-Atlantic Fishery Management Council and New England Fishery Management Council fishery management

Species managed by Atlantic States Marine Fisheries Commission and by Mid-Atlantic Fishery Management Council						plan in federal waters and under the Atlantic States Marine Fisheries Commission Spiny Dogfish Interstate Fishery Management Plan in state waters. The 2015 stock assessment update, conducted by the National Marine Fisheries Service Northeast Fisheries Science Center, estimates spiny dogfish along the Atlantic coast are not overfished and not experiencing overfishing. Female spawning stock biomass estimates from 2009 to 2015 exceeded the biomass reference point.
Spot						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Spot Species managed by Atlantic States Marine Fisheries Commission						The current fishery management plan uses a precautionary management framework that requires annual evaluation of the spot Traffic Light Analysis, which consists of harvest and abundance indicators. If the harvest and abundance indicators meet pre-determined thresholds for two consecutive years, management action is triggered. The annual evaluation this year found that management thresholds were not exceeded. However, analysis shows declining trends in indexes of abundance and commercial and recreational harvest. Because there is no accepted stock assessment, stock status cannot be reliably estimated. A benchmark stock assessment is scheduled for completion in late 2016.
Sturgeon, Atlantic						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Sturgeon, Atlantic						The Atlantic States Marine Fisheries Commission is responsible for managing this species and considers the stocks to be

Species managed by Atlantic States Marine Fisheries Commission						depleted along the Atlantic Coast. There is a coastwide prohibition on possession. On April 5, 2012, the National Marine Fisheries Service listed the Carolina Distinct Population Segment of Atlantic sturgeon as a federally endangered species. A new stock assessment is scheduled for completion in 2017.
Weakfish / Gray Trout						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Weakfish (Gray Trout) Species managed by Atlantic States Marine Fisheries Commission						The weakfish stock along the Atlantic coast is at a level of low abundance. Coast- wide landings are near the lowest levels on record. The most recent assessment indicates that the cause is likely due to factors other than fishing mortality. As a result, the Atlantic States Marine Fisheries Commission Weakfish Management Board implemented strict coastwide harvest limits intended to limit fishing pressure and aid in stock recovery. A new benchmark stock assessment was completed in 2016 and approved for management, but it is awaiting review by the Weakfish Management Board to determine if changes to management are needed.
Species and Stock	**Status**					
Shellfish and Crustaceans						
	Viable	**Recovering**	**Concern**	**Depleted**	**Unknown**	**Comments**
 Clam, Hard Species managed by North Carolina						Data limitations prevent conducting a hard clam stock assessment and calculating sustainable harvest.The best available information indicates commercial hand and mechanical harvest levels in most areas are increasing or stable except in Pamlico

Division of Marine Fisheries						Sound. Amendment 2 of the fishery management plan is scheduled for completion in 2017.
 Crab, Blue Species managed by North Carolina Division of Marine Fisheries						Despite increased landings in 2014 and 2015, landings still fell below the 10-year average for 2006-2015. The Blue Crab Fishery Management Plan uses an adaptive management framework that requires annual evaluation of a Traffic Light Analysis, which consists of three biological indicators. Results of the 2015 Traffic Light update met the moderate management trigger for adult abundance identified in Amendment 2 to the N.C. Blue Crab Fishery Management Plan. As such, adaptive management measures were implemented in June 2016 to improve the condition of the blue crab stock.
 Oyster, Eastern Species managed by North Carolina Division of Marine Fisheries						There are insufficient data to conduct a traditional stock assessment or estimate sustainable harvest for the Eastern oyster. Commercial oyster landings have been in decline for most of the past century. Oysters are vulnerable to overharvest because of other factors such as habitat disturbance, pollution and biological and environmental stressors. Amendment 4 of the fishery management is scheduled for completion in 2017.
 Scallop, Bay						High natural mortality from environmental change and predation cause annual variability in abundance. Sampling showed low abundance in all areas in 2015. The main harvest season

Species managed by North Carolina Division of Marine Fisheries						(late January to March) was not opened in 2016 in any region because of low abundance levels.
 Shrimp (C) Species managed by North Carolina Division of Marine Fisheries						Annual shrimp abundance is determined by environmental conditions and recruitment (the annual abundance of juvenile shrimp). Natural mortality far outweighs fishing mortality. The division is continuing to collaborate with the industry on bycatch reduction in the shrimp trawl fishery. A live bait permit to allow fishermen to fish until noon on Saturdays is under development; rule changes to implement this permit are expected to be be effective May 1, 2017.
Totals	**14**	**2**	**13**	**4**	**4**	

(A) Kingfishes (Sea Mullet) includes 3 species, and there are two species of river herring.

(B) The Snapper-Grouper Complex includes about 60 species, while there are more than 40 species of sharks. Within these groups, individual species range from Viable to Overfished. The status indicated is for the group as a whole.

(C) Shrimp consists of 3 species — brown, pink, and white.

(D) Black drum was added to the stock status report in 2012.

All federally-managed and regionally-managed species without a dedicated state plan fall under the N.C. Interjurisdictional Fishery Management Plan.

Release: Immediate	Contact: Patricia Smith
Date: July 1, 2016	Phone: 252-726-7021

One species reclassified in 2016 Stock Status Report

MOREHEAD CITY – The stock status of most coastal fish did not change in the 2016 Stock Status Report, released today by the N.C. Division of Marine Fisheries. Only one species was reclassified from the 2015 report.

Summer flounder moved from "viable" to "concern." The change was based on a 2015 National Marine Fisheries Service Northeast Fisheries Science Center benchmark stock assessment for U.S. waters north of Cape Hatteras. The assessment indicated the stock was not overfished but overfishing was occurring.

As a result of the stock assessment, federal fisheries authorities lowered the allowable biological catch by 29 percent, which lowered the state-by-state commercial quotas proportionately. North Carolina receives the highest commercial quota share at 27.4 percent.

The division annually classifies the status of important marine finfish, shellfish, shrimp and crabs as viable, recovering, concern, depleted or unknown. Definitions of these categories can be found at http://portal.ncdenr.org/web/mf/stock-status-categories-and-definitions.

The annual classifications are based on biological and statistical data from the prior year and serve as a barometer of the overall health of the state's fishery resources. They are used to prioritize development of state fishery management plans.

New this year, the online table that summarizes the report includes information about which fisheries management authorities manage the stock in parenthesis under each species name.

The complete 2016 Stock Status Report can be found on the division's website at: http://portal.ncdenr.org/web/mf/stock-status-reports.

For more information, contact division Fisheries Biologist Lee Paramore at 252-473-5734, ext. 222 or Lee.Paramore@ncdenr.gov

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Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **CSMA SB 8-16**

TO: Marine Fisheries Commission

FROM: Charlton Godwin, Fisheries Management Section

SUBJECT: Central Southern Management Area Striped Bass

At its May 2016 meeting, the Marine Fisheries Commission requested division staff meet with Wildlife Resources Commission staff and bring joint recommendations for addressing problems with striped bass reproduction in the Central Southern Management Area to the commission's August 2016 meeting.

Staffs from both agencies met June 22 and discussed stocking efforts and subsequent implications for the status of the stocks of estuarine striped bass in the Central Southern Management Area. Discussion focused on recent genetic research that indicates striped bass stocks in the Tar/Pamlico, Neuse and Cape Fear rivers are comprised of nearly 100 percent hatchery stocked fish, with limited natural reproduction and survival occurring in the Central Southern Management Area.

Division of Marine Fisheries staff, with concurrence from Wildlife Resources Commission staff, agreed to recommend to their respective directors that the Marine Fisheries Commission adjust the Fishery Management Plan Review Schedule at its August 2016 business meeting, so that the review of Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan would be initiated in August 2017, rather than August 2018.

Division of Marine Fisheries Director Braxton Davis and Wildlife Resources Commission Director Gordon Myers met on July 28 and agreed with the staff recommendation to request the Marine Fisheries Commission adjust the schedule to begin the review of Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan in August 2017 instead of August 2018.

This recommendation is also reflected in the 2016 Fishery Management Plan Review in the update for estuarine striped bass and in the recommended Fishery Management Plan Review Schedule, both of which are provided in the commission's briefing materials.

If the Marine Fisheries Commission decides to accelerate the review of Amendment 1 to August 2017, a joint workgroup comprised of staffs from the Division of Marine Fisheries and the Wildlife Resources Commission will meet in September 2016 to develop a list of specific actions required to begin the following work:

- Consider potential stock assessment options in light of new genetics research;

- Develop draft revisions to the Fishery Management Plan goals and objectives;
- Develop draft revisions to the stocking program objectives and strategies; and
- Continue to collaborate with academia to identify and implement research projects to address the lack of natural recruitment of striped bass in the Central Southern Management Area.

Additionally, at its May meeting, the commission passed a motion to request its Conservation Fund Committee meet within 30 days to consider providing funding for DNA testing of fin clips already taken from the Central Southern Management Area in 2016 of striped bass 24 inches and smaller. The committee met on June 20 and reviewed a proposal prepared by division staff to process genetic samples for a Central/Southern Striped Bass Genetic Study. The committee recommended funding the Central/Southern Striped Bass Genetic Study in the amount of $21,412 and forwarded the proposal to the Marine Fisheries Commission for consideration. Recent parentage-based tagging analyses of Central Southern Management Area striped bass in the Tar/Pamlico, Neuse and Cape Fear rivers indicates the stocks on the spawning grounds are near 100 percent hatchery origin. From 2010-2015, the majority of samples used in genetic analysis have been obtained by the North Carolina Wildlife Resources Commission from the spawning grounds in these systems. There is a need to obtain samples for genetic testing from fish from areas in the Central Southern Management Area that are well away from the spawning grounds and harvested by the commercial and recreational sectors. This will give a more complete analysis of hatchery contribution to these stocks. The South Carolina Department of Natural Resources Population Genetics Lab is currently contracted to perform this work for the North Carolina Wildlife Resources Commission. Fin clip samples collected by the Division of Marine Fisheries have also been sent to this lab. Division staff has been in contact with Dr. Tanya Darden at the South Carolina Department of Natural Resources Population Genetics Lab regarding the timeline of accomplishing this work. Dr. Darden's lab is currently cataloging the samples in their database and will begin genetic analysis in early September, and anticipate providing results for review by the commission at its Nov. 16-18 business meeting.

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor
DONALD R. VAN DER VAART
Secretary
BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **FMP Sched 8-16**

TO: Marine Fisheries Commission

FROM: Catherine Blum, Fishery Management Plan and Rulemaking Coordinator

SUBJECT: Fishery Management Plan Update

This memo describes the general materials about fishery management plans for the August 2016 commission meeting. There are three items in this section; the first two are for information and the third is scheduled for the commission to take action. Each item is summarized below.

Status of Ongoing Plans

The first item is a two-page summary of the status of the fishery management plans. This is a document the staff presents to the commission at its annual August business meeting. The document provides background information on the authority and process for fishery management plans, as well as the status of each individual plan.

Fishery Management Plan Review

The second item is a separate publication in its own folder entitled "2016 Fishery Management Plan Review." It is a compilation of annual updates about state-managed, federally-managed, and Atlantic States Marine Fisheries Commission-managed species for which there are fishery management plans for North Carolina. The updates are based on data through the previous calendar year. Staff provides the document to the commission at its annual August business meeting. It is a useful resource document, especially as a means of providing a comprehensive list of research recommendations for all fishery management plans.

The Fishery Management Plan Review is an invaluable reference document for information about the latest status of fisheries occurring in North Carolina. The document is organized into two primary sections: state-managed species and Atlantic States Marine Fisheries Commission and federally-managed species. The latter section is further divided into species with and without North Carolina indices. If a species has a North Carolina index, it means that North Carolina data were used by the federal councils or the Atlantic States Marine Fisheries Commission in their respective plans.

Each update in the Fishery Management Plan Review contains information about the:

- History of the plan;

- Management unit;
- Goal and objectives:
- Status of the stock;
- Status of the fishery, including current regulations and commercial and recreational landings;
- Monitoring program data, including dependent and independent monitoring;
- Management strategy;
- Management and research needs; and
- Recommendation on the timing for the next review of state plans.

Five-year Schedule

The final item in this section is the draft "Fishery Management Plan Review Schedule" presented for the commission's consideration and approval. This item is indicated on the agenda as an action item because it requires the commission's approval each year in accordance with General Statutes 113-182.1 and 143B-289.52. Upon the commission's approval, the final schedule will be forwarded to the secretary of the Department of Environmental Quality, also per statutory requirements, to assist the secretary in monitoring the progress in the development and adoption of fishery management plans.

Division of Marine Fisheries Director Braxton Davis and Wildlife Resources Commission Director Gordon Myers met on July 28 and agreed with the staff recommendation to request that the Marine Fisheries Commission begin the review of Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan in August 2017 instead of August 2018. This recommendation is reflected in the Fishery Management Plan Review Schedule which follows.

Annual Fishery Management Plan Update
North Carolina Marine Fisheries Commission Meeting
Aug. 18, 2016

Authority and Process

The Fisheries Reform Act of 1997 and its subsequent amendments established the requirement to create fishery management plans for all of North Carolina's commercially and recreationally significant species or fisheries. The contents of the plans are specified, advisory committees are required and reviews by the Department of Environmental Quality secretary and the Joint Legislative Commission on Governmental Operations are mandated.

The original 1997 legislation mandated the Blue Crab Fishery Management Plan be completed first and the Marine Fisheries Commission used the Division of Marine Fisheries' annual stock status review to prioritize the order of species that would be addressed in subsequent plans. All initial fishery management plans identified on the priority list have been developed. Fishery management plans normally take about two years to complete and are required to be reviewed at least once every five years. Upon review, amendment of a plan is required when changes to management strategies are necessary. An information update for a plan, which includes changes in factual and background data only, is completed if there are no management changes. The division and the Marine Fisheries Commission adopted an annual rule cycle in 2009 to coincide with rulebook production, increase efficiency in rule making processes, and consolidate efforts in the development of fishery management plans and the associated implementing rules.

Status of State Fishery Management Plans

Two of 13 state plans are currently underway. These are amendments to the Hard Clam and Oyster fishery management plans. A table indicating the draft 2016 schedule for the plan reviews is included at the end of the report. The Marine Fisheries Commission will vote on approval of the schedule at its August 2016 business meeting.

The draft **Hard Clam Fishery Management Plan Amendment 2** and the draft **Oyster Fishery Management Plan Amendment 4** are well underway. The 2010 supplement to the oyster plan is addressed in this review as well as additional management issues for both plans. Rulemaking is scheduled to begin following the commission's August 2016 meeting. Final approval of the amendments and implementing rules is scheduled for February 2017, with rules becoming effective no earlier than May 1, 2017.

The red drum stock assessment by the National Oceanic and Atmospheric Administration's Southeast Data, Assessment and Review is scheduled for completion no sooner than October 2016, pending additional technical tasks and peer review. Upon completion of the stock assessment, the division will undertake a review of the **Red Drum Fishery Management Plan Amendment 1**.

Supplement A to the **Southern Flounder Fishery Management Plan Amendment 1** was approved in November 2015 to adopt temporary management measures to reduce the catch of southern flounder up to 60 percent. This was due to concerns about the sustainability of current harvest levels because of a coast-wide decline in the number of young fish entering into the stock since the 1990s. Per statute, the temporary management measures will be in place until the

adoption of the next amendment. Although data inputs used in the 2014 stock assessment of southern flounder in North Carolina waters were determined to be valid, the stock assessment could not be used to determine stock status because the southern flounder stock mixes throughout the South Atlantic (North Carolina to Florida.) As a result, a coastwide stock assessment for southern flounder is underway and is expected to be completed in the second half of 2017, after which the next review of the plan will commence.

The next review of the **Spotted Seatrout Fishery Management Plan** is scheduled to begin in 2017. The next review of the **Division of Marine Fisheries-Wildlife Resources Commission Joint Estuarine Striped Bass Fishery Management Plan Amendment 1** is currently scheduled to begin in 2018; however, the staffs of the Division of Marine Fisheries and Wildlife Resources Commission recommend initiating the review in 2017. This is to address problems with striped bass reproduction in the Central Southern Management Area.

The next review of the **Blue Crab Fishery Management Plan Amendment 2** is scheduled to begin in 2018. In June 2016, management measures were implemented under the adaptive management framework adopted as part of Amendment 2.

The Marine Fisheries Commission gave its final approval of the **Shrimp Fishery Management Plan Amendment 1, Bay Scallop Fishery Management Plan Amendment 2, and Division of Marine Fisheries-Wildlife Resources Commission Joint River Herring Fishery Management Plan Amendment 2** in February 2015 and the implementing rules became effective May 1, 2015 and June 13, 2016. The next reviews are scheduled to begin in 2020.

The **Interjurisdictional Fisheries Management Plan Information Update** and the **Kingfishes Fishery Management Plan Information Update** were approved in November 2015. No change in management strategies was necessary, so the plans were updated with the most current factual and background data. The **Striped Mullet Fishery Management Plan Amendment 1** was also approved in November 2015 and implementing rules became effective April 1, 2016. The next review of these plans will begin in 2020.

DRAFT DOCUMENT – SUBJECT TO CHANGE

FISHERY MANAGEMENT PLAN REVIEW SCHEDULE (July 2016 – June 2021) Revised August 2016					
SPECIES (Date of Last Plan)	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
HARD CLAM (6/08)					
OYSTER (6/08)					
RED DRUM (11/08)					
SPOTTED SEA TROUT (2/12)					
ESTUARINE STRIPED BASS (5/13)					
SOUTHERN FLOUNDER (2/13)					
BLUE CRAB (11/13)					
BAY SCALLOP (2/15)					
RIVER HERRING (2/15)					
SHRIMP (2/15)					
INTERJURISDICTIONAL (11/15)					
KINGFISHES (11/15)					
STRIPED MULLET (11/15)					

DRAFT DOCUMENT – SUBJECT TO CHANGE

FISHERY MANAGEMENT PLAN REVIEW SCHEDULE (July 2016 – June 2021) Revised August 2016					
SPECIES (Date of Last Plan)	2016-2017	2017-2018	2018-2019	2019-2020	2020-2021
HARD CLAM (6/08)					
OYSTER (6/08)					
RED DRUM (11/08)					
SPOTTED SEA TROUT (2/12)					
ESTUARINE STRIPED BASS (5/13)					
SOUTHERN FLOUNDER (2/13)					
BLUE CRAB (11/13)					
BAY SCALLOP (2/15)					
RIVER HERRING (2/15)					
SHRIMP (2/15)					
INTERJURISDICTIONAL (11/15)					
KINGFISHES (11/15)					
STRIPED MULLET (11/15)					

North Carolina
Division of Marine Fisheries

2015 Fishery Management Plan Review

August 2016

Marine Fisheries
ENVIRONMENTAL QUALITY

INTRODUCTION

The Fishery Management Plan Review is a compilation of annual updates about state-managed, federally-managed, and Atlantic States Marine Fisheries Commission-managed species for which there are fishery management plans for North Carolina. The updates are based on data through the previous calendar year and the document is presented to the Marine Fisheries Commission at its annual August business meeting.

The Fishery Management Plan Review is an invaluable reference document and a resource for information about the latest status of fisheries occurring in North Carolina. The document is organized into two primary sections: state-managed species and Atlantic States Marine Fisheries Commission and federally-managed species. The latter section is further divided into species with and without North Carolina indices. If a species has a North Carolina index, it means there is North Carolina data that the federal Councils or Atlantic States Marine Fisheries Commission used in its respective plans.

There are currently 13 state fishery management plans, 12 of which are updated annually and included in this document. The remaining plan is the North Carolina Fishery Management Plan for Interjursdictional Fisheries. This plan adopts by reference management measures appropriate for North Carolina contained in approved federal Council or Atlantic States Marine Fisheries Commission fishery management plans.

These management measures are implemented by Marine Fisheries Commission rules to provide compliance or consistency with the approved plans and amendments. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal Councils plans) and the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic States Marine Fisheries Commission plans), are similar to the goals of the North Carolina Fisheries Reform Act of 1997 to “ensure long-term viability” of these fisheries. The state interjurisdictional plan reduces duplication of effort while meeting the requirements of North Carolina General Statute 113-182.1, Fishery Management Plans.

Each update in the Fishery Management Plan Review contains information about the:

- History of the plan;
- Management unit;
- Goal and objectives:
- Status of the stock;
- Status of the fishery, including current regulations and commercial and recreational landings;
- Monitoring program data, including dependent and independent monitoring;
- Management strategy;
- Management and research needs; and
- Recommendation on the timing for the next review of state plans.

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FISHERY MANAGEMENT PLAN UPDATE
BAY SCALLOP
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 2007
Amendments:	Amendment 1 – November 2010 Amendment 2 – February 2015
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	July 2005 – Began the original FMP a year earlier than planned due to concern limited abundance. No schedule change is requested at this time.
Next Benchmark Review:	July 2020

The N.C. Bay Scallop Fishery Management Plan (FMP) was adopted in November 2007 by the North Carolina Marine Fisheries Commission. The FMP implemented prohibited take from 2006 to 2008 until an independent sampling indicator was established for re-opening in 2009. Amendment 1 of the N.C. Bay Scallop FMP was finalized in November 2010 to provide more flexibility (Adaptive Management) to open the fisheries as the bay scallop population recovers. Target indices were established from fishery independent data collected before the red tide event in 1984 and 1985 in Core, Back, and Bogue sounds. A separate sampling indicator for re-opening was developed in 2009 for Pamlico Sound. Amendment 2, adopted in February 2015, continues to use the abundance thresholds for opening the harvest season and defining the harvest levels for all areas, except areas south of Bogue Sound. Areas south of Bogue Sound will not be managed with a specific abundance opening level, but will be opened or remain closed based on North Carolina Division of Marine Fisheries' (NCDMF) judgement from sampling in this region. Expanded sampling is to occur in all areas including areas south of Bogue Sound and improve the reliability of the data for the recreational scallop harvest. For private culture and enhancement the current management strategy is to modify rules for bottom culture and aquaculture operations to be consistent with rules for other shellfish species, and establish a pilot program with the Shellfish Research Hatchery to distribute cultured seed on private bottoms and contingent on results to distribute seed on private bottom, and then expand the pilot program to include public bottom.

Management Unit

Includes the bay scallop (*Argopecten irradians)* and its fisheries in all waters of coastal North Carolina.

Goal and Objectives

The goal of the North Carolina Bay Scallop Fishery Management Plan is to implement a management strategy that restores the stock, maintains sustainable harvest, maximizes the social and economic value, and considers the needs of all user groups. To achieve this goal, it is recommended that the following objectives be met:

1. Develop an objective management program that restores and maintains sustainable harvest.

2. Promote the protection, restoration, and enhancement of habitats and water quality necessary for enhancing the fishery resource.

3. Identify, enhance, and initiate studies to increase our understanding of bay scallop biology, predator/prey relationships, and population dynamics in North Carolina.

4. Investigate methods for protecting and enhancing the spawning stock.

5. Investigate methods and implications of bay scallop aquaculture.

6. Address social and economic concerns of all user groups.

7. Promote public awareness regarding the status and management of the North Carolina bay scallop stock.

STATUS OF THE STOCK

Stock Status

Bay scallops are considered an annual crop because of their short life span, therefore benchmark reference values cannot be measured to determine if the stock is or is not overfished, and if there is or is not overfishing occurring. North Carolina's bay scallop stocks are listed as a species of concern in the annual Stock Status Report because of the population declines. Annual commercial landings of bay scallops show large fluctuations through time and are presumed to be driven by changing climate conditions (i.e., winter freezes, high freshwater runoff), predation, and red tide. Therefore, bay scallops are vulnerable to overharvest because of these different factors affecting their survival.

Stock Assessment

Independent data have been collected by the NCDMF since 1984 and consistently collected since 1998 to evaluate recruitment into the population and recruitment into the fishery for the current fishing season. Analyses of these data have demonstrated trends between NCDMF independent data and landings data for the following year. The long term landings data (1972-2005) most likely reflected population abundance because harvest was allowed to continue until scallop densities reached levels below those that make the fishing economically viable (Peterson and Summerson 1992). However, during 2006 and after the implementation of the 2007 N.C. Bay Scallop FMP, a harvest prohibited take went into effect in order to rebuild the stock and until a standardized catch per unit effort could be met (NCDMF 2007). Therefore using landings data as an indicator is no longer an effective tool to indicate population size.

Data on scallop abundance from fishery independent sampling are evaluated annually and standardized scallop population level indicators were first established as progressive triggers for opening the harvest season in 2010 (NCDMF 2010). These triggers are based on NCDMF sampling that occurred between the pre-red tide months of October and December in 1984 and 1985 for Back, Bogue, and Core sounds and in post-red tide January 2009 in Pamlico Sound (Table 1). This time period for estimating abundance makes the most sense since it is less likely for the two year-classes to be selecting to the sampling gear. Areas south of Bogue Sound will not be managed with a specific abundance opening level, but will be opened or remain closed based on NCDMF judgement from sampling in this region (NCMDF 2015). These progressive triggers allow for flexibility to open the fisheries as the bay scallop population recovers and determines harvest limits based on 50%, 75%, and 125% of the natural log of the Catch Per Unit Effort (lnCPUE) target (Tables 2 and 3).

Fishery independent sampling shows that most tows have small or zero catch, while only a few samples exhibit large catches producing a lognormal distribution, which is usual for most fishery independent data. The natural log (ln) of the catch per unit effort (lnCPUE), measured as the number of scallops per minute (dredges) and number of scallops per meter squared (quadrat), is taken to avoid bias towards occasional large catches. A constant of 0.1 was added to all catches so that tows/quadrats with zero catches can be included in the estimates of the mean since the natural log of zero is undefined. All tows/quadrats taken at a station are averaged to get a single value for each station and are referred to as a sample. This is done to avoid weighting some tows/quadrats to each station more than others because the number of tows/quadrats was not always consistent in duration. Each sample is averaged to get the estimated mean lnCPUE and standard deviation for the October-December time period for all areas to produce indices of abundance.

Trends in the past ten years show bay scallop abundance is very low in all regions which is also a reflection in landings when harvest is opened (Figures 1, 2, and 3). Since the inception of the harvest opening index of abundance the season has only allowed opening three years in specific regions at the lowest allowed harvest levels. Two of the three open harvest seasons saw very little catch (Figure 4). Expanding the sampling coverage or number of stations in all areas is recommended in Amendment 2 of the FMP to improve estimates of bay scallop abundance. In response to this recommendation, sampling has been expanded in all regions and all samples, not just core stations, are now included in the annual estimates for determining if the harvest season will remain closed or open. As bay scallops expand and retract from year to year, broader coverage of these areas will help identify more precisely what is happening to the population before entering the harvest season.

STATUS OF THE FISHERY

Current Regulations

The North Carolina Marine Fisheries Commission adopted an adaptive management strategy to open waters to bay scallop harvest with specific progressive triggers for Bogue, Core, Back, and Pamlico sounds (Table 1). Areas south of Bogue Sound will not be managed with a specific abundance opening level, but will be opened or remain closed based on NCDMF judgement from sampling in this region. Expanded sampling is to occur in all areas including areas south of Bogue Sound and improve the reliability of the data for the recreational scallop harvest. The triggers allow limited harvest when NCDMF sampling indicates bay scallop abundance in a given region is at 50 percent of the target. Trip limits and fishing days for commercial harvest

will progressively increase if sampling showed bay scallop abundance was at 75 percent and 125 percent of the target levels established within each region (Table 2). Recreational daily harvest limits and open days remain the same at all abundance levels (Table 3).

The season can only occur from the last Monday in January through April 1st and there is no minimum size limit for both the commercial and recreational user groups. Specific trip limits, number of days to harvest, and specific gear allowances are implemented within the open season for commercial harvest. Both the opening of the season and the commercial harvest restrictions within the open season are based on NCDMF fishery independent sampling abundance levels determining the levels of harvest (NCDMF 2015). If the season is allowed to open in an area, the daily recreational harvest limit is one-half bushel per person per day not to exceed one bushel per vessel seven days a week. There was no open harvest season for bay scallops in 2015 because abundance levels were too low to meet the threshold for opening the season.

Commercial Landings

Bay scallop abundance and harvest have widely fluctuated since landings have been recorded (MacKenzie 2008). Landings are closely linked to weather and other environmental factors. Landings ranged from a peak of approximately 1.4 million lb of meats in 1928 when North Carolina led the nation in scallop production, to a low of zero landings in 2005 even though there was an open harvest season. Landings have been virtually non-existent since 2005.

The red tide (toxic dinoflagellate) event of late autumn 1987 and early 1988 caused mortality to approximately 21% of the adult scallops in Bogue and Back sounds and reduced recruitment of juvenile scallops the following spring to only 2% of normal (the mean of the previous three red tide-free years)(Summerson and Peterson 1990). This event has had lasting impacts to the bay scallop fishery and repopulation of the Bogue, Back, and Core sound regions has not fully occurred. Landings in recent years have been extremely low due to the failure of scallop stocks to recover after the red tide event, fishing pressure, and predation.

A moratorium on harvest occurred from 2006 to 2008 through the 2005 FMP (NCDMF 2007). Amendment 1 initiated abundance estimates to determine opening the fishery and at what levels harvest would occur based on the abundance estimates by region (NCDMF 2010). An open harvest commercial and recreational harvest season occurred in Core and Pamlico sounds in 2009, and in Pamlico Sound in 2010 (less than 500 lb of meat (Figure 4). Bogue Sound and all areas south of Bogue Sound were opened to harvest to the NC/SC state line in internal waters in 2014 (less than 1,500 lb of meat) (Figure 4).

Recreational Landings

Unknown

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Currently, the only data available for the stock in all areas are the commercial landings and associated effort from the Trip Ticket Program. There are no fishery dependent sampling programs that collect information on the commercial or recreational fisheries for bay scallops.

Fishery-Independent Monitoring

Independent sampling of bay scallops for fisheries management information has been conducted since 1975, and has varied from monthly examinations at twenty stations to seasonal monitoring at fewer locations.

Currently sampling occurs 4 times a year in Pamlico, Core, Back, Bogue and areas south of Bogue Sound during the second or third week of the month in January, April, July, and October. Standardized sampling at fixed stations occur quarterly (January, April, July, and October) in Pamlico Sound using a m^2 quadrat and a bay scallop dredge in Core, Back, Bogue, and areas south of Bogue Sound. A core set of 8 stations are towed 3 times for two minutes with a scallop dredge in Core, Back, and Bogue sounds and additional stations are also sampled 3 times for two minutes where scallops have historically been found. The core set stations were selected based on historical information from Program 697 of traditionally abundant areas in Core, Bogue, and Back sounds. A set of 3 core stations, two in New River and 1 in Topsail Sound, are towed 3 times for two minutes with a scallop dredge beginning in 2009. Stations were selected in New River and Topsail Sound based on scouting the areas for scallops and input from fishermen and the public that use the waters regularly. Sampling also occurs at 5 core stations and 5 non-core stations off Hatteras Island. Scallops are collected with a rake or by hand for 10, meter-square (m^2) samples within the station in Pamlico Sound. The PVC m^2 quadrat is randomly placed 10 separate times within the area. Beginning in 2015, after adoption of Amendment 2 of the FMP, more stations were sampled in most areas and especially in areas south of Bogue Sound. Catch per unit effort (lnCPUE) is defined as the natural logarithm, of the number of scallops (juvenile and adult combined) per 1 minute tow if a dredge is used or per quadrat. Additional stations (non-core) are sampled in most areas dependent on scallop abundance at the given time of year.

Most tows/quadrats have small or zero catch, while only a few samples exhibit large catches producing a lognormal distribution, which is usual for most fishery independent data. The natural log (ln) of the catch per unit effort (lnCPUE), measured as the number of scallops per minute (dredges) and number of scallops per meter squared (quadrat), is taken to avoid bias towards occasional large catches. A constant of 0.1 was added to all catches so that tows/quadrats with zero catches can be included in the estimates of the mean since the natural log of zero is undefined. All tows/quadrats taken at a station are averaged to get a single value for each station and are referred to as a sample. This is done to avoid weighting some tows/quadrats to each station more than others because the number of tows/quadrats was not always consistent in duration. Each sample is averaged to get the estimated mean lnCPUE and standard deviation for the October-December time period for all areas to produce indices of abundance (Figures 1 and 2).

Trends in the past ten years show bay scallop abundance is very low in all regions which is also a reflection in landings when harvest is opened (Table 4; Figure 1).

MANAGEMENT STRATEGY

The current management strategy for the bay scallop fisheries is to allow the NCDMF Director to open a region to limited bay scallop harvest when sampling indicates bay scallop abundance is at 50 percent of the natural logarithm of the Catch Per Unit Effort (lnCPUE) level it was in 1984-85 in the main harvest areas (Core, Bogue and Back sounds)(Table1). A separate sampling

indicator for re-opening was developed in 2009 for Pamlico Sound (Table 1). Areas south of Bogue Sound will not be managed with a specific abundance opening level, but will be opened or remain closed based on NCDMF judgement from sampling in this region. Expanded sampling is to occur in all areas including areas south of Bogue Sound and improve the reliability of the data for the recreational scallop harvest. For private culture and enhancement the current management strategy is to modify rules for bottom culture and aquaculture operations to be consistent with rules for other shellfish species, and establish a pilot program with the Shellfish Research Hatchery to distribute cultured seed on private bottoms and contingent on results to distribute seed on private bottom, expand the pilot program to include public bottom.

Trip limits and fishing days will progressively increase if sampling shows bay scallop abundance is at 75 percent or 125 percent lnCPUE levels (Tables 2 and 3). The open season may only occur from the last Monday in January through April 1 to ensure spawning is complete and the economic yield is at an optimum for fishermen. Improving data collection on the biology, harvest, environment, enhancement, and socioeconomic aspects relative to bay scallops is recommended throughout Amendment 2 to provide more comprehensive information for assisting in future management decisions. See Table 5 for current management strategies and the status on the implementation of each.

Bay scallop abundance is still quite low (Figures 1, 2, and 3). Harvest openings have only occurred three times since the initiation of the original FMP which was scheduled one year earlier in development due to concern for the stock.

MANAGEMENT AND RESEARCH NEEDS

The status on the implementation of the research recommendations is unknown or incomplete at this time since Amendment 2 was just adopted in February 2015. See Table 5 for current management strategies and the status on the implementation of each.

The following research recommendations were compiled from the Status of the Stock Section 6.0, the Private Culture, Aquaculture, and Stock Enhancement Section 9.0, the Socioeconomic Aspects of the Bay Scallop Fishery Section 10.0, and the Environmental Factors Section 11.0 and issue papers listed in the Principal Issues and Management Options Section 12.0. The list below is presented in order as it would appear in draft Amendment 2 and the section or issue paper they come from is identified. The Plan Development Team (PDT) reviewed and prioritized the research recommendations in accordance to the suggestion by the Biological Review Team research committee. The Bay Scallop Fishery Management Plan Advisory Committee (AC) reviewed the draft research recommendations and provided input to prioritize these recommendations as well. The Management Review Team determined the final ranking. If there were differences between the PDT and AC priorities then the middle priority level was chosen between the two, if there was only one level difference the AC priority was chosen. If one group chose to delete the research recommendation but the other prioritized the item then the research recommendation remained with the ranking. The prioritization of each research recommendation is designated either a HIGH, MEDIUM, or LOW standing. A low ranking does not infer a lack of importance but is either already being addressed by others or provides limited information for aiding in management decisions. A high ranking indicates there is a substantial need, which may be time sensitive in nature, to provide information to help with management decisions.

Proper management of the bay scallop resource cannot occur until some of these research needs are met (status of need provided in parenthesis):

- Develop better methods to quantify the population including the means to have more precise measures of spatial and temporal variability at both within and between Sound scales - HIGH (Ongoing through NCDMF fishery independent sampling)
- Collect information on larval recruitment and spat settlement - LOW (needed)
- Genetically identify how many separate bay scallop stocks exist in North Carolina - MEDIUM (needed)
- Examine the effects of scallop culture and oyster cultch on seagrass density - MEDIUM (needed)
- Perform socioeconomic surveys on commercial participants to determine specific business characteristics, the economics of working in the fishery, which issues are important to the participants, attitudes towards management of the fishery and general demographic information - LOW (needed)
- Determine a method to collect socioeconomic information on processors – LOW (needed)
- Collect information on the economic impact and value of the recreational bay scallop fishery - MEDIUM (needed)
- Determine the spatial and biological characteristics of SAV beds that maximize their ecological value to the bay scallop for enhancement or conservation purposes – LOW (needed)
- Develop techniques to enhance SAV habitat to promote scallop survival – LOW (needed)
- Conduct research to evaluate the role of shell hash and shell bottom in bay scallop recruitment and survival, particularly where SAV is absent - LOW (needed)
- Determine the concentrations of EDCs in known bay scallop habitats and impacts on bay scallops – LOW (needed)
- Assess the impacts of nutrient loading and algae on SAV and the life history of bay scallops - MEDIUM (needed)
- Determine levels of TSS, turbidity, chlorophyll *a,* and other parameters necessary to achieve desired water clarity and investigate the feasibility of a water quality standard for light attenuation required for SAV growth – LOW (needed)
- Complete a more comprehensive study on treading and impacts of treading on juvenile and adult bay scallops – HIGH (needed)
- Survey fishermen that use a commercial license for personal consumption – LOW (Ongoing through NCDMF)
- Collect more information on the value of the spring spawn to the population – MEDIUM (needed)

FISHERY MANAGEMENT PLAN RECOMMENDATION

Recommend maintain the current timing of the Benchmark Review. Amendment 2 of the N.C. Bay Scallop FMP was just adopted in February 2015 with rule changes in effect May 1, 2015. Suggested statute change to G.S. 113-168.4 is also part of Amendment 2 with the intention to take this suggested change to legislators at their next short session, otherwise leaseholders who wish to grow out bay scallops reared in an aquaculture operation cannot acquire seed for further grow out without this change.

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TABLES

Table 1. Target and progressive triggers based on the lnCPUE (natural log of the number of scallops per 1-minute tow) for the October – December 1984-1985 time period for Back, Bogue, and Core sounds. Target and progressive triggers based on the lnCPUE (natural log of the number of scallops per meter squared) for Pamlico Sound based on sampling in January 2009.

	Pamlico Sound	Core Sound	Back Sound	Bogue Sound
Target lnCPUE	-0.18	1.72	2.02	2.33
Progressive trigger 50%	-0.27	0.86	1.01	1.17
Progressive trigger 75%	-0.23	1.29	1.52	1.75
Progressive trigger 125%	-0.14	2.15	2.53	2.91

Table 2. Adaptive management measures for opening the bay scallop commercial fishery as the selected management strategy of the Marine Fisheries Commission. The harvest levels are based on progressive triggers derived from the lnCPUE 1984-1985 (Oct-Dec) target indicators for Core, Bogue and Back sounds and the lnCPUE Jan 2009 target indicator for Pamlico Sound.

Progressive triggers and target	Trip limit	Days open in the week	Allowed gears	Season
Less than 50% of target	No allowed harvest			
50% or greater of target but less than 75% of target	5 bushels per person per day not to exceed 10 bushels per fishing operation	Mon and Wed	By hand, hand rakes, hand tongs, dip net, and scoops	Last Monday in January to April 1st
75% or greater of target but less than 125% of target	10 bushels per person per day not to exceed 20 bushels per fishing operation	Mon, Tues, Wed, and Thur	By hand, hand rakes, hand tongs, dip net, and scoops	Last Monday in January to April 1st
	10 bushels per person per day not to exceed 20 bushels per fishing operation	Mon and Wed	Bay scallop dredges as described by rule 15A NCAC 03K. 0503	Delay opening until first full week in March after hand harvest removes scallops from shallow waters to April 1st
125% or greater of target	15 bushels per person per day not to exceed 30 bushels per fishing operation	Mon, Tues, Wed, and Thur	By hand, hand rakes, hand tongs, dip net, and scoops	Last Monday in January to April 1st
	15 bushels per person per day not to exceed 30 bushels per fishing operation	Mon and Wed	Bay scallop dredges as described by rule 15A NCAC 03K. 0503	Delay opening until the third full week in February after hand harvest removes scallops from shallow waters to April 1st

Table 3. Adaptive management measures for opening the bay scallop recreational fishery as the selected management strategy by the Marine Fisheries Commission. The harvest levels are based on progressive triggers derived from the lnCPUE 1984-1985 (Oct-Dec) target indicators for Core, Bogue and Back sounds and the lnCPUE Jan 2009 target indicator for Pamlico Sound.

Progressive triggers and target	Trip limit	Days open in week	Allowed gears	Season
Less than 50% of target 50% or greater of target	No allowed harvest 1/2 bushel per person per day not to exceed 1 bushel per recreational fishing operation	Seven days a week	By hand, hand rakes, hand tongs, dip net, and scoops	Last Monday in January to April 1st

Table 4. Fishery Independent sampling annual lnCPUE and standard error. Pamlico Sound sampling is conducted in January with a m^2 quadrat, all other areas are sampled in October with a scallop dredge.

	Pamlico Sound		Core Sound		Back Sound		Bogue Sound		South	
Year	LnCPUE	Standard Error	lnCPUE	Standard Error	lnCPUE	Standard Error	lnCPUE	Standard Error	lnCPUE	Standard Error
2006			-2.3026	0.0000	-1.5419	0.4975	-1.0241	0.3366		
2007			-1.2432	0.4958	-2.0040	0.2986	-1.5685	0.3366		
2008			2.9378	0.3485	-1.4067	0.4006	1.2051	0.5700		
2009	-0.1766	0.7908	-1.0071	0.4207	-1.3057	0.4549	1.3421	0.2676	0.9372	0.7512
2010	0.3238	0.6701	-0.5450	0.3887	-1.1036	0.5362	-1.1168	0.5366	-2.3026	0.0000
2011	-1.9941	0.1273	-0.6323	0.5705	0.8260	0.2581	0.3793	0.3429	-1.7652	0.3704
2012	-1.6620	0.2626	-1.7053	0.3777	-0.5607	0.7793	1.1833	0.2450	-0.9060	0.3599
2013	-1.2115	0.1091	-2.3026	0.0000	-2.3026	0.0000	-0.4116	0.7131	-1.1949	0.4186
2014	-1.5395	0.3130	-2.0040	0.2986	-1.0071	0.4207	-2.0040	0.2013	-1.6380	0.3374
2015	-1.8590	0.3865	-2.1427	0.1599	-2.0637	0.1628	-1.7992	0.1906	-1.6885	0.1552
2016	-2.2946	0.0080	Not available until October 2016							

Table 5. Summary of the management strategies and their implementation status from Amendment 2 of the Bay Scallop Fishery Management Plan.

Management Strategy	Implementation Status
ENVIRONMENTAL CONCERNS	
Status quo (manage fishing gear based on scallop densities)	No action required
Continue to support CHPP recommendations that enhance protection of existing bay scallop habitat	No action required; Already support the CHPP
Support programs that enhance bay scallop habitat by planting sea grass or other suitable settlement substrate	No action required; Already support CHPP
Identify and designate SHAs that will enhance protection of the bay scallop	Existing authority through CHPP implementation plan
Remap and monitor SAV coverage in North Carolina to assess distribution and change over time.	Existing authority through CHPP implementation plan
Restore coastal wetlands to compensate for previous losses and enhance water quality conditions for the bay scallop	Existing authority through CHPP implementation plan
Work with CRC to revise shoreline stabilization rules to adequately protect riparian wetlands and shallow water habitat and significantly reduce the rate of shoreline hardening	Existing authority through CHPP implementation plan
Develop and implement a comprehensive coastal marina and dock management plan and policy to minimize impacts to SAV and other fish habitats	Existing authority through CHPP implementation plan
Evaluate dock criteria siting and construction to determine if existing requirements are adequate for SAV survival and growth, and modify if necessary	Existing authority through CHPP implementation plan
Assess the distribution, concentration, and threat of heavy metals and other toxic contaminants in freshwater and estuarine sediments and identify the areas of greatest concern to focus water quality improvement efforts	Existing authority through CHPP implementation plan
Shallow areas where trawling is currently allowed should be re-examined to determine if additional restrictions are necessary	Existing authority through CHPP implementation plan
Accelerate and complete mapping of all shell bottom in coastal North Carolina	Existing authority through CHPP implementation plan
Improve methods to reduce sediment and nutrient pollution from construction sites, agriculture, and forestry	Existing authority through CHPP implementation plan
Reduce impervious surfaces and increase on-site infiltration of stormwater through voluntary or regulatory measures	Existing authority through CHPP implementation plan
Provide more incentives for low-impact development	Existing authority through CHPP implementation plan
Aggressively reduce point source pollution from wastewater through improved inspections of wastewater treatment facilities, improved maintenance of collection infrastructure, and establishment of additional incentives to local governments for wastewater treatment plant upgrading	Existing authority through CHPP implementation plan
Aggressively reduce point and non-point nutrient and sediment loading in estuarine waters, to levels that will sustain SAV habitat, using regulatory and non-regulatory actions	Existing authority through CHPP implementation plan

Management Strategy	Implementation Status
ENVIRONMENTAL CONCERNS	
Provide proper disposal of unwanted drugs, reduce insecticide and heavy metal run-off, and develop technologies to treat wastewater for antibiotics and hormones	Existing authority through CHPP implementation plan
Discourage use of detergents in coastal waters, especially detergents with antimicrobial components	Existing authority through CHPP implementation plan
INSUFFICIENT DATA	
Support improving the reliability of the data for the recreational scallop harvest	Dependent on available funding to improve current survey design
MANAGEMENT	
Eliminate the August 1 through September 15 season open period in rule	Rule change required to 15A NCAC 03K .0501; Rule change completed on May 1, 2015
Expand sampling in all regions and manage harvest conditionally in areas south of Bogue Sound until adequate sampling can determine a harvest trigger for management.	Existing authority
Continue current progressive triggers with adaptive harvest levels in all areas, except areas south of Bogue Sound, and modify harvest management measures as shown in Table 12.7 and Table 12.8 in the issue paper. And continue to improve the statistical rigor of the abundance index.	Existing proclamation authority.
Keep dredges at the 75% trigger harvest level in Table 12.7	Existing proclamation authority.
Modify the daily commercial harvest possession limit in Rule 15A NCAC 03K .0501 to a quantity of no more than 15 standard U.S. bushels per person per day not to exceed 30 standard U.S. bushels in any combined commercial fishing operation per day to be consistent with the adaptive management measures trip limits.	Requires rule change to rule 15A NCAC 03K .0501; Rule change completed on May 1, 2015.
Exempt bay scallop harvest from leases from the regular season and harvest limits	Requires rule change to rules 15A NCAC 03K .0111, 03K .0206, 03K .0303, 03K 0501, 03K .0502, 03K .0507, 03K .0508, 03O .0501; Rule changes completed on May 1, 2015
Support an exemption from G.S. 113-168.4 (b) (3) when the sale is to lease or Aquaculture Operations permit holders for further rearing	Requires statutory change to G.S. 113-168.4; NCDMF will take this suggested change to legislators at the next short session.
STOCK ENHANCEMENT	
Establish a pilot program with the Shellfish Research Hatchery to distribute cultured seed on private bottoms	Will need to start communicating with Shellfish Hatchery staff and interested private culturists interested in establishing this pilot work
Contingent on results to distribute seed on private bottom, expand the pilot program to include public bottom	Dependent on results from previous management strategy.

FIGURES

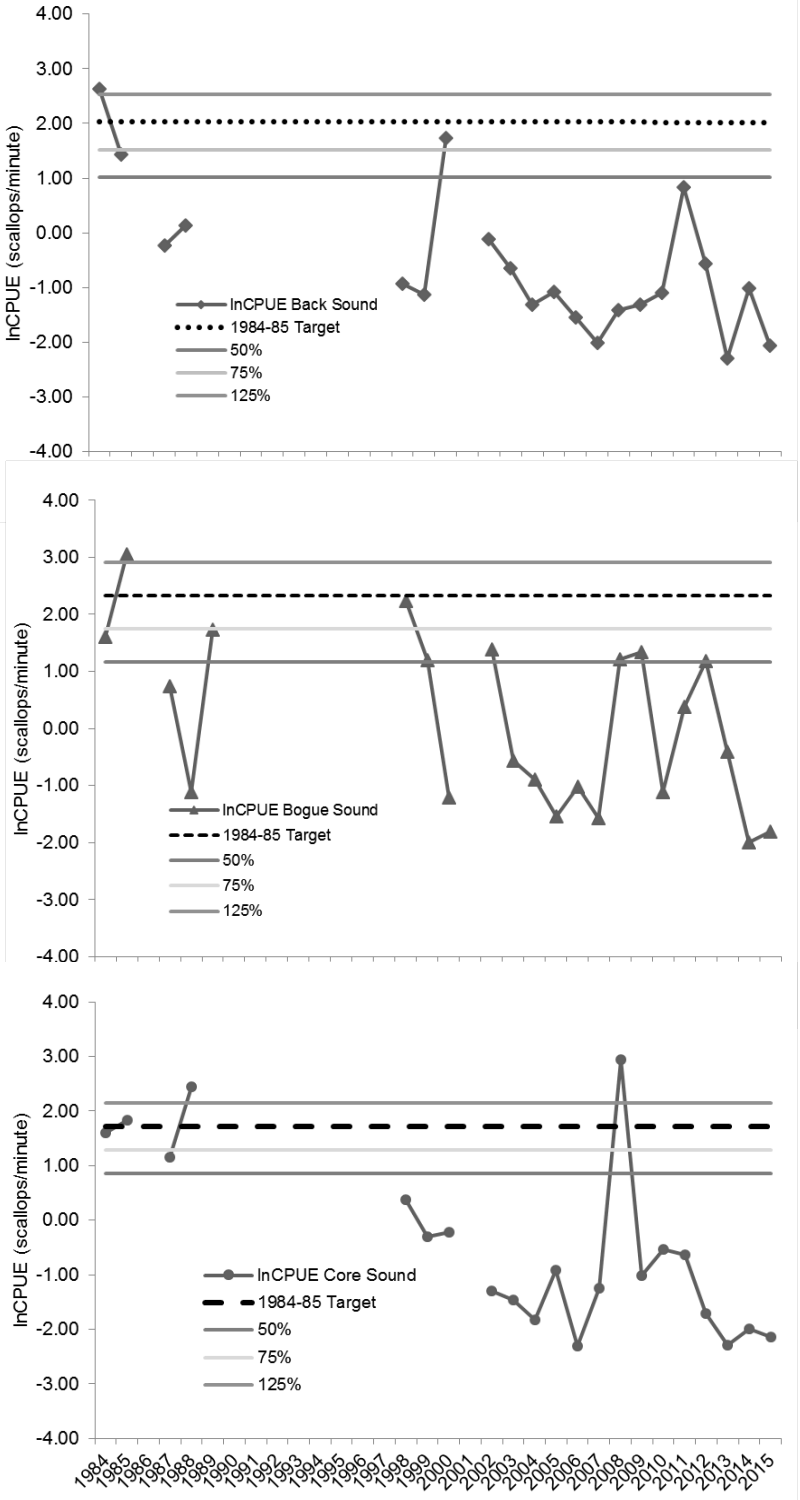

Figure 1. The mean number of scallops (lnCPUE)(scallops/minute) for Back, Bogue, and Core sounds during the October-December sampling time period and average lnCPUE (target) for the 1984-1985 period showing progressive triggers at 50%, 75%, and 125% of the target. Year indicates the sampling year which is used to determine the harvest season for the next calendar year.

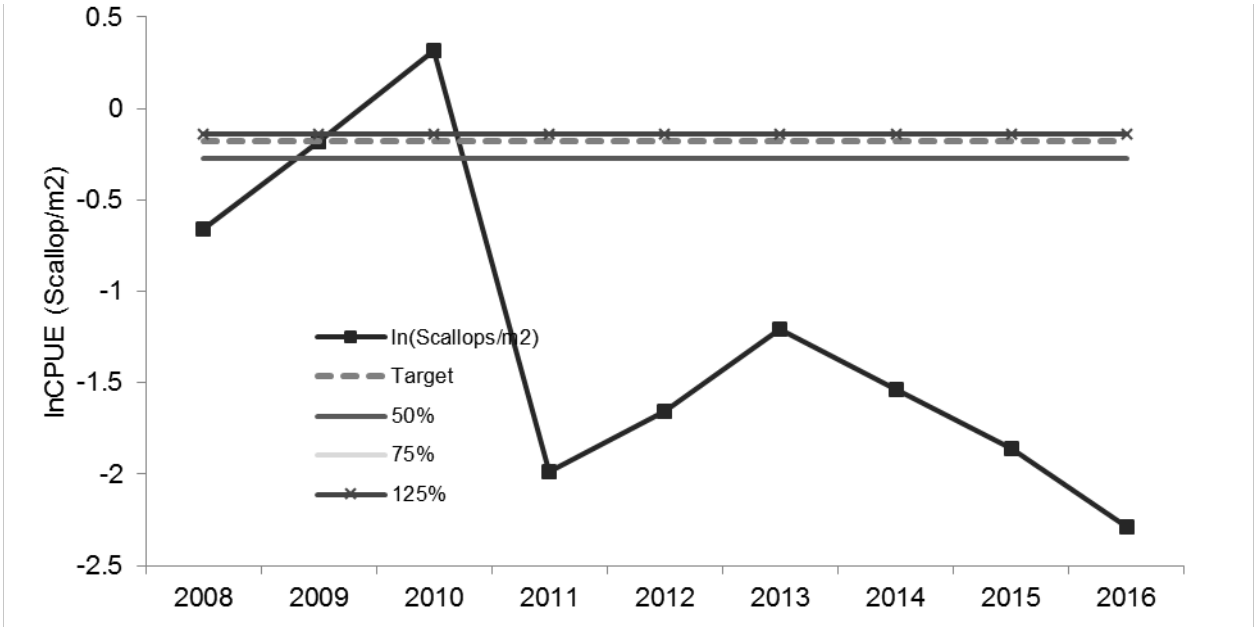

Figure 2. The mean number of bay scallops, lnCPUE (ln(scallops/m^2)), for Pamlico Sound during the January sampling time period and target for the January 2009 period showing progressive triggers at 50%, 75%, and 125% of the target. Year indicates the sampling year which is used to determine the harvest season for the same calendar year.

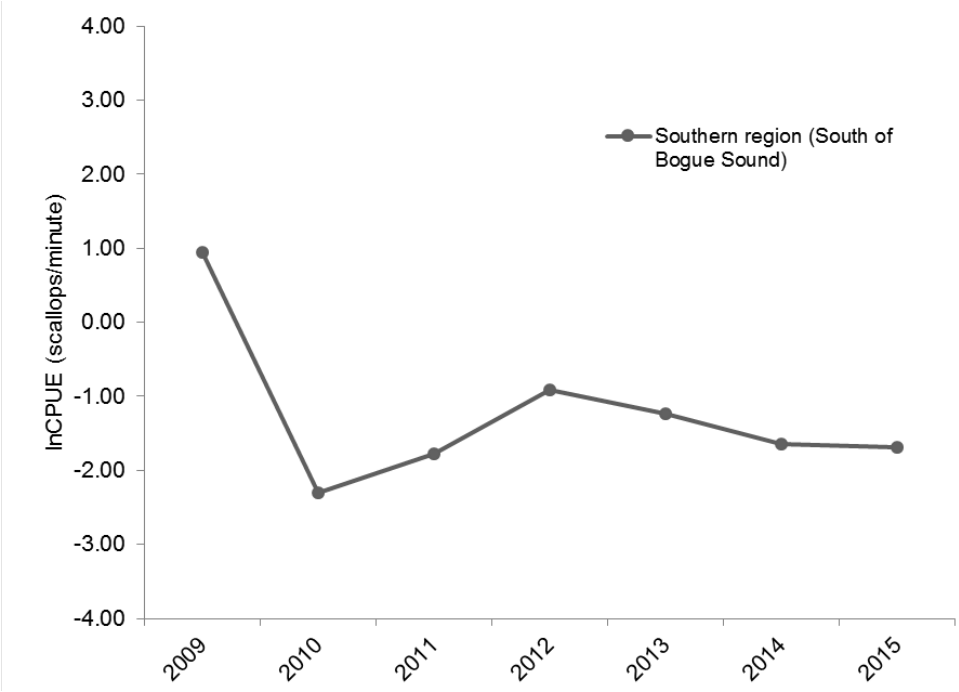

Figure 3. The mean number of scallops (lnCPUE)(scallops/minute) for areas south of Bogue Sound in October, 2009-2015. Target opening estimates and progressive triggers are not defined for this region until sampling is expanded and a longer time series is established.

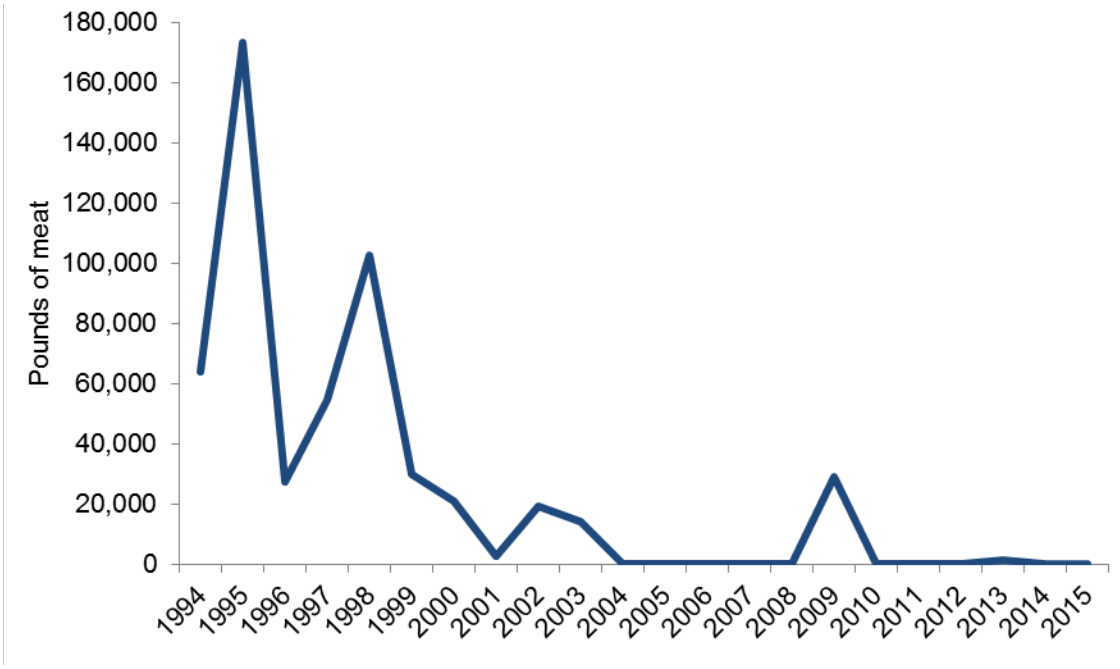

Figure 4. Bay scallop landings (pounds of meat) in North Carolina, 1994-2015. Landings occurred in 2010 and 2013 but are not evident in the figure due to the scale required to show the range of landings for the time series.

FISHERY MANAGEMENT PLAN UPDATE
BLUE CRAB
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	December 1998
Amendments:	December 2004 November 2013
Revisions:	June 2016
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	November 2018

The original North Carolina Blue Crab Fishery Management Plan (FMP) was adopted in December 1998. The plan adopted several management changes including: 1) requiring sinking lines to be used on all crab pot buoys, 2) prohibited commercial gears (except attended gill nets) in crab spawning sanctuaries from March 1 through August 31, 3) prohibited baiting peeler pots except with live legal male blue crabs, 4) repealed the exemption for culling peelers before reaching shore in the hard crab fishery, 5) prohibiting the possession of white line peelers from June 1 through September 30, 6) changed the unattended pot rule from 10 days to 7 days, 7) prohibiting setting pots in any navigation channel marked by State or Federal agencies, 8) modified crab pot area regulations to use depth instead of distance from shore, 9) implemented marking requirements for recreational pots, 10) defined collapsible traps as non-commercial gear, and 11) established a permit for shedding operations (NCDMF 1998).

Amendment 1 was adopted in December 2004. The amendment implemented several management changes including: 1) establishing a 6.75-inch maximum size limit for mature females from September 1 through April 30 if the spawner index fell below the threshold for two consecutive years, 2) establishing a 5.25-inch maximum size limit for female peeler crabs from September 1 through April 30 if the spawner index fell below the threshold for two consecutive years, 3) prohibiting the sale of white-line peelers but allow possession by licensed peeler operations and requiring white-line peelers to be kept separate from pink and red-line peelers, 4) extending the pot cleanup period by nine days, 5) change the unattended pot rule from 7 days to 5 days, 6) requiring a 4-inch stretch mesh tail bag for crab trawls in western Pamlico Sound (including the Pamlico, Pungo, Bay, and Neuse rivers), 7) separate hard and peeler crab trawl landings on trip ticket, 8) modifying channel net rule to incorporate limited blue crab bycatch provisions identical to those for shrimp trawls, 9) modifying user conflict rule to resolve user conflicts on a regional basis, 10) rule change to allow crab pots in all designated long haul areas in the Hyde, Beaufort, and Pamlico counties, 11) modifying the dates for designated crab pot areas from May 1 through October 31 to June 1 through November 30, 12) change

designated pot area boundary description to a standardized 6 foot depth contour in many areas, and 13) prohibit the use of trawls in designated pot areas (NCDMF 2004).

Amendment 2 was adopted in November 2013. The amendment implemented several management changes including: 1) repealing the spawner index trigger and replacing it with adaptive management framework based on the results of the annual Traffic Light Stock Assessment update, 2) open long haul areas in the Pungo River to pots, 3) add Lower Broad Creek to non-pot areas in rule, 4) modify crab dredging rule to conform to current harvest management, 5) incorporate Pamlico Sound four-inch crab trawl line into rule, 6) redefine criteria for exempting escape rings in crab pots from the 1½-inch pot mesh size to unbaited pots and pots baited with a male crab, 7) repeal proclamation authority that allowed for the exemption of escape ring requirement to allow harvest of peeler crabs, 8)adopt no trawl line in Pamlico Sound and Newport River boundary in rule as new boundary for areas where closure of escape rings to take small mature female crabs is allowed, 9) modify trawl nets rule to identify Pamlico, Back, and Core sounds as areas that can open to peeler trawling by proclamation, 10) modify rule to clearly state the intent of the exceptions, culling tolerance, and separation requirements for various crab categories, and 11) establish proclamation authority to require terrapin excluders in crab pots and establish a framework for developing criteria and terrapin excluder specifications (NCDMF 2013).

Based on the results of the annual Traffic Light update management action was required by the North Carolina Marine Fisheries Commission (NCMFC). At their May 19, 2016 business meeting the NCMFC was presented with several management options identified in the adaptive management framework in Amendment 2 to the N.C. Blue Crab FMP. To improve the condition of the blue crab stock the NCMFC adopted the following management measures: 1) require one additional escape ring in crab pots and one of the three escape rings must be located within one full mesh of the corner of the pot and within one full mesh of the bottom of the apron/stairs (divider) of the upper chamber of the pot; 2) eliminate the harvest of v-apron immature female hard crabs (excluding peeler crabs); and include v-apron immature female hard crabs in the culling tolerance; 3) prohibit the harvest of dark sponge crabs (brown and black) from April 1-April 30 each year; and include dark sponge crabs in the culling tolerance; 4) lower the culling tolerance from 10 percent to 5 percent for all crabs, except mature females; and 5) prohibit the harvest of crabs with dredges except incidental to lawful oyster dredging as outlined in NCMFC Rule 15A NCAC 03L .0203(a)(2) (NCDMF 2016).

All adaptive management measures were effective June 6, 2016 except for the additional escape ring requirement which will not be effective until January 15, 2017. This delay coincides with annual pot closure period to allow fishermen time to modify their pots. The above actions taken by the NCMFC are documented in the June 2016 Revision to the N.C. Blue Crab FMP Amendment 2 (NCDMF 2016).

Management Unit

The management unit includes the blue crab (*Callinectes sapidus*) and its fisheries in all coastal fishing waters of North Carolina.

Goal and Objectives

The goal of the North Carolina Blue Crab FMP is to manage the blue crab fishery in a manner that promotes its ecological and economic value, and the long-term viability of the resource through sustainable harvest. The following objectives will be utilized to achieve this goal.

1. Utilize a management strategy that provides resource protection and sustainable harvest, promotes blue crab ecological and economic value, provides opportunity for resource utilization, and considers the needs of all users.

2. Promote harvesting practices that minimize waste of the resource and environmental damage.

3. Promote the protection, restoration, and enhancement of habitats and environmental quality necessary for the perpetuation of the blue crab resource.

4. Maintain a clear distinction between conservation goals and allocation issues.

5. Minimize conflicts among and within user groups, including non-crabbing user groups.

6. Identify and promote research to improve the understanding and management of the blue crab resource.

7. Promote education and public information to help users understand the causes and nature of problems for blue crabs in North Carolina, its habitats and fisheries, and the rationale for efforts to address resource management.

STATUS OF THE STOCK

Stock Status

Results of the current stock assessment suggest the North Carolina blue crab stock is not overfished. The stock status of blue crabs is considered to be of "Concern" because the adult abundance characteristic of the Traffic Light has triggered management action. Even though there is now a more robust assessment of the stock condition, overfishing status cannot be determined at this time.

Stock Assessment

The Traffic Light method was used to assess the blue crab stock in 2011. The Traffic Light Stock Assessment method is capable of synthesizing a variety of information to provide a description of the stock condition. The nature of the Traffic Light method does not allow for a quantitative assessment of sustainable harvest for the North Carolina blue crab stock since overfishing cannot be calculated.

The blue crab stock is considered overfished when the proportion of red in the production characteristic of the Traffic Light method is greater than or equal to the third quartile (≥0.75) for three consecutive years. Based on this definition, the results of the Traffic Light through 2015 indicate the North Carolina blue crab stock is not overfished.

Though the overfished definition is based only on the production characteristic, the adult abundance and recruit abundance characteristics are evaluated annually for warning signs that the stock may be approaching an unfavorable state. If a series of negative trends is evident in the adult abundance and production characteristics for three consecutive years, management action may be taken to reduce the unfavorable condition of the stock. Only the adult abundance

and production characteristics are utilized to trigger management actions; the recruit abundance characteristic may be used to supplement or further direct conservation management actions, if deemed necessary. A review by the Shellfish/Crustacean Advisory Committee is required so they may consider management options and to evaluate their merits. All management measures must be approved by the NCMFC before the Director's proclamation authority (expanded under the adaptive management framework) may be used to implement any changes to the fishery.

The NCMFC preferred adaptive management strategy for blue crabs (Table 1) relies on the Traffic Light Stock Assessment as the tool to provide information on the relative condition of the stock. The base years (1987 to 2009) for assigning the signals in the Traffic Light Stock Assessment will remain constant until the next amendment of the FMP. The Traffic Light Stock Assessment will be updated annually by July of each year.

STATUS OF THE FISHERY

Current Regulations

General Statutes

All management authority for North Carolina's blue crab fishery is vested in the State of North Carolina. Statutes that have been applied to the blue crab fishery include:

- Definitions relating to resources. G.S.113-129.
- Definitions relating to activities of public. G.S.113-130.
- Jurisdiction of fisheries agencies. G.S.113-132.
- It is unlawful for any person without the authority of the owner of the equipment to take fish from said equipment. G.S. 113-268 (a).
- It is unlawful for any vessel in the navigable waters of the State to willfully, wantonly, and unnecessarily do injury to any seine, net or pot. G.S. 113-268 (b).
- It is unlawful for any person to willfully destroy or injure any buoys, markers, stakes, nets, pots, or other devices or property lawfully set out in the open waters of the state in connection with any fishing or fishery. G.S. 113-268 (c).

Marine Fisheries Commission Rules

The NCMFC has established several rules that directly govern the harvest of blue crabs. Below are rules and excerpts from rules that directly affect the blue crab fishery. The rules below do not cover any gear, area, or other rules which may impact the blue crab fishery. As regulations may change, please contact the North Carolina Division of Marine Fisheries (NCDMF) for the most current regulations.

Definitions

Blue Crab Shedding: The process whereby a blue crab emerges soft from its former hard exoskeleton. A shedding operation is any operation that holds peeler crabs in a controlled environment. A controlled environment provides and maintains throughout the shedding process one or more of the following: (i) food, (ii) predator protection, (iii) salinity, (iv) temperature controls, or (v) water circulation, utilizing technology not found in the natural

environment. A shedding operation does not include transporting pink or red-line peeler crabs to a permitted shedding operation. 15A NCAC 03I .0101 (2) (c).

Peeler Crab: A blue crab that has a soft shell developing under a hard shell and having a white, pink, or red-line or rim on the outer edge of the back fin or flipper. 15A NCAC 03I .0101 (2) (f).

Commercial Fishing Equipment or Gear: All fishing equipment used in coastal fishing waters except: (i) Cast nets; (ii) Collapsible crab traps, a trap used for taking crabs with the largest open dimension no larger than 18 inches and that by design is collapsed at all times when in the water, except when it is being retrieved from or lowered to the bottom; (iii) Dip nets or scoops having a handle not more than eight feet in length and a hoop or frame to which the net is attached not exceeding 60 inches along the perimeter; (iv) Gigs or other pointed implements which are propelled by hand, whether or not the implement remains in the hand; (v) Hand operated rakes no more than 12 inches wide and weighing no more than six lb and hand operated tongs; (vi) Hook and line and bait and line equipment other than multiple hook or multiple bait trotline; (vii) Landing nets used to assist in taking fish when the initial and primary method of taking is by the use of hook and line; (viii) Minnow traps when no more than two are in use; (ix) Seines less than 30 feet in length; (x) Spears, Hawaiian slings or similar devices, which propel pointed implements by mechanical means, including elastic tubing or bands, pressurized gas or similar means. 15A NCAC 03I .0101 (3) (c).

Mesh Length: The diagonal distance from the inside of one knot to the outside of the other knot, when the net is stretched hand-tight. 15A NCAC 03I .0101 (3) (k).

Crab Harvest Restrictions

Hard crab minimum size limit of 5 inches measured from tip of spike to tip of spike for male and immature female hard blue crabs. Soft crabs shall be separated where taken and placed in a separate container. Peeler crabs shall be separated where taken and placed in a separate container. White-line peeler crabs shall be separated from pink and red-line peeler crabs where taken and placed in a separate container. Male crabs to be used as peeler bait are exempt from the 5-inch size limit from March 1 through October 31 and hall be placed in a separate container. A culling tolerance of not more than five percent by number shall be allowed for white-line peelers in the pink and red-line peeler container [suspended by Proclamation M-11-2016]. It is unlawful to: sell white-line peelers, possess white-line peelers unless they are to be used by the harvester in the harvester's permitted blue crab shedding operation, possess male white line peelers from June 1 through September 1. It is unlawful to possess more than 50 crabs per person per day not to exceed 100 blue crabs per vessel per day for recreational purposes. To comply with management measures I the N.C. Blue Crab Fishery Management Plan, the Director, may by proclamation, close the harvest of blue crabs and may impose any or all of the following restrictions on the commercial and recreational blue crab harvest: specify, areas, season; time periods, means and methods, culling tolerance, and limit harvest based on size, quantity, sex, reproductive stage, or peeler stage. 15A NCAC 03L .0201 (a) (b) (1) (2) (3) (4) (c) (d) (1) (2) (3) (e) (f).

Spawning Sanctuaries

It is unlawful to set or use trawls, pots, and mechanical methods for oysters or clams or take crabs with the use of commercial fishing equipment from crab spawning sanctuaries [3R .0110 (1) (2) (3) (4) (5)] from March 1 through August 31. During the remainder of the year the Director may, by proclamation, close these areas and may impose any or all of the following

restrictions: areas, time periods, means and methods, and limit harvest based on size, quantity, sex, reproductive stage, or peeler stage. 15A NCAC 03L .0205 (a) (b) (1) (2) (3) (4).

Peeler and Soft Crabs

It is unlawful to possess more than 50 blue crabs in a shedding operation without first obtaining a Blue Crab Shedding Permit from the Division of Marine Fisheries. 15A NCAC 03O .0503 (c).

Recreational Harvest

- Blue crabs may be taken without a commercial license if the following gears are used; cast nets, collapsible crab traps with the largest open dimension no larger than 18 inches, a dip net having a handle not more than 8 feet in length and a hoop or frame to which the net is attached not exceeding 60 inches along the perimeter; single bait-and-line equipment, or seines less than 30 feet. 15A NCAC 03I .0101 (3) (c) (i) (ii) (iii) (vi) (ix)
- Recreational crab pot buoys must be any shade of hot pink in color, and be no less than 5 inches in diameter and length and be engraved with the owner's last name and initials. If a vessel is used the buoy must also be engraved with the gear owner's current motorboat registration number or owner's U.S. vessel documentation name. 15A NCAC 03J .0302 (a) (1) (2).
- It is unlawful for a person to use more than one crab pot attached to the shore along privately owned land or to a privately owned pier without possessing a valid Recreational Commercial Gear License. 15A NCAC 03J .0302 (b).
- Up to five crab pots may be used by holders of the Recreational Commercial Gear License. 15A NCAC 03O .0302 (a) (3).
- Peeler pots are not permitted to be used by holders of the Recreational Commercial Gear License. 15A NCAC 03O .0302 (a) (3).
- One multiple hook or multiple bait trotline up to 100 feet in length may be used to harvest blue crabs. 15A NCAC 03O .0302 (a) (4).
- Trotlines must be marked at both ends with any shade of hot pink in color, and be no less than 5 inches in diameter and length and be engraved with the owner's last name and initials. If a vessel is used the buoy must also be engraved with the gear owner's current motorboat registration number or owner's U.S. vessel documentation name. 15A NCAC 03J .0302.

Trawls

- It is unlawful to use trawl nets in designated pot areas opened to the use of pots and within an area bound by the shoreline to the depth of six feet. 15A NCAC 03J .0104 (b) (6).
- It is unlawful to use shrimp trawls for the taking of blue crabs in internal waters, except that it shall be permissible to take or possess blue crabs incidental to commercial shrimp trawling provided that the weight of the crabs shall not exceed; 50 percent of the total weight of the combined crab and shrimp catch; or 300 lb, whichever is greater. For individuals using shrimp trawls authorized by a Recreational Commercial Gear License, 50 blue crabs, not to exceed 100 blue crabs if two or more Recreational Commercial Gear License holders are on board. The Fisheries Director may, by proclamation, close any area to trawling for specific time periods in order to secure compliance with this rule. 15A NCAC 03J .0104 (f) (1) (2) (A) (B) (g).
- From December 1 through March 31 it is unlawful to possess finfish caught incidental to shrimp and crab trawling in the Atlantic Ocean unless the weight of the combined catch of

shrimp and crabs exceeds the weight of finfish; except that trawlers working south of Bogue Inlet may keep up to 300 lb of kingfish, regardless of their shrimp or crab catch weight. 15A NCAC 03J .0202 (5).

- It is unlawful to take or possess crabs aboard a vessel in internal waters except in areas and during such times as the Fisheries Director may specify by proclamation. 15A NCAC 03L .0202 (a).
- It is unlawful to take crabs with crab trawls with a mesh less than three inches, except in areas of western Pamlico Sound the minimum mesh length is four inches; the Director may, by proclamation, specify other areas for trawl mesh length and increase the minimum mesh length to no more than four inches. 15A NCAC 3L .0202 (b) (1) (2).
- It is unlawful to use trawls with a mesh length less than two inches or with a combined total headrope length exceeding 25 feet for taking soft or peeler crabs. 15A NCAC 03L .0202 (c).
- It is unlawful to use trawl nets for any purpose in any of the special secondary nursery areas, except that the Fisheries Director, may, by proclamation, open any or all of the special secondary nursery areas, or any portion thereof to crab trawling from August 16 through May 14. 15A NCAC 03N .0105 (b), 15A NCAC 03R .0105, 15A NCAC 03L .0100 and .0200.
- It is unlawful to use trawl nets in areas listed in 15A NCAC 3R .0106, except that certain areas may be opened to peeler trawling for single-rigged peeler trawls or double-rigged boats whose combined total headrope length does not exceed 25 feet. 15A NCAC 3J .0104 (b) (4); 15A NCAC 03R .0106 (1).

Crab Pots

- It is unlawful to leave pots in any coastal fishing waters for more than five consecutive days, when such pots are not being employed in fishing operations, except upon a timely and sufficient showing of hardship. 15A NCAC 03I .0105 (b) (1) (2) (A) (B) (3) (c).
- All pots shall be removed from internal waters from January 15 through February 7. Areas may be reopened, by proclamation, to the use of pots after January 19 if it is determined that such areas are free of pots. 15A NCAC 03J .0301 (a) (1).
- From June 1 through November 30 the use of crab pots is restricted in certain areas north and east of the Highway 58 Bridge at Emerald Isle. These areas are described in 15A NCAC 03R .0107 (a). To allow for the variable spatial distribution of crustacea and finfish, the Fisheries Director may, by proclamation, specify time periods for or designate the areas described in 15A NCAC 03R .0107(b); or any part thereof, for the use of pots. From May 1 through November 30 in the Atlantic Ocean and west and south of the Highway 58 Bridge at Emerald Isle in areas and during time periods designated by the Fisheries Director by proclamation.15A NCAC 03J .0301 (a) (2) (A) (B) (3) and 03R .0107 (a) (b).
- It is unlawful to use pots in any navigation channel maintained and marked by State or Federal agencies. 15A NCAC 03J .0301 (b) (1).
- It is unlawful to use pots in any turning basin maintained and marked by the North Carolina Ferry Division. 15A NCAC 03J .0301 (b) (2).
- It is unlawful to use pots in a commercial fishing operation unless each pot is marked by attaching a floating buoy which shall be of solid foam or other solid buoyant material no less than five inches in diameter and no less than five inches in length. Buoys may be any color except yellow or hot pink or any combination of colors that include yellow or hot pink. The pot owner's N.C. motorboat registration number, or U.S. vessel documentation name, or last name and initials shall be engraved in the buoy, or on a metal or plastic tag attached to the buoy. 15A NCAC 03J .0301(c) (1) (2) (3).

- It is unlawful to use crab pots in coastal fishing waters unless each pot contains no less than two unobstructed escape rings that are at least 2 5/16 inches inside diameter and located in the opposite outside panels of the upper chamber of the pot except: unbaited pots, pots baited with a male crab, and pots set in areas described in 15A NCAC 03R .0118. 15A NCAC 03J .0301 (g) [suspended by Proclamation M-11-2016].
- The Fisheries Director may, by proclamation, exempt the escape ring requirement describe in paragraph (g) in order to allow the harvest of mature female crabs and may impose any or all of the following restrictions: specify time, areas, means and methods, seasons, and quantity. 15A NCAC 03J .0301 (h).
- It is unlawful to use more than 150 pots per vessel in the Newport River.15A NCAC 03J .0301(i).
- It is unlawful to remove crab pots from the water or remove crabs from pots between one hour after sunset and one hour before sunrise. 15A NCAC 03J .0301(j).
- It is unlawful to use pots to take crabs unless the line connecting the pot to the buoy is non-floating. 15A NCAC 03J .0301(k).

Crab Dredging

- It is unlawful to use any dredge weighing more than 100 lb except in the Atlantic Ocean. 15A NCAC 03J .0303 (a).
- It is unlawful to use more than one dredge per vessel to take crabs or to use any dredges between sunset and sunrise. 15A NCAC 03J .0303 (b).
- It is unlawful to take crabs with dredges except from January 1 through March 1 in portions of Pamlico Sound. 15A NCAC 03L .0203 (a) (1) and 15A NCAC 03R .0109 [suspended by Proclamation M-11-2016].
- Crabs may be taken incidental to lawful oyster dredging provided the weight of the crabs shall not exceed 50% of the total weight of the combined oyster and crab catch; or 500 lb, whichever is less. 15A NCAC 03L .0203 (a) (2) (A) (B).
- It is unlawful to take crabs with dredges between sunset and sunrise and between sunset on any Saturday and sunrise on the following Monday, except in the Atlantic Ocean. 15A NCAC 03L .0203 (b).

Miscellaneous

- It is unlawful to possess, sell, or purchase fish under four inches in length except for use as bait in the crab pot fishery in North Carolina with the following provision: such crab pot bait shall not be transported west of U.S. Interstate 95 and when transported, shall be accompanied by documentation showing the name and address of the shipper, the name and address of the consignee, and the total weight of the shipment. 15A NCAC 03M .0103 (1).

Wildlife Resources Commission Rules

Manner of Taking Nongame Fish Purchase and Sale

- Blue crabs shall have a minimum carapace width of five inches (point to point) and it is unlawful to possess more than 50 crabs per person per day or to exceed 100 crabs per vessel per day. 15A NCAC 10C .0401 (a) (1).
- Blue crab taken by hook and line, grabbling or by licensed special devices may not be sold. 15A NCAC 10C .0401 (c).

Taking Nongame Fish, Crustaceans, and Mollusks for Bait or Personal Consumption

- A single, multiple bait line for taking crabs not to exceed 100 feet in length that is under the immediate control and attendance of the user and is limited to one line per person and no more than one line per vessel. The line is required to be marked on each end with a solid float no less than five inches in diameter and bearing legible and indelible identification of the user's name and address. 15A NCAC 10C .0402 (a) (6).
- A collapsible crab trap with the largest opening not greater than 18 inches and which, by design, collapses at all times when in the water, except when being retrieved or lowered to the bottom. 15A NCAC 10C .0402 (a) (7).
- Nongame fishes, crustaceans (crayfish and blue crabs), and mollusks taken for bait or personal consumption may not be sold. 15A NCAC 10C .0402 (b).
- No more than 50 crabs per person, per day or 100 per vessel, per day with a minimum carapace width of five inches (point to point) from inland fishing waters or in designated waterfowl impoundments located on game lands. 15A NCAC 10C .0402 (d) (3).

Special Device Fishing

- It is unlawful to use crab pots in inland fishing waters, except by persons owning property adjacent to the inland fishing waters of coastal rivers and their tributaries who are permitted to set two crab pots to be attached to their property and not subject to special device license requirements. 15A NCAC 10C .0404 (e).

Commercial Landings

Commercial blue crab landings (hard, soft, and peeler crabs) averaged 40.5 million lb from 1987 – 2009 (base years used in the traffic light; Figure 1). The majority of blue crab landings are hard blue crabs. Landings for 2015 were 30.1 million lb, under the base year average. Generally, landings have been declining since 2003, although landings for 2015 were 23 percent higher than 2014. Landings have been below the base year average since 2004. Landings data from 1987 – 1994 were collected under the NCDMF/National Marine Fisheries Service Cooperative Statistics Program which was based on voluntary dealer reporting. Since 1994, landings data have been collected under the NCDMF Trip Ticket Program which instituted mandatory dealer reporting. Landings data should be viewed only as a general indicator of fishing trends since they are influenced by market demand, price, fishing effort, weather, availability of alternate species, regulations, and data collection techniques as well as stock abundance.

Recreational Landings

A survey of Recreational Commercial Gear License (RCGL) holders conducted from 2002 – 2008 by the NCDMF indicated blue crabs were the most abundant species landed (by weight) by RCGL participants. During this time, on average, blue crabs accounted for 20% (116,797 lb) of the total poundage (587,172 lb) landed by RCGL holders. This survey was discontinued in 2009 so more recent estimates of RCGL harvest are unavailable. The harvest of RCGL exempted shore and pier based pots, as well as other non-commercial gear, is unknown.

A mail survey of recreational fishermen was started in the fall of 2011 to attempt to generate recreational harvest estimates for blue crab. Results from this survey are available for 2012-2015 (Table 2). Generally, estimates of recreational blue crab harvest were low, ranging from a low of 70,901 blue crabs (approximately 23,634 lb, using an average of three crabs per lb) in 2015 to a high of 120,980 blue crabs (approximately 40,327 lb) in 2012. For 2012 – 2015, the average annual recreational harvest of blue crab was 96,663 blue crabs (approximately 32,221 lb).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The Traffic Light, used to monitor the health of the blue crab stock, uses commercial crab sampling data (combined with fishery-independent data) to determine the annual length of fifty percent maturity for female blue crabs. This index is used in the Production characteristic of the Traffic Light. The annual length of fifty percent maturity is compared to the mean length of fifty percent maturity for the base years of 1987 – 2009 (112.1 mm carapace width; CW). In 2015, the length of fifty percent maturity was 124.7 mm CW and was above the mean for the base years. The length of fifty percent maturity has been above the base year mean since 2005 (Figure 2).

Fishery-Independent Monitoring

The Traffic Light, used to monitor, the health of the blue crab stock, uses several fishery-independent indices for the Adult Abundance, Recruit Abundance, and Production characteristics. The status of each indicator is compared to the mean of that indicator over a set of base years. The base years used for the blue crab traffic light were 1987 – 2009.

Adult Abundance

The adult abundance characteristic uses data from the Juvenile Anadromous Trawl Survey (P100), the Estuarine Trawl Survey (P120), and the Pamlico Sound Survey (P195) to monitor adult blue crab abundance. Indices from P120 and P195 consist of blue crabs greater than or equal to 100 mm CW; an index of total abundance (no size restrictions) is derived from P100. Two indices are derived from P120, a Pamlico index using data from tributaries in and around Pamlico Sound and Core Sound and a Southern index using data collected from Back Sound and south (Figure 3).

Adult abundance for P100 was above the mean for the base years (0.27 crabs/minute) from 2006 – 2012, both 2013 (0.266 crabs/minute) and 2014 (0.23 crabs/minute) adult abundance estimates were below the base year mean but in 2015 (1.04 crabs/minute) adult abundance estimates were above the base year mean. Adult abundance for P120 in the Pamlico region was below the base year mean (0.62 crabs/tow) in 2013 (0.31 crabs/tow), 2014 (0.27 crabs/tow), and 2015 (0.53 crabs/tow). In the Southern region, adult abundance for P120 was below the base year mean (0.15 crabs/tow) from 2011-2014. In 2015, adult abundance was above the base year mean at 0.19 crabs/tow in the Southern region. Adult abundance for P195 has been below the base year mean (4.52 crabs/tow) since 2000. Adult abundance in 2015 was 0.30 crabs/tow and was the lowest in the 29-year time series. Figure 4 shows the individual traffic lights for each index as well as the composite adult abundance traffic light.

Recruit Abundance

The recruit abundance characteristic uses data from the Estuarine Trawl Survey (P120) and the Pamlico Sound Survey (P195) to monitor blue crab recruit abundance. Each index consists of blue crabs less than 100 mm CW and greater than or equal to 30 mm CW. Two indices are derived from P120, a Pamlico index using data from tributaries in and around Pamlico Sound and Core Sound and a Southern index using data collected from Back Sound and south. Two indices are also derived from P195, a summer (June) and a fall (September) index (Figure 5).

Recruit abundance for P120 in the Pamlico region was below the base year mean (1.93 crabs/tow) in 2013 (0.66 crabs/tow), 2014 (0.66 crabs/tow), and 2015 (1.72 crabs/tow). In the Southern region, recruit abundance has been below the base year mean (0.44 crabs/tow) since 2005. In 2015, recruit abundance was 0.33 crabs/tow in the Southern region. Recruit abundance for P195 in the summer has been below the base year mean (29.66 crabs/tow) since 2011. In the fall, recruit abundance has been below the base year mean (3.49 crabs/tow) since 1998. In 2015, recruit abundance was 0.65 crabs/tow in the fall. Figure 6 shows the individual traffic lights for each index as well as the composite recruit abundance traffic light.

Production

The production characteristic uses data from the Juvenile Anadromous Trawl Survey (P100), the Estuarine Trawl Survey (P120), and the Pamlico Sound Survey (P195) to monitor the blue crab stock's production potential. The production indicators include measures of median carapace width, pre-recruit abundance (blue crabs less than 30 mm CW), length at fifty percent maturity (see fishery-dependent monitoring section), spawning stock (mature female mm/minute), and frequency of occurrence of mature females (percent of samples with mature female blue crabs).

Three indices are derived from P100 including median carapace width, spawning stock, and frequency of occurrence of mature females (Figure 7). Median carapace width has been below the base year mean (114.2 mm) from 2009-2014. In 2015, the median carapace width was above the base year mean at 124 mm in P100. The spawning stock index has been below the base year mean (19.54 mm/minute) from 2012-2014. In 2015, the spawning stock index was above the base year mean at 146.79 mm/minute in P100. The frequency of occurrence of mature females was above the base year mean (23.4 percent) from 2005 – 2013, and then dipped below in 2014; in 2015 the frequency of occurrence of mature females was 40.8 percent, above the base year mean.

Three indices are derived from P120 including Pamlico and Southern region median carapace width and a statewide pre-recruit abundance index (Figure 8). Median carapace width was below the base year mean (34.3 mm) in 2013 (19 mm) and 2014 (22 mm) but was above the base year mean in 2015 (38 mm) in the Pamlico region. In the Southern region, median carapace width was below the base year mean (32.7 mm) in 2013 (29 mm) and 2014 (32 mm) but was above the base year mean in 2015 (37 mm). The statewide pre-recruit index has been below the base year mean (1.10 crabs/tow) since 2010; in 2015 the pre-recruit index was 0.71 crabs/tow.

Four indices are derived from P195 including summer and fall median carapace width, fall spawning stock, and fall frequency of occurrence of mature female indices (Figure 9). The

summer median carapace width index was below the base year mean (72.1 mm) in 2013 (54 mm) and 2014 (58 mm) but was above the base year mean in 2015 (77 mm). The fall median carapace width index was above the base year mean (107.7mm) from 2010 - 2013; in 2014 (56 mm) and 2015 (64 mm) the fall median carapace width was below the base year mean. The fall spawning stock index has been below the base year mean (741.7 mm/tow) since 2004; in 2015 the fall spawning index was 80.7 mm/tow. The frequency of occurrence of mature females has been below the base year mean (55.9 percent) since 2004; in 2015 the frequency of occurrence of mature females was 20.4 percent and was the second lowest in the 29-year time series. Figure 10 shows the individual traffic lights for each index as well as the composite production traffic light.

MANAGEMENT STRATEGY

Traffic Light

The NCMFC preferred management strategy for blue crabs relies on the Traffic Light Stock Assessment approach to provide information on the relative condition of the stock. The base years (1987 to 2009) for assigning the signals in the Traffic Light Stock Assessment will remain constant until the next amendment of the FMP. The Traffic Light Stock Assessment is updated annually by July of each year to gauge the current status of the stock. To trigger management actions, either the adult abundance or production characteristic of the assessment must be at or above the 50 percent red threshold for three consecutive years to trigger the moderate management actions and must be at or above the 75 percent red threshold for two of three consecutive years to trigger the elevated management actions established in the plan (Table 1). The recruit abundance indicator, while not used to trigger initial management action, may be used to supplement any management actions taken if the adult abundance or production triggers are activated.

The current assessment update indicates the adult abundance characteristic has met the moderate threshold for the third consecutive year. Currently the adult abundance characteristic is at 50 percent red. Currently the production characteristic is at 44 percent red. The recruit abundance characteristic has exceeded the moderate threshold for the fourth consecutive year and has exceeded the elevated threshold for two of the past three consecutive years. Currently the recruit abundance characteristic is at 74.5 percent red (Figure 11).

This serves as the third of the three consecutive years meeting the moderate threshold for the adult abundance characteristic, that is required before moderate management action must be taken.

Based on the results of the Traffic Light update management action was required by the NCMFC. At their May 19, 2016 business meeting the NCMFC was presented with several management options identified in the adaptive management framework in Amendment 2 to the N.C. Blue Crab FMP. To improve the condition of the blue crab stock the NCMFC took the following actions:

1. Required one additional escape ring in crab pots and one of the three escape rings must be located within one full mesh of the corner of the pot and within one full mesh of the bottom of the apron/stairs (divider) of the upper chamber of the pot.
2. Eliminated the harvest of v-apron immature female hard crabs (excluding peeler crabs); and include v-apron immature female hard crabs in the culling tolerance.

3. Prohibited the harvest of dark sponge crabs (brown and black) from April 1-April 30 each year; and include dark sponge crabs in the culling tolerance.
4. Lowered the culling tolerance from 10 percent to 5 percent for all crabs, except mature females.
5. Prohibited the harvest of crabs with dredges except incidental to lawful oyster dredging as outlined in NCMFC Rule 15A NCAC 03L .0203(a)(2).

All adaptive management measures were effective June 6, 2016 except for the additional escape ring requirement which will not be effective until January 15, 2017. This delay is to allow fishermen time to modify their pots (NCDMF 2016).

Principal Issues

Several management issues were explored in Amendment 2; Table 3 outlines the specific issue explored and the implementation status of each management strategy.

MANAGEMENT AND RESEARCH NEEDS

Several management and research needs were identified in N.C. Blue Crab Fishery Management Plan Amendment 2; Table 4 outlines the specific needs and highlights the progress made towards each management and research need.

FISHERY MANAGEMENT PLAN RECOMMENDATION

The NCDMF recommendation is to maintain the timing of the Benchmark Review “as is” on the current FMP schedule. Currently the review is scheduled to begin in November 2018.

LITERATURE CITED

NCDMF. 1998. North Carolina Blue Crab Fishery Management Plan. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. Morehead City, NC. 178 p.

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NCDMF. 2016. June 2016 Revision to the North Carolina Blue Crab Fishery Management Plan Amendment 2. Department of Environmental Quality. North Carolina Division of Marine Fisheries. Morehead City, NC.

TABLES

Table 1. Management measures in N.C. Blue Crab Fishery Management Plan Amendment 2 that may be implemented by proclamation as described in the blue crab adaptive management framework when a stock characteristic exceeds a designated management threshold.

Characteristic	Moderate management level	Elevated management level
Adult abundance	A1. Increase in minimum size limit for male and immature female crabs	A4. Closure of the fishery (season and/or gear)
	A2. Reduction in tolerance of sub-legal size blue crabs (to a minimum of 5%) and/or implement gear modifications to reduce sublegal catch	A5. Reduction in tolerance of sub-legal size blue crabs (to a minimum of 1%) and/or implement gear modifications to reduce sublegal catch
	A3. Eliminate harvest of v-apron immature hard crab females	A6. Time restrictions
Recruit abundance	R1. Establish a seasonal size limit on peeler crabs	R4. Prohibit harvest of sponge crabs (all) and/or require sponge crab excluders in pots in specific areas
	R2. Restrict trip level harvest of sponge crabs (tolerance, quantity, sponge color)	R5. Expand existing and/or designate new crab spawning sanctuaries
	R3. Close the crab spawning sanctuaries from September 1 to February 28 and may impose further restrictions	R6. Closure of the fishery (season and/or gear)
		R7. Gear modifications in the crab trawl fishery
Production	P1. Restrict trip level harvest of sponge crabs (tolerance, quantity, sponge color)	P4. Prohibit harvest of sponge crabs (all) and/or require sponge crab excluders in pots for specific areas
	P2. Minimum and/or maximum size limit for mature female crabs	P5. Reduce peeler harvest (no white line peelers and/or peeler size limit)
	P3. Close the crab spawning sanctuaries from September 1 to February 28 and may impose further restrictions	P6. Expand existing and/or designate new crab spawning sanctuaries
		P7. Closure of the fishery (season and/or gear)

Table 2. Recreational blue crab trip, harvest, and discard estimates (number of blue crabs), 2012 – 2015. Percent standard error (PSE) is a measure of precision.

Year	Estimated Blue Crab Trips	PSE for Trips (%)	Estimated Blue Crabs Kept	PSE for Kept(%)	Estimated Blue Crab Discards	PSE for Discards	Estimated Total Catch	PSE for Total Catch
2012	26,863	8.9	120,980	12.0	79,072	12.5	200,052	11.5
2013	30,731	11.6	94,174	13.9	61,451	15.7	155,626	13.1
2014	23,381	11.3	100,596	19.5	67,413	15.7	168,010	16.5
2015	39,344	35.8	70,901	17.2	75,757	26.5	146,657	17.9

Table 3. Summary of management strategies and outcomes from N.C. Blue Crab Fishery Management Plan Amendment 2.

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Stock Protection			
11.1 Adaptive management framework for the North Carolina blue crab stock	1. Repeal the current female stock conservation management trigger.	1	Rule change to 03L .0201 **Completed**
	2. Continue existing sampling programs to maintain baseline information for the Traffic Light Stock Assessment method.	1 and 6	No action required.
	3. Adopt the adaptive management framework based on the Traffic Light Stock Assessment and the proposed moderate and elevated management levels for recruit abundance, adult abundance, and production characteristics. Initial management action will only be implemented when either the adult abundance or production characteristic reach the management trigger of 50% red or greater for three consecutive years. The recruit abundance characteristic will be used as a supplement to further direct conservation management actions, if deemed necessary.	1 and 6	Rule change to 03L .0201, 03L .0203, 03L .0204, 03L .0205, 03L .0206, 03L .0209, and 03J .0301. **Completed**
User Conflicts			
11.2 Crab pot limit for southern Bogue Sound	Status quo, continue with no crab pot limit in southern Bogue Sound.	1, 4, and 5	No action required.
11.3 Consider allowing non-pot areas in the Pungo River area to be re-designated as open to pots	Open the non-pot (long haul net) areas all the time by rule in the Pungo River and keep status quo in the Long Point area on the Pamlico River.	1, 4, and 5	Rule change to 03R .0107. **Completed**
Clarification of Rules			
11.4 Incorporate the lower Broad Creek closure of pot area into rule	Modify the rule to include the lower Broad Creek area that is closed to crab pots from June 1 through November 30.	1, 4, and 5	Rule change to 03R .0107. **Completed**
11.5 Clarify crab dredging restrictions	Amend the rule to match harvest management for crab dredging.	2	Rule change to 03L .0203. **Completed**

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Clarification of Rules			
11.6 Incorporate the Pamlico Sound crab trawling proclamation into rule 15A NCAC 03L .0202	Modify Rule 15A NCAC 03L .0202 to incorporate the long-standing provisions of Proclamation SH-5-2007 (Pamlico Sound four inch mesh crab trawl line), and retain the Director's proclamation authority to restrict crab trawl mesh size.	1 and 2	Rule change to 03L .0202 **Completed**
11.7 Explore options for escape ring exemptions in hard crab pots to harvest peeler crabs	1. Amend the current rule to redefine criteria for exempting escape rings in crab pots from the 1½-inch pot mesh size to unbaited pots and pots baited with a male crab.	1, 2, and 5	Rule change to 03J .0301 and 03L .0301. **Completed**
	2. Repeal the proclamation authority that allows for exempting the escape ring requirement in order to allow the harvest of peeler crabs.	1 and 5	Rule change to 03J .0301. **Completed**
11.8 Convert crab pot escape ring proclamation exemptions for mature females into rule	Adopt the no trawl line along the Outer Banks in Pamlico Sound as the new boundary in Pamlico Sound, and the Newport River boundaries as delineated in the proposed rule as new boundaries for the area where closure of escape rings to take small mature females is allowed.	1 and 4	Rule change to 03J .0301. Add new rule 03R .0118. **Completed**
11.9 Correction of peeler trawl exception rule	Modify Rule 15A NCAC 03J .0104 (b)(4) TRAWL NETS to correctly reference the Pamlico, Back and Core sounds as the areas in which the Director can open peeler trawling by proclamation.	1 and 2	Rule change to 03J .0104. **Completed**
11.10 Blue crab size limit and culling tolerance	Modify rule to clearly state the intent of the exceptions, culling tolerance, and separation requirements for the various categories of crabs.	1	Rule change to 03L .0201. **Completed**
Harvest Practices			
11.11 Allow floating crab pot lines in areas where obstructions exist	Status quo, continue with non-floating line on crab pots.	1, 2, and 5	No action required.

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Harvest Practices			
11.12 Diamondback terrapins interactions with the blue crab fishery in North Carolina	1. Establish proclamation authority for requiring terrapin excluder devices in crab pots.	2 and 5	Rule change to 03L .0204. **Completed**
	2. Establish a framework for developing proclamation use criteria and terrapin excluder specifications which may extend until after adoption of the amendment. The strategy is contingent on: a. Consultation with the Crustacean Advisory Committee on developing criteria; and b. No use of the proclamation authority until criteria is approved by the Marine Fisheries Commission.	2 and 5	Staff is developing an issue paper to be presented later this year.
11.13 Multiple pots to a single buoy	Status quo, do not allow multiple pots to a single buoy.	1 and 5	No action required.
11.14 Pot loss and ghost pot bycatch mortality	1. Encourage crab potters in areas of high pot loss to incorporate methods to reduce pot loss. Develop and provide information on potential methods to reduce pot loss.	6 and 7	Develop and provide information on potential methods to reduce pot loss.
	2. Encourage crab potters in areas of high pot loss to incorporate escape panel designs in pots to reduce potential ghost fishing impacts. Develop and provide information on potential methods and materials to reduce ghost fishing impacts.	6 and 7	Develop and provide information on potential methods and materials to reduce ghost fishing impacts.
Environmental Factors			
10.4 Habitat	1. Identify and designate Strategic Habitat Areas that will enhance protection of the blue crab.	1, 3, and 6	Existing authority through the Coastal Habitat Protection Plan (CHPP).

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Environmental Factors			
10.4 Habitat	2. Identify, research, and designate additional areas as Primary Nursery Areas that may be important to blue crabs as well as other fisheries.	1, 3, and 6	Existing authority through the CHPP.
	3. Continue to map blue crab spawning areas and evaluate any that need to adjust or expand the boundaries or restrictions of the crab spawning sanctuaries based on recent research.	1, 3, and 6	Existing authority through the CHPP.
	4. Remap and monitor submerged aquatic vegetation in North Carolina to assess distribution and change over time.	3 and 6	Existing authority through the CHPP.
	5. Restore coastal wetlands to compensate for previous losses and enhance habitat and water quality conditions for the blue crab.	3 and 6	Existing authority through the CHPP.
	6. Work with Coastal Resource Commission to revise shoreline stabilization rules to adequately protect riparian wetlands and shallow water habitat and significantly reduce the rate of shoreline hardening.	3	Existing authority through the CHPP.
	7. Develop and implement a comprehensive coastal marina and dock management plan and policy to minimize impacts to submerged aquatic vegetation, wetland edge, and other habitat important to blue crab.	3	Existing authority through the CHPP.
	8. Assess the distribution, concentration, and threat of heavy metals and other toxic contaminants in freshwater and estuarine sediments and identify the areas of greatest concern to focus water quality improvement efforts.	3 and 6	Existing authority through the CHPP.
	9. Support oyster shell recycling and oyster sanctuary programs to provide areas of enhanced or restored shell bottom habitat.	3	Existing authority through the CHPP.

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Environmental Factors			
10.4 Habitat	10. Consider if prohibition of crab dredging is advisable.	2	Existing authority through the CHPP.
	11. Protect “recruitment bottlenecks”, like inlets for the blue crab, from trawling or other impacts including natural channel modification using hardened structures like groins and jetties.	2 and 3	Existing authority through the CHPP.
	12. Shallow areas where trawling is currently allowed should be re-examined to determine if additional restrictions are necessary.	2	Existing authority through the CHPP.
10.4 Water Quality	1. Improve methods to reduce sediment and nutrient pollution from construction sites, agriculture, and forestry.	3	Existing authority through the CHPP.
	2. Increase on-site infiltration of storm water through voluntary or regulatory measures.	3	Existing authority through the CHPP.
	3. Provide more incentives for low-impact development.	3	Existing authority through the CHPP.
	4. Aggressively reduce point source pollution from wastewater through improved inspections of wastewater treatment facilities, improved maintenance of collection infrastructure, and establishment of additional incentives to local governments for wastewater treatment plant upgrading.	3	Existing authority through the CHPP.
	5. Provide proper disposal of unwanted drugs, prevent the use of harmful JHA insecticides near-surface waters or in livestock feed, and develop technologies to treat wastewater for antibiotics and hormones.	3, 6, and 7	Existing authority through the CHPP.

Table 4. Summary of research needs and outcomes from N.C. Blue Crab Fishery Management Plan Amendment 2.

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Continue to support research to determine the status of protected species (e.g., migration patterns, habitat utilization) along the North Carolina coast to better anticipate and prevent interactions.	2 and 5	No Action
Support research on blue crab fishery interactions with protected species (e.g., identifying any seasonal or spatial peaks in potential for interactions).	2 and 5	Ongoing; Began an observer program for Pamlico Sound in 2000, and expanded into other areas of state. Recently began using observers on alternative platforms which may reduce the type of finfish bycatch data collected. Currently monitoring set gill net fisheries statewide.
Support gear modification research and testing that could reduce protected species interactions.	2 and 5	No Action
Continue socioeconomic surveys of blue crab harvesters and include wholesale and retail benefits, the entire support industry for this fishery including suppliers, picking houses, and restaurants..	1, 6, and 7	Ongoing
Update Recreational Commercial Gear License (RCGL) survey.	6	No Action
Continue survey and compile data of recreational crabbers not possessing a RCGL license.	6	Ongoing through a recreational mail survey.
Determine the economic effects of imported crabmeat, including the mixture of imported meat with local crabmeat, on processing and demand.	1 and 6	No Action
Determine the costs associated with crab processing. Identify the factors and their relative importance in predicting processor closures.	1 and 6	No Action
Research the changing demographics of the commercial blue crab fishery.	1 and 6	No Action
Continue research on the impacts of endocrine disrupting chemicals (EDCs) on the various life stages of the blue crabs and way to reduce introduction of EDCs into estuarine waters.	1, 3, 6, and 7	No Action

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Assess the impact of winter inlet deepening dredge activities on the overwintering female blue crabs and their habitat.	1, 3, and 6	No Action
Determine the spatial and biological characteristics of SAV beds that maximize their ecological value to the blue crab for restoration or conservation purposes.	1, 3, and 6	Ongoing CHPP and SHA work group
Identify, research, and map shallow detrital areas important to blue crabs.	1, 3, and 6	Ongoing CHPP and SHA work group
Additional research is needed on the extent, causes, and impacts of hypoxia and anoxia on blue crab behavior and population abundance in North Carolina's estuarine waters.	1, 3, and 6	Ongoing CHPP
Conduct research on the water quality impacts of crab pot zincs, bait discard, and alternative crab baits in the pot fishery.	1, 3, and 6	No Action
Develop methods to expand sampling effort to more accurately assess the status of the blue crab stock and its fisheries.	1 and 6	Ongoing
Continue research on blue crab discards in the shrimp trawl fishery.	1, 2, and 6	Ongoing through characterization studies using onboard observers.
Expand research state wide on the use of terrapin excluder devices in crab pots	1, 3, and 5	Ongoing
Implement outreach programs to inform state agencies, the public, and the commercial and recreational fishing industries about issues relating to protected species and fishery management.	1, 2, and 7	Ongoing
Continue gear development research to minimize species interactions.	1, 2, and 6	Ongoing
Continue existing programs that have been used to monitor North Carolina's blue crab stock to maintain baseline data	1 and 6	Ongoing through existing surveys.
Identify key environmental factors that significantly impact North Carolina's blue crab stock and investigate assessment methods that can account for these environmental factors	1 and 6	Ongoing

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Conduct a study of the selectivity of the gear used in the Juvenile Anadromous Trawl Survey (Program 100) to evaluate the size at which blue crabs are fully-selected to the survey gear; the results of such a study could help determine whether the survey data could be used to develop a reliable index of blue crab recruitment for the Albemarle region; no such index is currently available	1 and 6	No Action
Expand spatial coverage of the Estuarine Trawl Survey (Program 120) to include shallow-water habitat in Albemarle Sound; sampling in shallow-water habitat is intended to target juvenile blue crabs so that a recruitment index for the Albemarle Sound could be developed	1 and 6	No Action
Expand temporal coverage of the Estuarine Trawl Survey (Program 120) beyond May and June sampling; additional sampling later in the blue crab's growing season would provide more information on within-year changes in growth, mortality, and abundance; at a minimum, recommend addition of September sampling in order to capture the fall settlement peak	1 and 6	No Action
Expand spatial coverage of Pamlico Sound Survey (Program 195) to include deep water habitat in Albemarle Sound and the Southern Region; expanding the sampling region of adult blue crab habitat would allow for a more spatially-comprehensive adult index; additionally, there would be increased confidence in comparison of adult abundance trends among regions since all would derive from the same sampling methodology	1 and 6	No Action
Implement a statewide survey with the primary goal of monitoring the abundance of blue crabs in the entire state; such a survey would need to be stratified by water depth to ensure capture of all stages of the blue crabs life cycle and standardized among North Carolina waters	1 and 6	No Action

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Implement monitoring of megalopal settlement near the ocean inlets could potentially add a predictive function to the blue crab stock assessments in the future; Forward et al. (2004) detected a positive, linear relationship between megalopal abundance and commercial landings of hard blue crabs for both the local estuarine area and the entire state of North Carolina when a two-year time lag was implemented (Forward et al. 2004); such monitoring is critical to track larval ingress peaks and the effect of natural forces, such as tropical storms and prevailing winds, on ingress.	1 and 6	No Action
Continue surveys of recreational harvest and effort to improve characterization of the recreational fishery for blue crabs	1 and 6	Ongoing through a recreational mail survey.
Identify programs outside the NCDMF that collect data of potential use to the stock assessment of North Carolina's blue crabs	1 and 6	No Action
Perform in-depth analysis of available data; consider standardization techniques to account for gear and other effects in development of indices; explore utility of spatial analysis in assessing the blue crab stock	1, 6	No Action

FIGURES

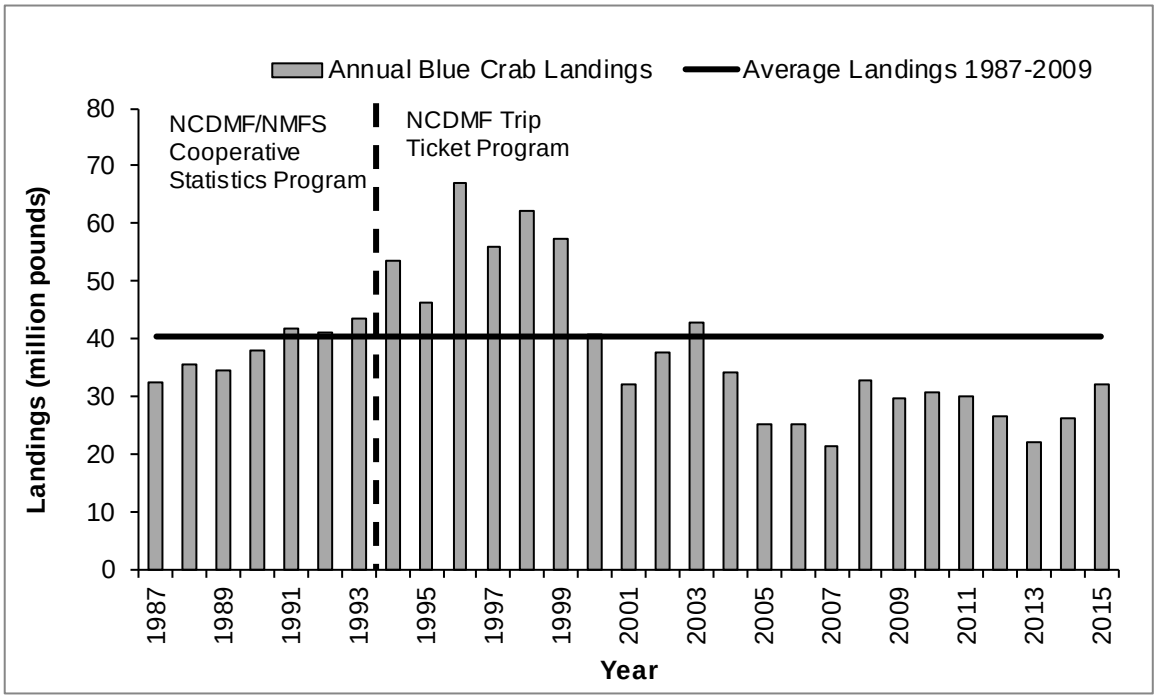

Figure 1. Annual blue crab commercial landings, 1987-2015. Landings include hard, soft, and peeler crabs. The vertical dashed line denotes the change from a voluntary to a mandatory commercial landings reporting program.

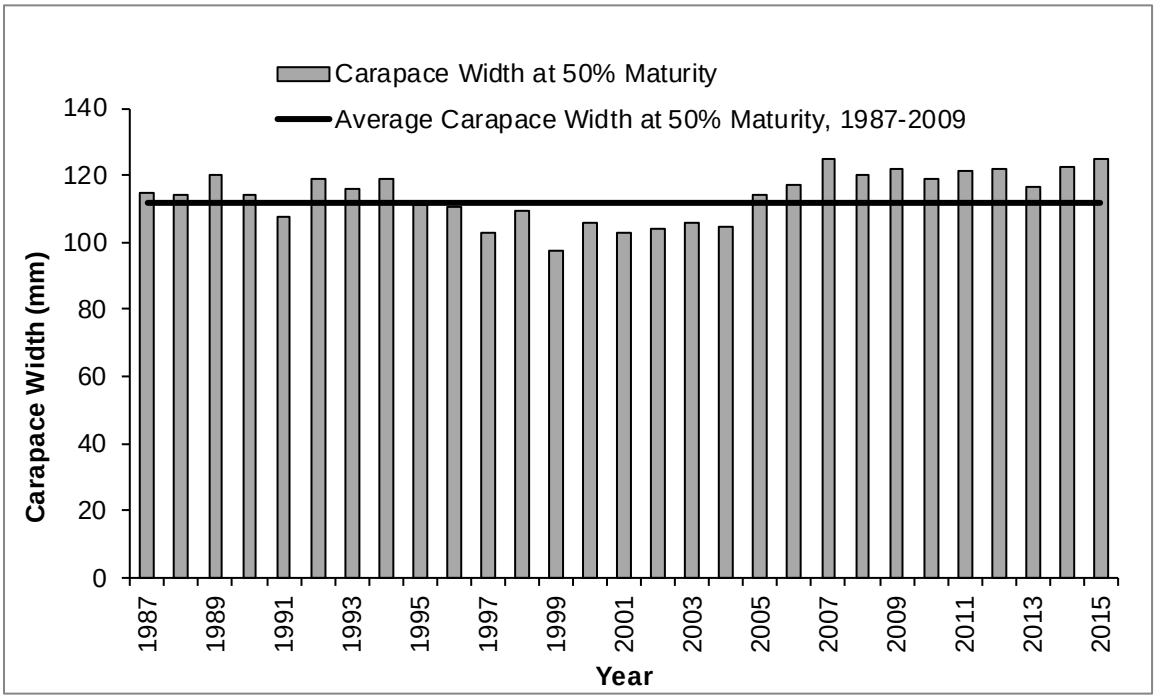

Figure 2. Length at 50% maturity for female blue crabs used in the production characteristic of the Blue Crab Traffic Light, 1987-2015. Fishery-dependent and independent data were included in the analysis.

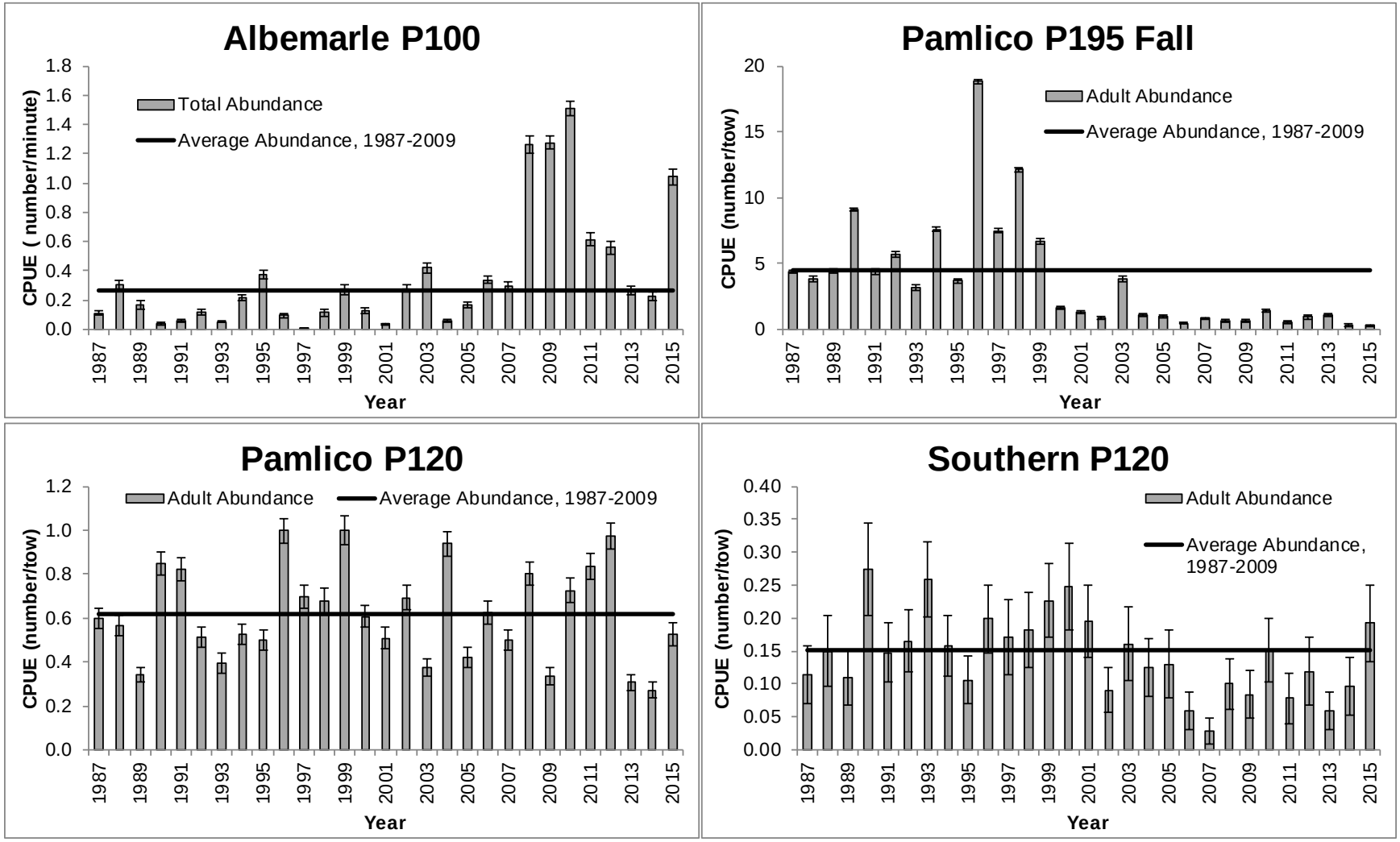

Figure 3. Indices from NCDMF programs P100, P120, and P195 used for the adult abundance characteristic of the Blue Crab Traffic Light, 1987-2015. Error bars represent one standard error of the mean.

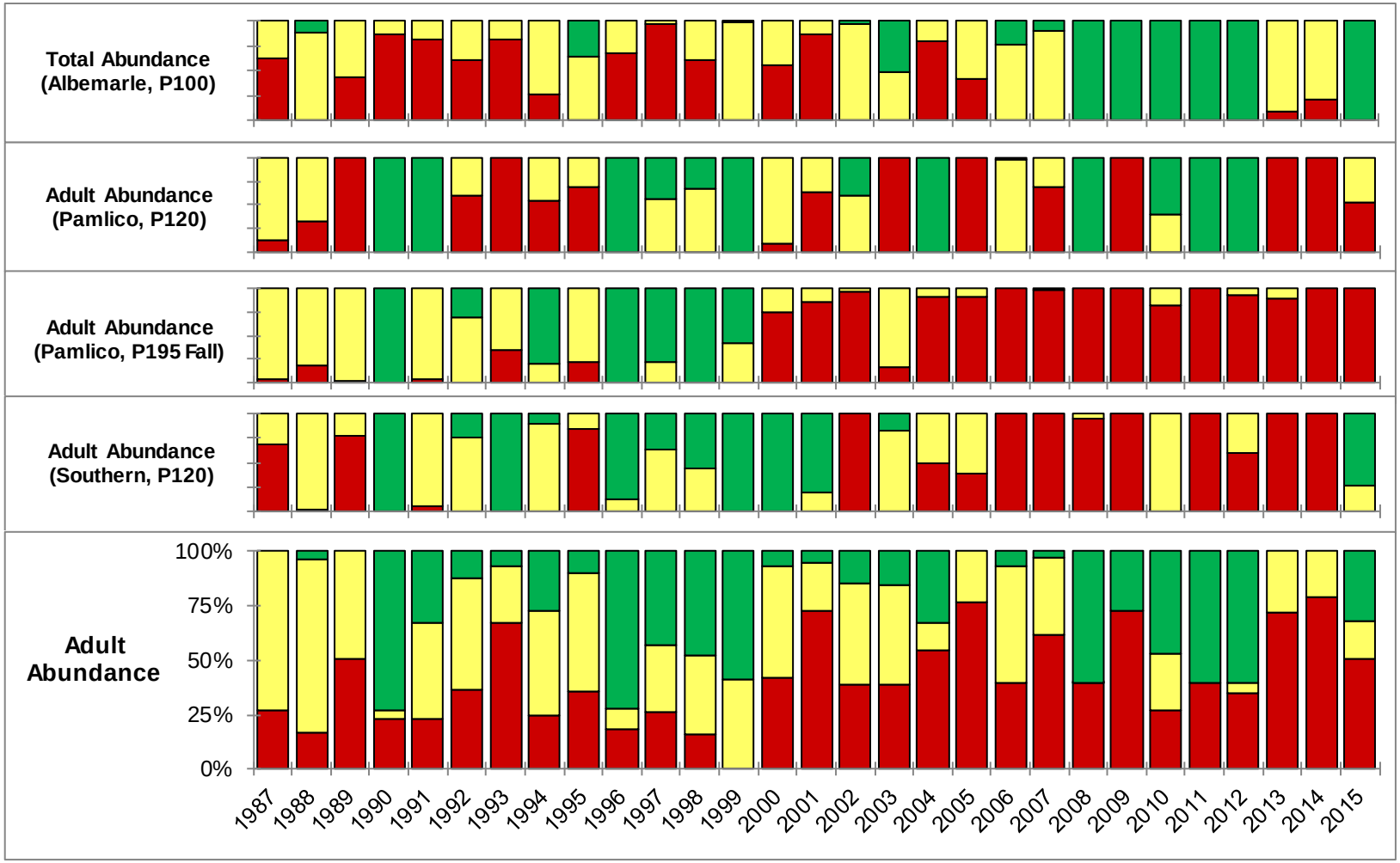

Figure 4. Blue Crab Traffic Light individual adult abundance indicators and the integrated summary (bottom figure), 1987-2015.

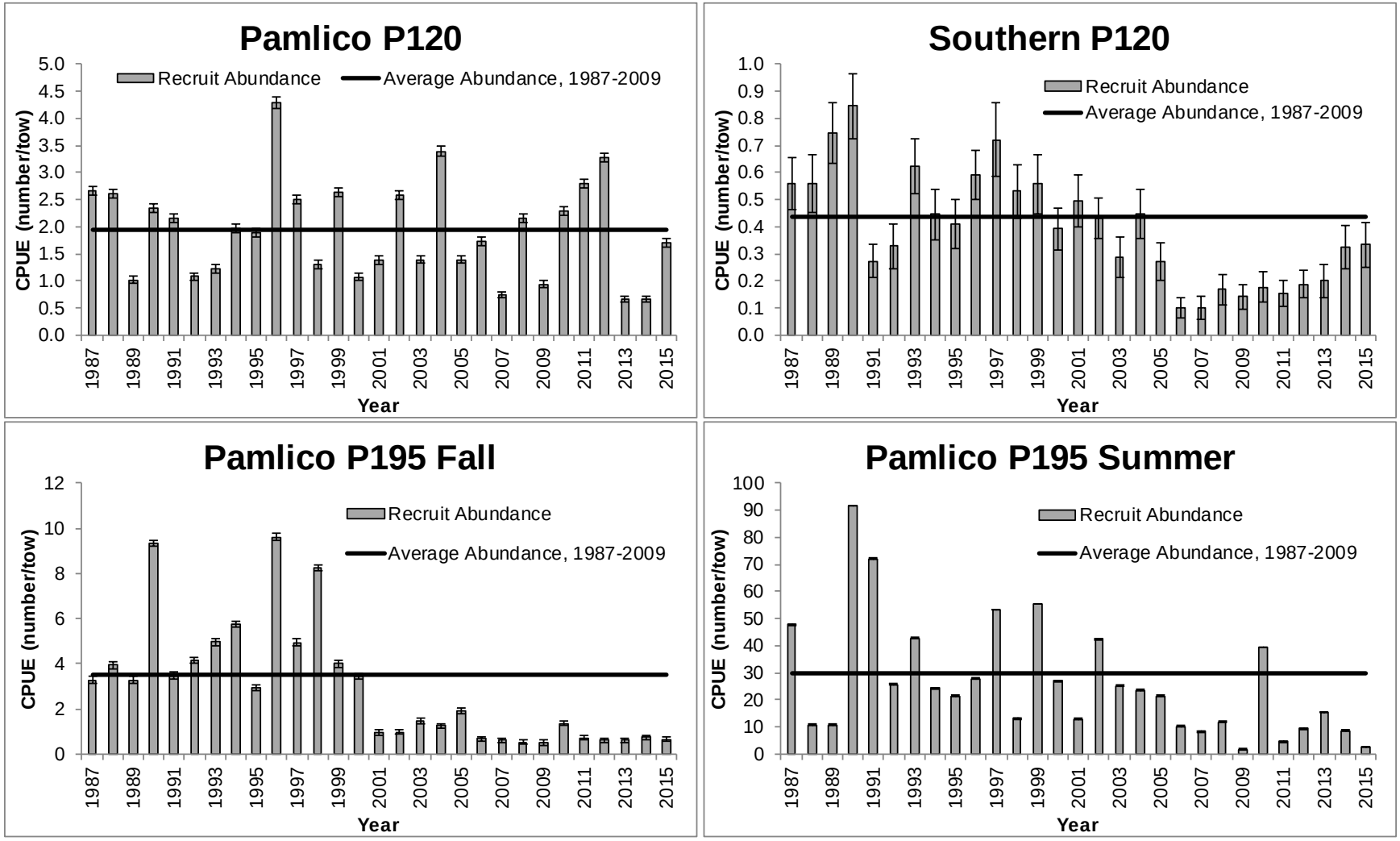

Figure 5. Indices from NCDMF programs P120 and P195 used for the recruit abundance characteristic of the Blue Crab Traffic Light, 1987-2015. Error bars represent one standard error of the mean.

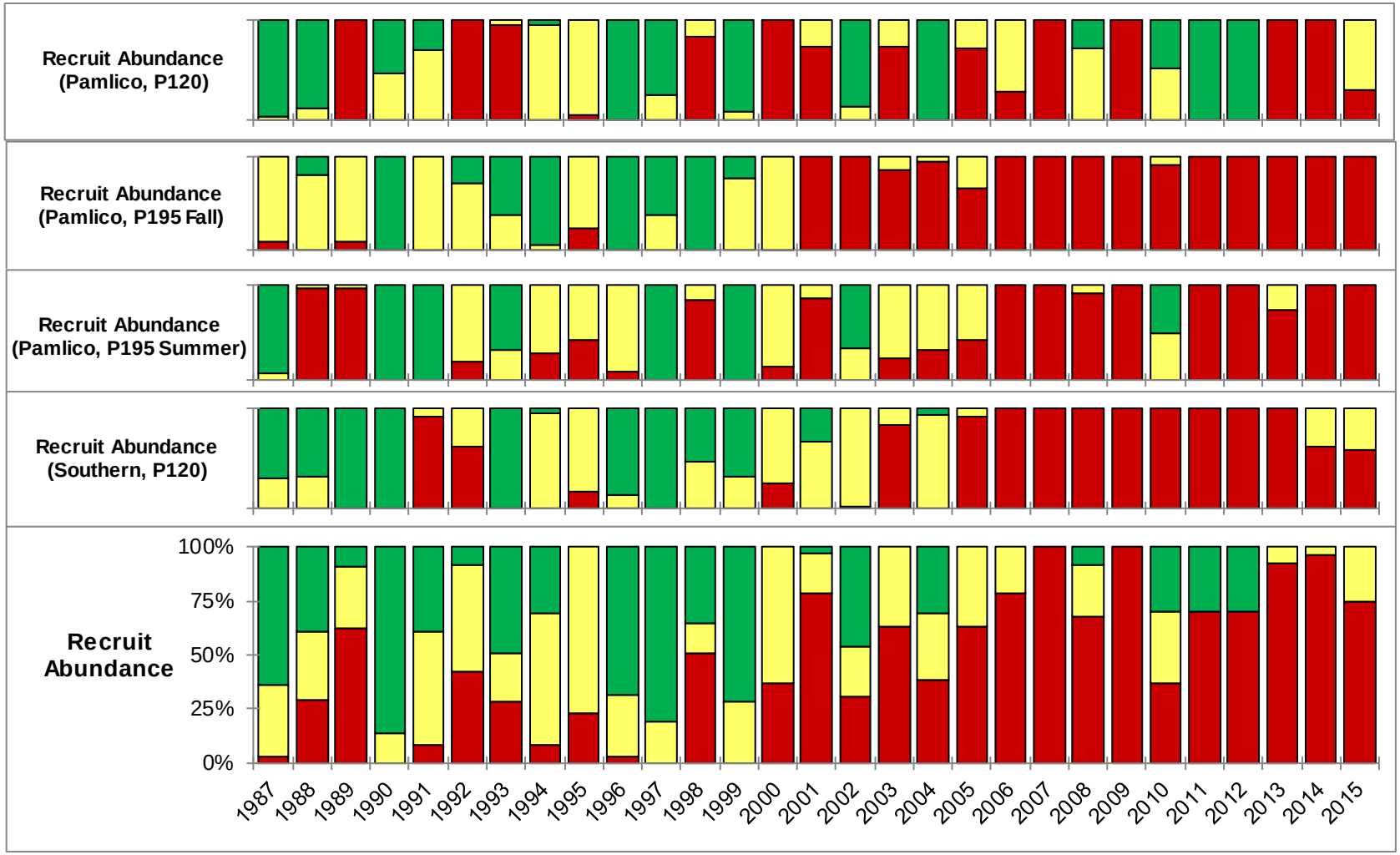

Figure 6. Blue Crab Traffic Light individual recruit abundance indicators and the integrated summary (bottom figure), 1987-2015.

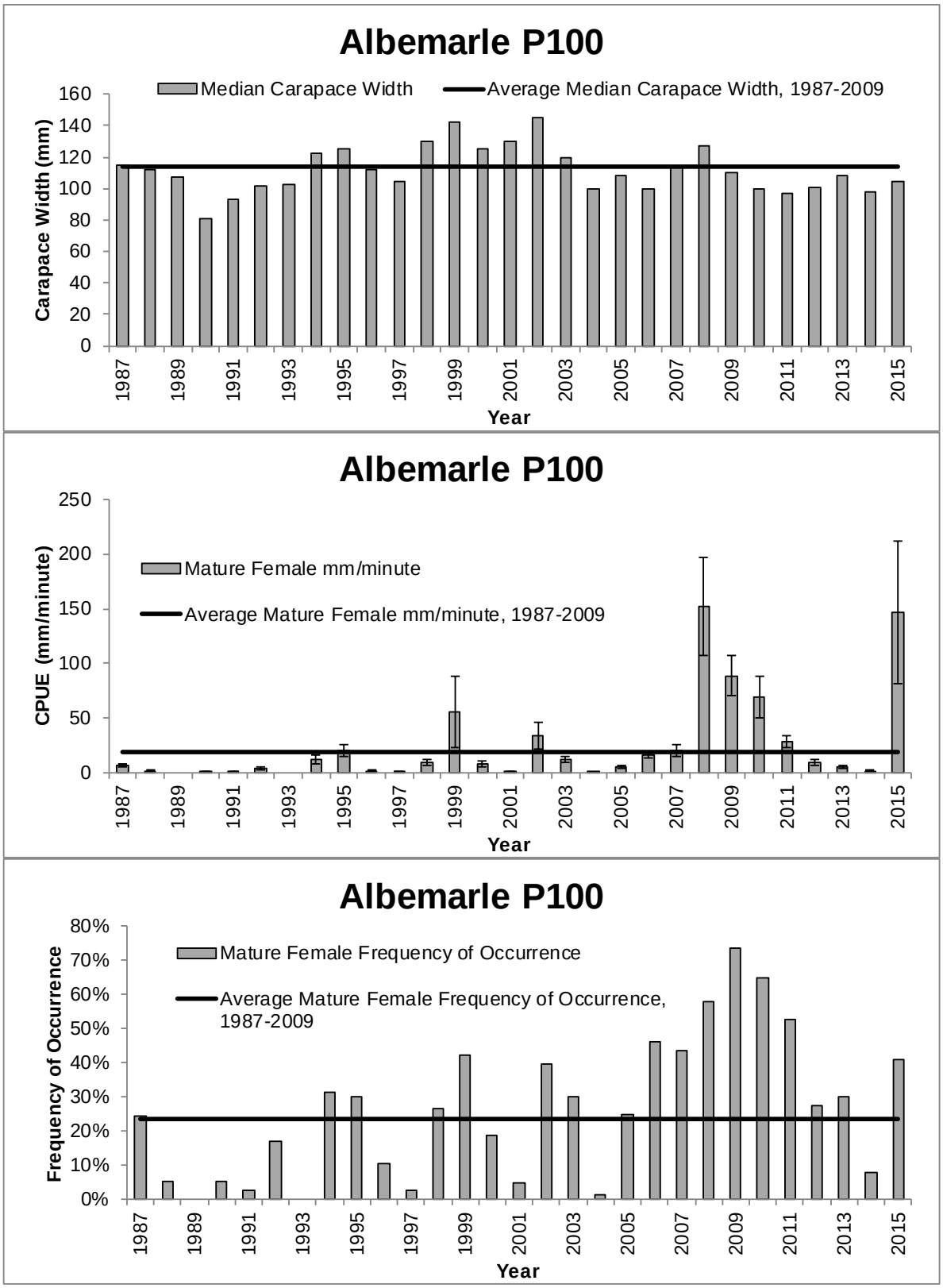

Figure 7. Indices from NCDMF program P100 used for the production characteristic of the Blue Crab Traffic Light, 1987-2015. Error bars represent one standard error of the mean.

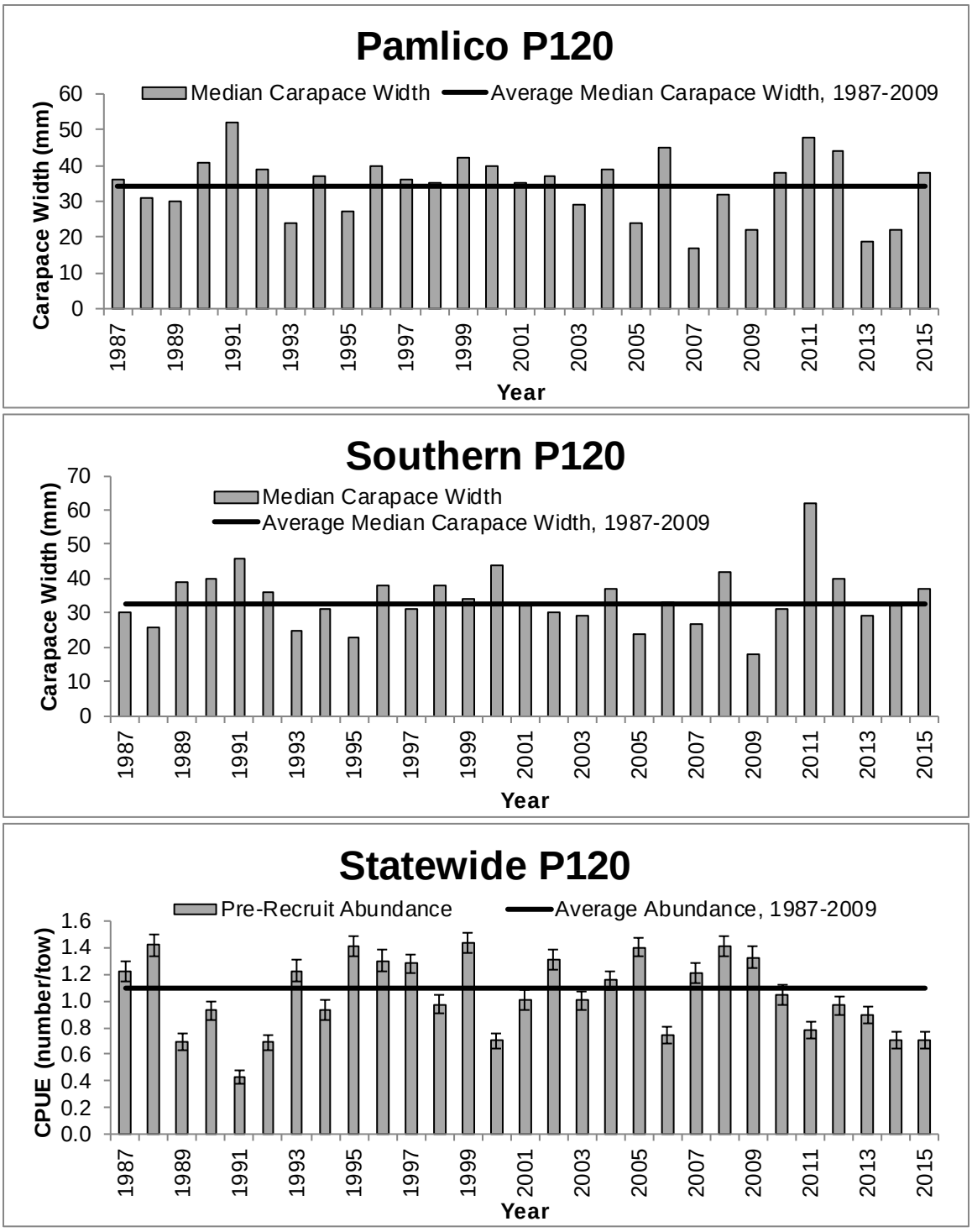

Figure 8. Indices from NCDMF program P120 used for the production characteristic of the Blue Crab Traffic Light, 1987-2015. Error bars represent one standard error of the mean.

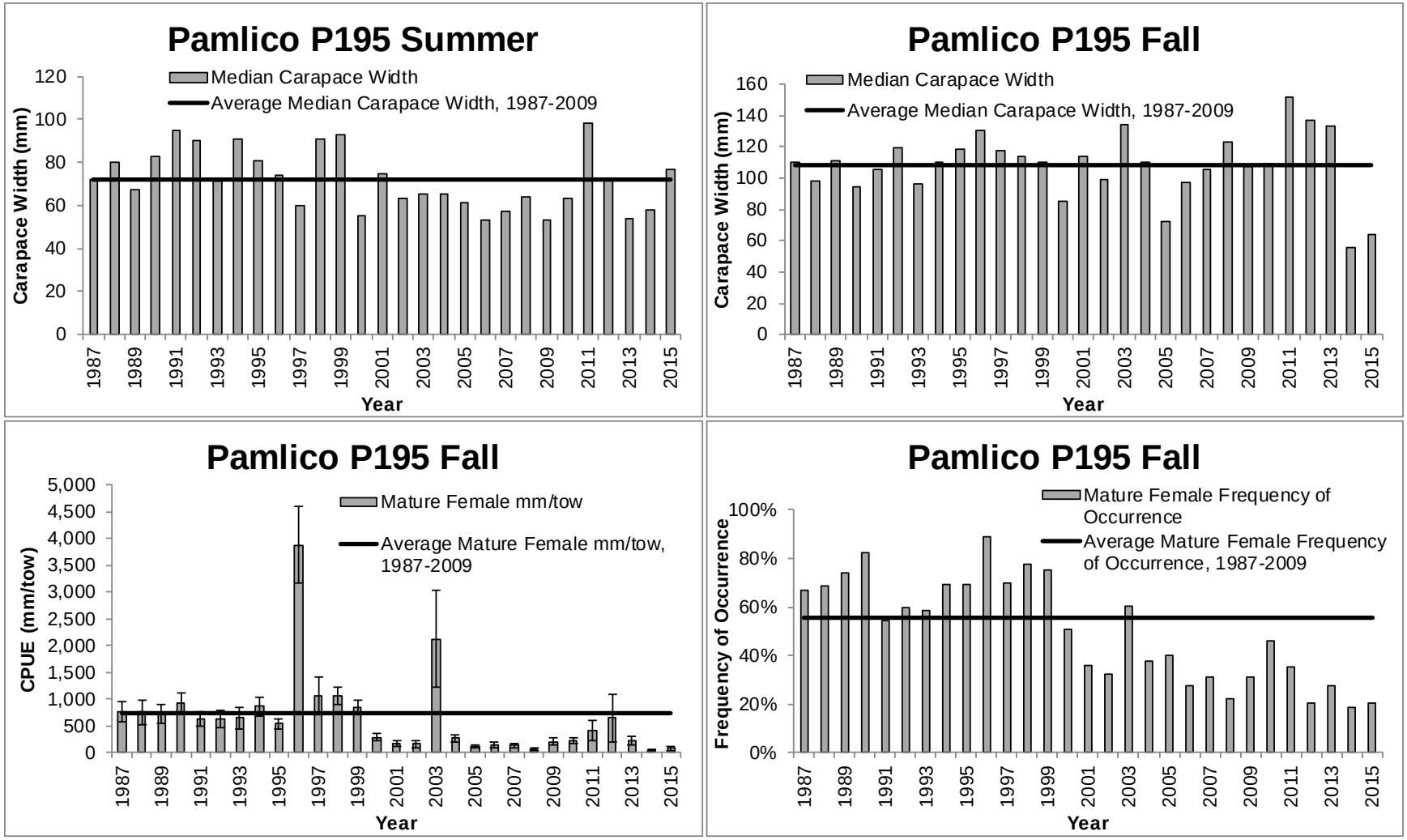

Figure 9. Indices from NCDMF program P195 used for the production characteristic of the Blue Crab Traffic Light, 1987-2015. Error bars represent one standard error of the mean.

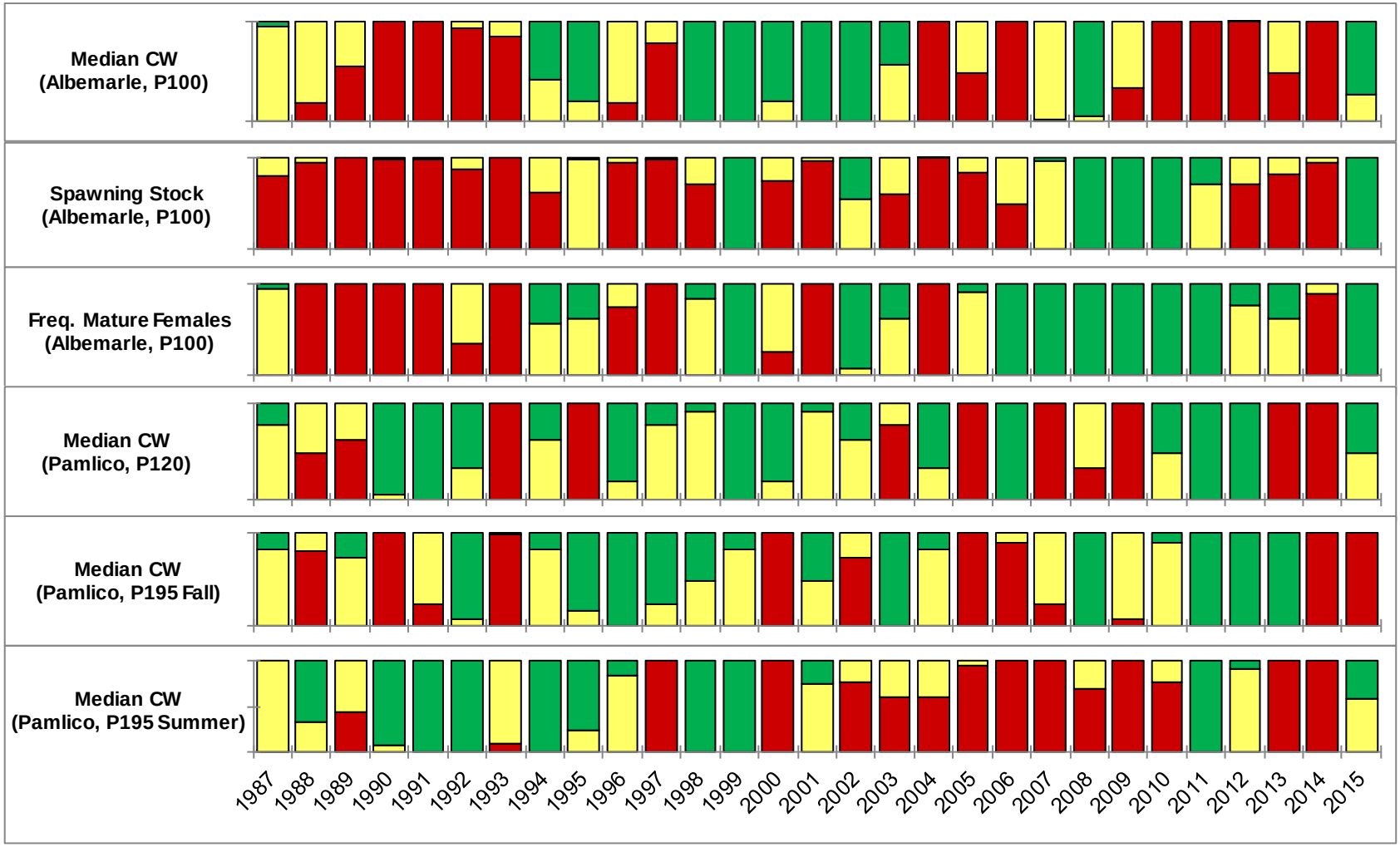

Figure 10. Blue Crab Traffic Light individual production indicators and integrated summary (bottom figure, next page), 1987-2015.

Figure 10 (cont.). Blue Crab Traffic Light individual production indicators and integrated summary (bottom figure), 1987-2015.

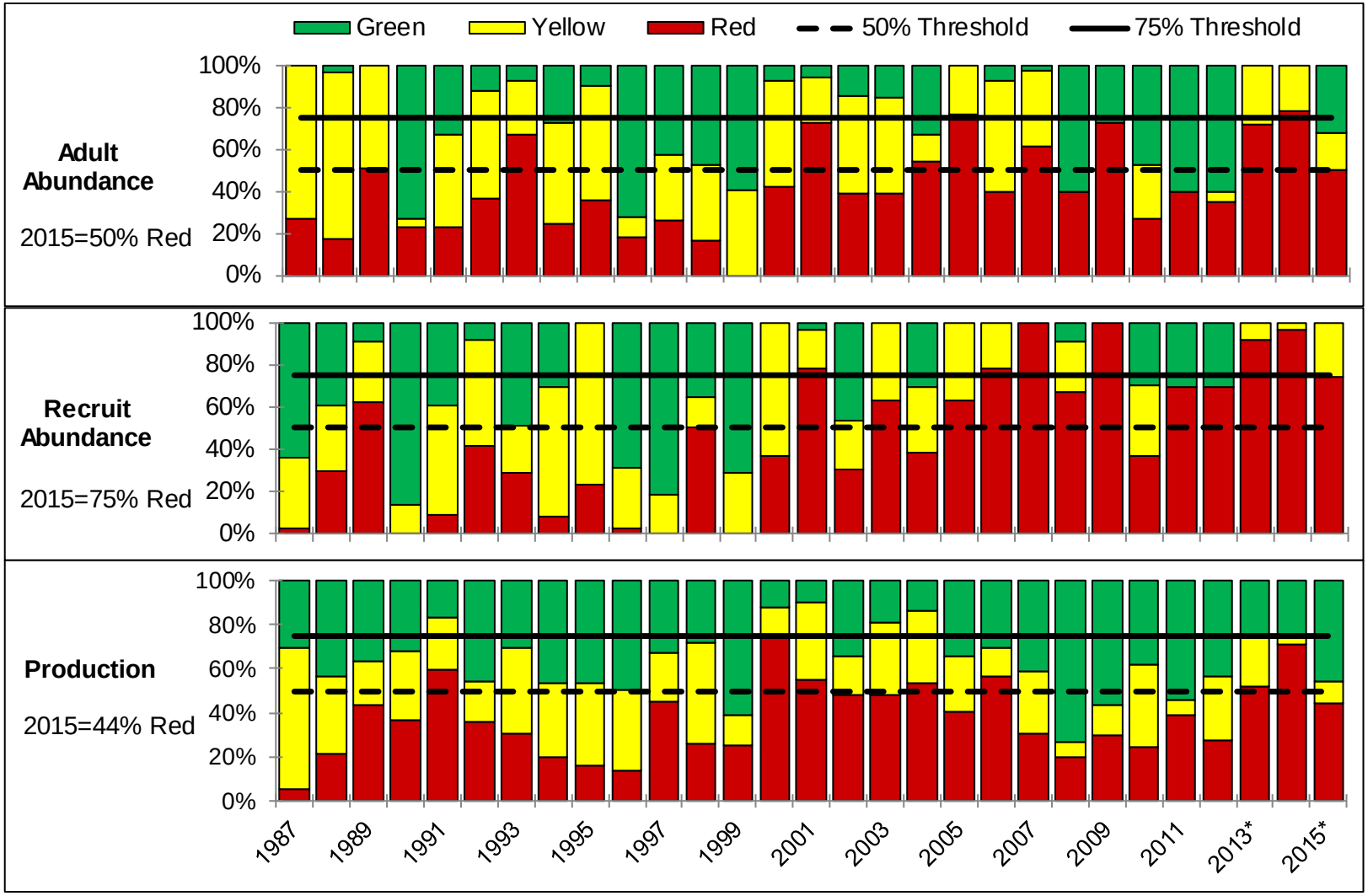

Figure 11. Blue Crab Traffic Light indicators for the adult abundance, recruit abundance, and production characteristics, 1987-2015. The dashed line represents the second quartile (50%) moderate management trigger and the solid line represents the third quartile (75%) elevated management trigger relative to the proportion of red.

FISHERY MANAGEMENT PLAN UPDATE
EASTERN OYSTER
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	August 2001
Amendments:	Amendment 1 – January 2003 Amendment 2 – June 2008 Amendment 3 – April 2014
Revisions:	None
Supplements:	Supplement A to Amendment 2 – November 2010
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	Amendment 4 is currently in development and scheduled for adoption in February 2017

The original N.C. Oyster Fishery Management Plan (FMP) was adopted by the North Carolina Marine Fisheries Commission (NCMFC) in 2001 and set up a process for designation of additional areas limited to hand harvest methods around Pamlico Sound and recommended several statutory changes to the shellfish lease program including higher fees, training requirements, and modified lease production requirements. The N.C. Oyster FMP Amendment 1 simply changed one of the criteria for designation of hand harvest areas from waters generally less than 10 feet deep to waters less than six feet deep. Highlights of the management measures developed in the N.C. Oyster FMP Amendment 2 include adopting a 15-bushel harvest limit in Pamlico Sound and a 10-bushel harvest limit for all gears in designated areas around the sound, reducing the available harvest season, changed the way lease production averages were calculated, limited lease applications to five acres and a recommendation to expand oyster sanctuary construction efforts. Supplement A raised the potential harvest limit in Pamlico Sound to 20 bushels and created a monitoring system for when to close mechanical harvest in that area. The N.C. Oyster FMP Amendment 3 created two seed oyster management areas in Onlsow County.

The draft N.C. Oyster FMP Amendment 4 along with the draft N.C. Hard Clam FMP Amendment 2 is in development and scheduled for final adoption in February 2017.

Management Unit

The management unit includes the Eastern oyster (Crassostrea virginica) and its fisheries in all waters of coastal North Carolina.

Goal and Objectives

From the draft Amendment 4, approved by the North Carolina Marine Fisheries Commission in August 2014 (NCDMF 2016):

The goal of the N.C. Oyster FMP is to manage the state's oyster population so that it achieves sustainable harvest and maximizes its role in providing ecological benefits to North Carolina's estuaries. To achieve this goal, it is recommended that the following objectives be met:

1. Identify, restore, and protect oyster populations as important estuarine habitat.

2. Manage and restore oyster populations to levels capable of maintaining sustained production through judicious use of natural oyster resources, enhancement of oyster habitats, and development and improvement of oyster production on shellfish leases and franchises.

3. Minimize the impacts of oyster parasites and other biological stressors through better understanding of oyster disease, better utilization of affected stocks, and use of disease resistant and biological stress resistant oysters.

4. Consider the socioeconomic concerns of all oyster resource user groups, including market factors.

5. Recommend improvements to coastal water quality to reduce bacteriological-based harvest closures and to limit other pollutants to provide a suitable environment for healthy oyster populations.

6. Identify and encourage research to improve understanding of oyster population ecology and dynamics, habitat restoration needs, and oyster aquaculture practices.

7. Identify, develop, and promote efficient oyster harvesting practices that minimize damage to the habitat.

8. Initiate, enhance, and continue studies to collect and analyze economic, social, and fisheries data needed to effectively monitor and manage the oyster resource.

9. Promote public awareness regarding the ecological value of oysters and encourage public involvement in management and enhancement activities.

STATUS OF THE STOCK

Stock Status

There are insufficient data to conduct a traditional stock assessment for the Eastern oyster in North Carolina, therefore benchmark reference values could not be determined for the stock. Until that time, the NCDMF Oyster Plan Development Team recommends that the status of Eastern oyster in North Carolina continue to be defined as concern. North Carolina commercial oyster landings have been in decline for most of the past century. This decline was likely initiated by overharvest and compounded by habitat disturbance, pollution, and biological and environmental stressors. Oysters are believed to be vulnerable to overharvest because these

factors negatively impact their survival. Species designated by the NCDMF with a concern status exhibit one or more of the following: increased effort, declining landings, truncated age distribution, or are negatively impacted by biotic and/or abiotic factors (e.g., water quality, habitat loss, disease, life history, predation, etc.).

Stock Assessment

An oyster stock assessment was attempted in 1999, but the necessary data were lacking to determine levels of sustainable harvest. Since there were no significant changes in the types and quantity of data collected, an oyster stock assessment could not be achieved in 2006 and again in 2014 (NCDMF 2008; NCDMF 2016). Collection of appropriate data should be initiated in order to conduct a stock assessment and determine levels of sustainable harvest (NCDMF 2008).

Data are not available to perform a traditional assessment so it was not possible to estimate population size or fishing mortality rates in the latest draft update in 2014. The only data representative of the stock were the commercial landings and associated effort. For this reason, the current assessment focused on trends in catch rates in the commercial oyster fishery. These catch rates should not be considered an unbiased representation of trends in population size; fisheries-dependent data are often not proportional to population size due to a number of caveats and should be interpreted with caution if the interest is relative changes in the population. In order for a fisheries-dependent index to be proportional to abundance, fishing effort must be random with respect to the distribution of the population and catchability must be constant over space and time. Other factors affecting the proportionality of fishery-dependent indices to stock size include changes in fishing power, gear selectivity, gear saturation and handling time, fishery regulations, gear configuration, fishermen skill, market prices, discarding, vulnerability and availability to the gear, distribution of fishing activity, seasonal and spatial patterns of stock distribution, changes in stock abundance, and environmental variables. Many agencies, such as the NCDMF, do not require fishermen to report records of positive effort with zero catch; lack of these “zero catch” records in the calculation of indices can introduce further bias.

The North Carolina commercial oyster fishery is subject to trip limits, which could bias catch rates (Mike Wilberg, UMCES, pers. comm.; John Walter, NOAA Fisheries, pers. comm.); that is, the trip limits affect the amount of catch that is observed per unit effort—the true value of the variable cannot be observed. A censored regression approach was attempted to calculate an index of relative abundance (numbers harvested per transaction) using data collected from a fishery with trip limits.

Data were obtained from the North Carolina Trip Ticket Program for 1994 through 2013. The censored response variable (catch per unit effort) was fit within a Generalized Additive Models for Location Scale and Shape (GAMLSS) framework using the ‘gamlss.cens’ (Stasinopoulos et al. 2014) and ‘survival’ (Therneau 2014) packages in R (R Core Team 2014). Catch rates were estimated for both hand harvest and mechanical harvest in each of the major water bodies from which Eastern oysters are harvested where sufficient data were available. Data were summarized by fishing year (October through March for hand harvest and November through March for mechanical harvest). Only landings from public bottom were examined.

Catch rates were expressed as bushels harvested per transaction. The censored regression approach failed for both hand and mechanical harvest data despite trying three different distributional assumptions (lognormal, gamma, t). This failure was believed to be due to the

large number of trips (transactions) that meet or exceed the trip limit in both fisheries. Similar work found that when about 50% or more of the trips equaled or exceeded the trip limits, there was not enough information from the uncensored trips to produce a reliable model. Here, 51.4% of trips by hand gears equaled (39.3%) or exceeded (12.1%) the trip limits over all water bodies and fishing years combined; the number of trips equaling or exceeding the trip limits for mechanical gears was 43.5% (42.9% equaled and < 1% exceeded).

Available data were considered insufficient for estimating reliable fishing mortality rates.

STATUS OF THE FISHERY

Current Regulations

Oysters cannot be taken from any public or private bottom in areas designated as prohibited (polluted) by proclamation except for special instances for: Shellfish Management Areas (NCMFC Rule 15A NCAC 03K .0103), with a permit for planting shellfish from prohibited areas (NCMFC Rule 15A NCAC 03K .0104), and for the depuration of shellfish (NCMFC Rule 15A NCAC 03K .0107). Oysters cannot be taken between the hours of sunset and sunrise of any day. Beginning in April 2014, time and temperature control measures were initiated for oysters to prevent post-harvest growth of naturally-occurring Vibrio bacteria that can cause serious illness in humans.

Public Bottom

The minimum size limit for oysters from public bottom is 3-inch shell length. Both the hand and mechanical oyster harvest season from public bottom are opened annually by proclamation. It is unlawful to sell oysters taken on Saturday and Sunday from public bottom.

The hand-harvest season for commercial and recreational harvest begins on October 15 each year with commercial harvest limited to Monday through Friday each week and recreational harvest allowed seven days a week. Hand-harvest methods to take oysters are allowed in all areas found suitable for shellfish harvest by the Shellfish Sanitation and Recreational Water Quality Section of the NCDMF during the open season. Beginning in 2013 through statutory changes, the Shellfish License was restricted to hand harvest only, and harvest by mechanical methods was prohibited. Recreational harvest is only allowed by hand methods. The season typically continues until closed by rule on March 31 although some locations may close earlier due to perceived excessive harvest. Brunswick County is the only area frequently closed early due to this concern and it closed prior to March 31 thirteen times between the1996/97 and 2015/16 seasons. The daily hand harvest limit for oysters in Pamlico Sound outside the bays is 15-bushel per day per commercial fishing operation and 10-bushels per day per commercial fishing operation in the bays and in the Mechanical Methods Prohibited area along the Outer Banks of Pamlico Sound. Areas from Core Sound south have a daily hand harvest limit of 5-bushels per person not to exceed 10-bushels in any combined fishing operation regardless of the number of persons, license holders, or boats involved. Recreational daily harvest limits in 2015/16 were one bushel per person per day not to exceed two bushels per vessel per day.

The mechanical harvest season for oysters in 2015/16 was opened November 9, 2015, and areas where mechanical harvest gear was allowed were restricted to deeper portions of the sounds, rivers and bays north of Core Sound. These areas are designated NCMFC 15A NCAC 03R .0108. Mechanical methods for oysters was only allowed to operate from sunrise to 2:00

p.m. during the 2015/16 season. The bays around Pamlico Sound are opened for a six-week season, and were opened from November 9 to December 18, 2015 with a 10-bushel per commercial fishing operation per day harvest limit. Areas outside the bays open to mechanical harvest were limited to a daily harvest limit of 15-bushels of oysters per operation. The mechanical harvest season can close sooner for areas in Pamlico Sound if sampling by NCDMF indicates that oysters of legal size have been reduced below 26% of the sampling for two consecutive sampling trips, as directed by Supplement A to Amendment 2 of the Oyster FMP.

There are also further restrictions noted in the proclamation for mechanical oyster harvesters to make sure that cultch material and culled oysters are either put back into the water where they were taken or remain on the existing rocks. North Carolina has a rule in place (N.C. Marine Fisheries Commission Rule 15A NCAC 03K .0202) requiring culling on site. The following restrictions were put in place beginning with the 2012/13 oyster season to discourage those practices.

> It is unlawful to possess more than **five** bushels of unculled catch onboard a vessel. Only material on the culling tray is exempt from culling restrictions.
>
> It is unlawful to possess unculled catch or culled cultch material while underway and not engaged in mechanical harvesting.

Also some harvesters did not have vessels or dredges rigged for circular dredging patterns which work best with towing points over the side of the vessel or for short tows to allow for culling between pickups. The following restrictions were put in place to encourage circular dredging patterns and shorter tows to keep the cultch and culled oysters on the existing rocks.

> It is unlawful for the catch container (bag, cage) attached to a dredge to extend more than **two** feet in any direction from the tooth bar.
>
> It is unlawful to tow a dredge unless the point where the tow line or cable exits the vessel and goes directly into the water is on the port or starboard side of the vessel forward of the transom.

Private Bottom

The minimum size limit for oysters from private bottom is a 3-inch shell length and culling requirements only occur during the open public harvest season, the rest of the year there is no minimum size requirement for oysters taken from private bottom. There is no daily maximum harvest limit applied to the taking of oysters from private bottom in internal waters. Permits are required to use mechanical methods for oysters on a lease or franchise. Public bottom must meet certain criteria in order to be deemed suitable for leasing for shellfish cultivation and there are specific planting, production, and marketing standards for compliance to maintain a shellfish lease or franchise. Also there are management practices that must be adhered to while the lease is in operation, such as: marking poles and signs, spacing or markers, and removal of markers when the lease is discontinued.

Possession and sale of oysters by a hatchery or aquaculture operation and purchase and possession of oysters from a hatchery or aquaculture operation are exempt from the daily harvest limit and minimum size restrictions. The possession, sale, purchase and transport of such oysters must be in compliance with the Aquaculture Operation Permit. Leases that use

the water column must also meet certain standards as outlined in G.S. 113-202.1 in order to be deemed suitable for leasing and aquaculture purposes.

There is a specific application process to obtain a lease and a public comment process that is required before a shellfish lease is granted if anyone wishes to protest the issuance of a lease. Owners of shellfish leases and franchises must provide annual production reports to the Division. Failure to furnish production reports can constitute grounds for termination. Cancellation proceedings will begin for failure to meet production requirements and interfering with public trust rights. Corrective action and appeal information is given. And there are also requirements for the transfer of a lease before the contract term ends.

Commercial Landings

Data on landings from public bottom by gear indicate that, prior to 1960, most of the oysters were taken by dredge when compared to all hand methods. Chestnut (1955) reported that ninety percent of the oysters landed in North Carolina came from Pamlico Sound. The Pamlico Sound area is largely dependent on dredging. The resurgence of the dredge landings in 1987 was due, in part, to increased oyster populations and in part to increased effort, as displaced mechanical clam harvesters turned to oyster dredging due to closure of southern clam areas by a red tide. These closures affected 98% of the clam harvesting areas and had its greatest impact on the clam fishermen. The red tide was a dinoflagellate bloom that caused closure of over 361,000 acres of public bottoms to shellfish harvest from November 1987 to May 1988. The dinoflagellate (*Karenia brevis*) produced a neurotoxin, which was concentrated in shellfish, making them unfit for consumption. Hand harvest landings of oysters failed to reach their potential that same year due to the fact that a majority of the hand-harvest-only areas were also closed because of the red tide (Figure 1). Hand harvest landings are the most consistent contributor to the State's oyster fishery. Hand harvest landings exceeded the dredge landings for significant periods between 1961 and 1970 and between 1989 and 2008 (Figure 1).

The oyster parasite *Perkinsus marinus*, also known as Dermo disease, has been responsible for major oyster mortalities in North Carolina during the late 1980s to mid-1990s. Dermo, a protist, similar to dinoflagellates, causes degradation of oyster tissue. Once infected, oysters suffer reduced growth, poor condition, diminished reproductive capacity and ultimately mortality resulting from tissue lysis and occlusion of hemolymph vessels (Ford and Figueras 1988; Ford and Tripp 1996; Haskin et al. 1966; Ray and Chandler 1955). Chestnut (1955) may have been the first to report its occurrence in North Carolina. However, no extensive assessments were attempted until large-scale oyster mortalities prompted investigations during the fall of 1988. Oyster samples from 11 sites were sent to the Virginia Institute of Marine Science (VIMS) and the Cooperative Oxford Laboratory. Results showed that Dermo infection was the major cause of mortalities (NCDMF 2008).

Staff observed in the southern estuaries while the Dermo infections were on the rise, that during late summer, moderate and high Dermo infection levels did not reduce oyster populations. Hand harvest landings in the south from 1991 through 2002 did not decline in the same manner as landings from Pamlico Sound during the same time. It is suspected that the small, high salinity estuaries may inhibit mortality by flushing out parasites at a higher rate or by exceeding the salinity tolerance of the Dermo parasite, allowing for a higher survival rate compared to Pamlico Sound. The link between low dissolved oxygen, increased availability of iron and increased parasite activity may also be a factor in the different mortality rates as the smaller, high salinity estuaries are less prone to low dissolved oxygen events than the Pamlico Sound (Leffler et al. 1998). Dermo infection intensity levels since 2005 have remained low; however,

prevalence appears to be increasing (NCDMF unpublished data). Dermo infection intensity has remained low and mechanical harvest landings in Pamlico Sound continued to recover from the extremely high Dermo mortality levels and hurricane impacts of the mid-1990s until additional environmental impacts began affecting the fishery in 2011 (Figure 1).

Overall oyster landings have been increasing in the last ten years (Figure 1). The most significant increase occurred in the mechanical harvest fishery in Pamlico Sound during the 2009/10 and 2010/11 seasons (Figures 1 and 2). There was a high abundance of oysters in some areas in Pamlico Sound that had not been seen in over 20 years, high market demand, and an increase in new participants in the fishery likely influenced these higher landings. In 2013 General Statute 113-169.2 limited the use of the Shellfish License to hand harvest methods only. Hand harvest has shown a slight increasing trend in landings for the past ten years, although the last few years are showing a decline likely a result of the Shellfish License no longer allowed to be used to mechanically harvest oysters and an increase cost for all commercial licenses in the last few years (Figure 2).

Mechanical Harvest Fishery Off Public Bottom

During the early 2009/10 mechanical harvest oyster season, the Great Island Narrows area between Great Island and the mainland in Hyde County in Pamlico Sound experienced intensive oyster harvest (Figures 1 and 2). Some of the operations were harvesting the 15-bushel limit, offloading, returning to the area with a new crew and harvesting another limit the same day. The harvest limit of 15-bushels per commercial fishing operation per day did not apply to vessels that replaced the crew since the new crew constituted a new commercial fishing operation according to standing division policy. Staff investigation of this intensive harvest indicated that substantial shell damage was occurring on the remaining oysters and the area was closed after six weeks of harvest. The oyster dredge fleet moved out into the open sound and continued to have good catches for the rest of the 2009/10 mechanical harvest oyster season.

The 2010/11 season began with a 2:00 pm time limit on dredging to stop the two-trips-per-day loophole but it probably had little impact on mechanical harvest since experienced dredgers could take their limit in a few hours and there appeared to be many new entrants into the fishery. The traditionally harvested oyster rocks in the deeper waters of western Pamlico Sound contributed greatly to the increased landings in the 2009/10 and 2010/11 seasons but the Middle Ground area in 2010/11 provided another unexpected source of significant oyster production similar to the Great Island Narrows in 2009 (Figures 1 and 2). Also, interest in taking advantage of expected high market demand caused by closure of oyster harvest areas in the Gulf of Mexico due to the Deepwater Horizon oil spill lengthened the season slightly with a November 1 mechanical harvest season opening in the fall of 2010.

The last significant production of oysters from a non-traditional harvest area was reported by local fishermen to have occurred more than 20 years prior to the 2010/11 season or around the time of another large increase in mechanical harvest landings in 1987/88 (Figure 1). That production came from Brant Island Shoal and like the Middle Ground is an area in western Pamlico Sound generally around 12 feet deep and characterized by hard sandy bottom. Dredge samples and sonar observations from the Middle Ground oyster producing area revealed that there were no typical oyster rock formations and the cultch material producing the oysters was typically large “fossil” clam shells. Nearby oyster rocks are found in areas around 18 feet deep and on mounds of oyster shell cultch. The oysters tended to be very large with most samples averaging more than the 3-inch (76 mm) size limit and up to 80 percent of some samples legal

for harvest. There were reports that some shucking houses complained the oysters were too large. These Middle Ground oysters also displayed an unusual shell characteristic with very long, thin umbos, or beaks, not normally seen on Pamlico Sound oysters.

Hurricane Irene hit the North Carolina coast on August 27, 2011 and had major impacts on the mechanical harvest area for oysters. The oyster resources on the Middle Ground could not be located after the storm probably due to sedimentation or physical relocation caused by waves or currents. Many of the deeper water oyster resources located near Brant Island Shoal were also significantly damaged (Figure 3). Most of the damage was oyster mortality caused by detritus covering the oyster rocks. Oyster resources in the Neuse and Pamlico rivers did not appear to suffer much damage but also did not show any of the typical growth characteristics during the following fall and winter months. These factors had a pronounced effect on the mechanical harvest oyster season in 2011/12 and the mechanical harvest area in western Pamlico Sound was closed on January 2, 2012. Mechanical harvest landings declined to near 2008/09 levels (Figure 2). Regular sampling of oyster sizes to fulfill the requirements of Supplement A to the N.C. Oyster FMP has made it clear that oyster growth during the harvest season is essential to sustain acceptable harvest levels.

Prior to the 2012/13 mechanical harvest season, an apparent, severe low dissolved oxygen event occurred in the Neuse River that caused virtually a 100 percent mortality of the oyster resources at 18 feet or greater depths. A few oyster rocks in shallower waters between Maw Point Shoal and Light House Shoal were spared as well as some division oyster habitat enhancement projects in other shallow areas (Figure 3). The Pamlico River area also had not recovered from the effects of Hurricane Irene at this time. The Neuse River area was available for mechanical harvest until the adjacent bays closed on December 21, 2012 although there was no harvest activity in the river during the time it was open. The Pamlico River area closed to mechanical harvest on February 1, 2013 based on failure to meet the 26-percent trigger although effort was much reduced since early January. The 2012/13 mechanical harvest oyster landings declined further.

There was little evidence of any recovery of the Neuse River oyster resources prior to the 2013/14 season but the Pamlico River area appeared to be recovering and growth indicators were good during the season. The Dare County area in northern Pamlico Sound also supported some significant mechanical harvest activity throughout the season and when oyster harvests began to decline in the western sound in early February, 20 to 25 boats moved to Dare County to finish the season. The remaining productive areas in the Neuse River closed on February 28, 2014 and most of the harvesters left the Pamlico River area by mid-February. Mechanical harvest in Dare County continued until the season ended on March 31, 2014. The overall result was some increase in the combined gear oyster landings with over 725,000 lb of meats landed in 2014 (Figure 2).

The 2014/15 mechanical harvest season opened on November 10, 2014, all areas were above the percentage of legal-sized oysters during preseason sampling. Effort was still consistently low in the Neuse River due to limited amounts of oysters available for harvest and this area was closed on March 23, 2015. The Pamlico River area also showed promise for growth and maintaining the number of legal sized oysters to stay open, but fishing effort was much higher in the Pamlico River area with the fleet scattered from the mouth of the river to Brant Island (Figure 3). Pamlico River closed on March 9, 2015 and did not re-open for the rest of the season. At the beginning of the season, effort in Hyde County was mostly in Wysocking Bay while effort in Dare County was from Sandy Point to the Crab Hole. After Christmas, more effort shifted into the Crab Hole area off of Stumpy Point Bay due to Hyde County boats joining

the Dare County fishery. Dealers reported that fishermen were bringing in their limits by mid-day. After the fleet shift to Northern Dare, sampling resulted in less than 26 percent legal-size oysters for two consecutive sampling trips in both Dare and Hyde counties which resulted in a closure of these areas on January 12, 2015. Sampling continued and it was decided to stop sampling Hyde County because of no improvement. Staff continued to sample Dare County and the area was re-opened on March 9, 2015 and closed by rule on March 31, 2015. The fleet encountered what was described as a "crust" covering much of the oyster rocks fished on opening day and took several days to break up this "crust". Effort was high in the Northern Dare area for the re-opening with approximately 50 boats fishing on the first day and dropping off to around 20 boats. The 2014/15 peaked in December. Closures of the Northern Hyde and Dare areas resulted in declines in harvest in January and in combination with weather impacts in February.

The 2015/16 mechanical harvest season opened on November 9, 2015 with a 2:00 p.m. end time to help extend the season, all areas were above the percentage of legal-sized oysters during preseason sampling in October. Water temperatures were quite warm throughout the season and not a lot of new growth was observed until January on the oysters. Some areas in northern Hyde County were covered in tunicates the previous year and little spat was seen in these locations during this season. Planting sites in the Dare County samples showed a lot of dredge damage from the previous year. The Neuse River area had places with only dead shell and was limited in locations to harvest oysters.

Effort was highest in the Pamlico River at the beginning of the 2015/16 season, with 33 and 35 boats counted dredging for oysters during sampling in mid-November and early December. In the Neuse River effort was between 12 and 15 vessels during three sampling events up until the bays were closed. After Christmas most of the effort shifted to a small area northwest of the light at Bluff Shoal in the Hyde County area. Most of the effort before Christmas in the Hyde County area occurred in Wysocking Bay and then shifted to the one area noted previously in January. The area that was dredged by most of the fleet in January was an old clam bed with little bottom relief. There were an estimated 42 boats working in the compressed area on January 15, 2016, the oysters were large and showed good growth. By late January the new area was depleted and fishermen were seen working offshore Juniper Bay Point near the sanctuary, off Great Island, and Royal Shoal in the deeper areas of Pamlico Sound. Oyster dredging effort was low in Dare County this season because many fishermen continued to pot for crabs right up until the pot closure period. By February effort had dropped to less than 10 fishermen sighted during a sampling event in any area. More samples were showing boxes (empty intact shells) in the catch and showed increasing minor to substantial damage to the live shells. On February 25, 2016 and February 28, 2016 the Neuse River and Northern Dare areas were closed to mechanical harvest because oysters sampled in these areas were less than 26 percent legal-size oysters for two consecutive sampling trips. Dealers were notified of the closures and were not surprised, and by mid-February many oyster fishermen working in Hyde County and the Pamlico River quit harvesting oysters because they could not reach their daily harvest limit and were gearing up for other fisheries (i.e. crab pots and shad fishing). Pamlico River and the Northern Hyde area remained opened to mechanical oyster harvest for the entire 2015/16 season.

Hand Harvest Fishery Off Public Bottom

Hand harvest gear accounts for the majority of the landings and has been the dominant harvest gear for oysters in North Carolina since the 1960s. Hand harvest oyster landings are also less variable than landings from mechanical gears. These higher, more consistent landings come

from Core Sound south to the state line. The hand harvest areas in the northern region of the state are exclusively subtidal reefs with depths of 2 to 6 feet in which hand tongs are used. Hand harvest gear has not been extensively used in the northern area since oyster dredging was allowed in 1887. In Amendment 2 to the N.C. Oyster FMP in 2008, the MFC adopted the strategy to promote a more habitat friendly fishery by increasing the hand harvest limits to match dredging limits in the Pamlico Sound bay areas. The 2008 Oyster Fishery Management Plan Amendment 2 put in place a 15 bushel per day hand/mechanical harvest limit per commercial fishing operation in Pamlico Sound mechanical harvest areas outside the bays, a 10 bushel per day hand/mechanical harvest limit per commercial fishing operation in the bays and in the Mechanical Methods Prohibited area along the Outer Banks of Pamlico Sound. This management option raised the limits of hand harvest to encourage less destructive harvest methods in those particular areas of bays and open waters. However, hand harvest limits remained five bushels per person, not exceeding 10 bushels per commercial fishing operation from Core Sound south to the North Carolina-South Carolina border. Areas in the southern region from Carteret County south are closed to mechanical harvest of oysters.

Other factors affecting the hand harvest fishery are the loss of harvest area due to pollution closures. Many shellfish waters in North Carolina are permanently or conditionally closed due to bacterial contamination associated with urban development. The greatest proportion of closed shellfish waters occur in the southern district (Onslow, Pender, New Hanover, and Brunswick counties) where over half of the waters are closed and can be attributed to small, narrow waterbodies and more developed watersheds. The area north of Core Sound with the higher hand harvest limits does not have the same problem with large percentages of the available harvest area closed by reason of pollution so oyster harvest is not impacted.

Hand-harvest oyster landings have generally increased in recent years (Figure 2). Oyster harvest south of the Highway 58 Bridge generates significant landings even though the area only encompasses five percent of the total area which is open to shellfishing in the state. During the 2015/16 open oyster harvest season, complaints were received on the poor quality of oysters coming from areas in Brunswick County at the beginning of the season. Particularly in the Lockwood Folly area and some people said no one was landing their daily harvest limit. Heavy rainfalls caused many temporary closures to shellfishing in this region throughout the season.

Permanent and Temporary Shellfish Closures

Microbial contamination from fecal matter is important to NCDMF because it affects the opening and closing of shellfish harvest waters. Fecal coliform bacteria occur in the digestive tract of, and are excreted in the solid waste from, warm-blooded animals including humans, wildlife and domesticated livestock. Because consumption of shellfish containing high levels of fecal coliform bacteria and associated pathogens can cause serious illness in humans, shellfish growing waters must be closed to shellfish harvest when fecal coliform counts increase above the standard 14 MPN/100ml [NCMFC Rules 15A NCAC 18A Section .0900 Classification of Shellfish Waters], where MPN denotes “most probable number.” The NCDMF closes waters where a high potential for bacterial contamination exists, such as around marinas and point source discharges. Shellfish harvest closures have continued to occur over time, which has led to a reduction in available shellfish harvest areas. Long term shellfish closures due to bacterial contamination remove available harvest area for shellfish and concentrate those activities on remaining resources compounding harvest related impacts on the oyster habitat in those areas.

Between 2007 and 2014, there were 1,427 additional acres of water permanently closed to shellfish harvesting in North Carolina (Table 1). Recent bacterial closures have primarily affected the central and southern areas of the coast. New Hanover and Brunswick counties in 2015 could only open up to 43 percent and 34 percent of their waters to shellfishing respectively when runoff did not affect their waters and cause temporary closures. On February 4, 2015, approximately 314,710 acres were closed administratively in lower resource areas as a result of the inability to sample due to budget constraints. The areas closed to shellfish harvest because of the inability to meet federal sampling requirements caused by funding cuts were approximately 11,834 acres in the Neuse River, approximately 3,042 acres in the Pungo River, and approximately 299,107 acres in Albemarle Sound.

In addition to the areas that are permanently closed to shellfishing, other areas are temporarily closed during periods of high rainfall due to runoff. The rainfall closure threshold varies by growing area as detailed in each management plan, and can vary from 1 inch to 2.5 inches of rain in a 24-hour period. Closures last from several days to more than a month, and reopen when bacteriological water sample results show the area has returned to normal conditions. Large storms, such as hurricanes, result in harvest closures covering much larger areas, sometimes including all of North Carolina's estuarine waters. The conditionally approved areas are concentrated in the Core-Bogue, New-White Oak, and Southern Estuaries management units. Within these watersheds, permanent closures are most common in the upper reaches of tidal creeks and rivers, with conditionally approved areas occurring downstream of those areas or in the upper portions of less degraded creeks. As temporary closures have increased in frequency and duration, they have become an issue of great concern to the public, particularly in the southern area of the coast.

2015 was a particularly difficult year for temporary closures, as portions of the coast received between 25 and 60 percent more rainfall than average. These closures impacted shellfish harvesting areas throughout North Carolina, but three of more popular harvest areas, Lockwoods Folly River, Stump Sound, and Newport River, were some of the most heavily impacted. Portions of the Newport River area were closed to harvest for 71 percent of the harvest season, while portions of the Lockwoods Folly River area were closed for 63 percent of the season, and portions of Stump Sound for 60 percent of the season.

Private Culture

Statutory authority to lease bottomlands for shellfish cultivation can be traced back to a statute adopted in 1909. Today some shellfish leases are held by commercial fishermen to supplement their income from public harvest areas. Other shellfish leases are held by individuals and corporations looking to augment other sources of income; to be engaged in a sustainable business opportunity; or to maintain an attachment to cultural maritime heritage and way of life. Since 2012 administrative and process changes have been made to allow for better customer service, communication and ongoing support of the NC Shellfish Lease and Franchise Program. Process operations and customer support were reviewed; actions were undertaken and implementation steps were completed to improve process operations and to provide a higher level of customer service.

The NCDMF administers the shellfish lease program whereby state residents may apply to lease estuarine bottom and water columns for the commercial production of shellfish. The NCDMF does not differentiate between clam, oyster, bay scallop, and mussel leases; therefore, allowing shellfish growers to grow out multiple species simultaneously or as their efforts and

individual management strategy allows. For the period of 2003-2013, roughly 40% of all private culture operations harvested only oysters (NCDMF 2016).

Since 1994 there has been an overall increase in oyster harvest from private culture operations. Oyster harvest from private culture operations in the period from 1994 to 2013 account for twelve percent of all oyster landings (NCDMF 2016). As of 2015, the lease program had 269 leases and 10 applications during the year. Currently shellfish leases take up about 1,808 acres of bottom.

Recreational Landings

Unknown

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Currently, the only data available for the stock in all areas are the commercial landings and associated effort from the Trip Ticket Program. No fishery dependent monitoring programs occur for oysters.

Fishery-Independent Monitoring

There are two independent programs for oysters. One is a long-term spatfall sampling program conducted by the Habitat and Enhancement section to estimate recruitment of spat (P610). The second program is an indicator for habitat disturbance and damage of the commercial dredge fishery on public bottom to determine closure of the season for habitat protection of oyster rocks.

Public Bottom Mechanical Harvest Area Oyster Sampling

Supplement A to Amendment 2 established the trigger for closing areas to mechanical harvest to protect the resource and habitat. The management trigger was established and defined as when the sampling indicates the number of legal-sized (3-inch) oysters in the area has declined to 26% of the live oysters sampled. The management areas are divided geographically into four areas; the Neuse River Area, Pamlico River Area, Northern Hyde Area, and Northern Dare Area (Figure 4). Sampling targets areas and oyster rocks being worked by commercial oystermen, directly before the opening of and throughout the mechanical harvest oyster season. The sampling sites are selected based on the presence/absence of commercial oystermen working in the area. Only areas where commercial oystermen are working are sampled to determine localized depletion and address habitat protection. From each sample, the first 100 live oysters, including spat and any boxes, are collected for workup. Each oyster, up to a maximum of 100, is measured to the nearest mm and inspected for any damage. Shell damage is denoted as none, minor, or substantial for further evaluation.

Sampling began on September 23, 2009 with preseason oyster sampling, in four management areas, using mechanical harvesting methods. Sampling has consistently continued with a target of 10 sites per management area, throughout the four management areas. All sampling is conducted using NCDMF vessels and standard oyster dredges with comparable construction to those used by commercial oystermen. Samples are collected at least bi-monthly in each

management area before, during, and after the open mechanical oyster harvest season. More intensive sampling is conducted if samples are near the trigger percentage. Sampling continues after an area is closed to assess the possibility of reopening. Sampling is discontinued when it is apparent that reopening is not likely to occur. Mean oyster shell height (commonly referred to as length) is calculated for each 100-oyster sample. The number of legal-sized (≥76 mm) and undersized (<76 mm) oysters is determined for each sample. The total legal-sized oysters for all the samples taken in a management area on a sampling trip is divided by the total of all oysters sampled on that trip to calculate the percentage used to assess compliance with the harvest closure trigger. Oyster sizes are also sorted into 5-mm size bins and the size distribution for the area is presented as a line graph. Box/gaper size distribution is sorted and displayed similarly. Sampling results are reported to interested dealers/fishermen and staff after each sampling event.

This sampling is not intended for use as a species abundance index, but instead to reflect the conditions of the habitat during the open oyster mechanical harvest season to determine closure of an area as a protection measure. For the purpose of this update only the prior open mechanical harvest season data will be provided with a brief overview of the season.

All areas were above the percentage of legal-sized oysters during preseason sampling of the 2015/16 mechanical harvest season. The Neuse River closed on February 25, 2016 and the northern Dare County area closed on February 28, 2016 and remained closed for the remainder of the season. Sampling continued in the Neuse River in early March but was discontinued after one sampling event because the percentage of sublegal oysters were so low and the season was about to end. Sampling in northern Dare County area was discontinued because it was too late in the season for a re-opening. Effort was low in the Hyde County and Dare County areas because warm water temperatures allowed some fishermen to continue potting for blue crabs based on discussions with local oyster dealers. The warm temperatures throughout the season also reduced the growth in the oysters that would sustain the fishery throughout the season. Table 2 shows the percentages of legal-sized oysters taken by area throughout the 2015/16 mechanical harvest season and the number of commercial oyster vessels operating in the area while sampling occurred in parentheses.

Spatfall Evaluation

Division staff conduct spatfall sampling annually, on cultch planting sites from the previous three years, during January but samples may be collected through April, if required. Subtidal sites are sampled by towing a standard oyster dredge over the planting site until, at a minimum, 30 pieces of cultch are collected. Normally a 75-lb, 36-inch toothed bar dredge is used; however, various other dredges may be used. On rare occasions, patent tongs and hand tongs may be used to obtain planting samples. Intertidal sites are sampled by hand at low tide in all applicable intertidal areas of the Southern District and hand tongs are used in the more northerly subtidal areas of Stump Sound and New River. Three tong grabs per location are usually taken to obtain the minimum amounts of cultch required. Gear type and any other valuable gear parameters are recorded. Prior to 2005, data was not collected south of New River.

Thirty pieces of cultch are randomly selected from each sample and the type of cultch (oyster, calico scallop, surf clam, marl, or sea scallop) is noted. The total number of spat on each piece of cultch is enumerated, with each spat being measured to nearest millimeter shell length. The average number of spat per piece of cultch is calculated by summing the number of spat per cultch piece, divided by the total number of cultch pieces sampled. Annual Juvenile

Abundance Index (JAI) is calculated as the average number of spat per site and then averaged across all sites within that year. The ten year average is calculated by averaging the annual JAI over the last 10 years.

The JAI has been somewhat variable from year to year in the more recent years in the time series, but overall showing a slightly increasing trend for the past ten years (Table 3; Figure 5). The 2015 JAI was the second lowest and below the average in the ten-year time series (Table 3).

MANAGEMENT STRATEGY

There are no management triggers or methods to track stock abundance, fishing mortality, or recruitment between benchmark reviews from the current FMP.

Highlights of the management measures developed in Amendment 2 include adopting a 15-bushel harvest limit in Pamlico Sound and a 10-bushel harvest limit for all gears in designated areas around the sound, reducing the available harvest season, changed the way lease production averages are calculated, limited lease applications to five acres and a recommendation to expand oyster sanctuary construction efforts. Supplement A raised the potential harvest limit in Pamlico Sound to 20 bushels and provided a monitoring system for determining the closure of mechanical harvest areas when sampling indicates the number of legal-sized oysters in the area has declined to 26 percent of the live oysters sampled for two consecutive sampling occurrences. This trigger is to protect the resource and habitat and not a measure to track stock abundance or removals from the stock (fishing mortality). Amendment 3 established two seed oyster management areas in Onslow County.

Scheduled for adoption in February 2017, preferred management options of the Marine Fisheries Commission from draft Amendment 4 for oysters taken from public bottom include:

- continuing the monitoring system to determine when to close mechanical oyster harvest in an area
- align the maximum daily harvest limit for oysters with current management
- continue the six-week open mechanical harvest in the bays, but close the bays to mechanical harvest for two weeks after Thanksgiving and then re-open two weeks before Christmas for the remainder of the six-week open mechanical harvest in the bays
- reduce the culling tolerance from 10 percent to five percent for the possession of sublegal oysters
- reduce the daily harvest limit for Shellfish License holders to two bushels per person not to exceed four bushels per vessel

For private culture of oysters, the draft preferred management options in draft Amendment 4 include:

- adding convictions for theft of shellfish from leases or franchises to the list of convictions that may result in revocation of fishing licenses to implement stronger deterrents to shellfish theft and intentional aquaculture gear damage
- clarify how production and marketing rates are calculated for shellfish leases and franchises to meet minimum production requirements
- expand the maximum proposed lease size to 10 acres in all areas

- specify criteria that allow a single extension period for shellfish leases of no more than two years per contract period to meet production and marketing requirements in the case of unforeseen circumstances, and reorganize the rules for improved clarity.

Draft Amendment 4 also includes to expand oyster enhancement activities as a preferred management option.

See Tables 4, 5, and 6 for current management strategies and implementation status in Amendment 2, Supplement A to Amendment 2, and Amendment 3 of the Oyster FMP. Table 7 provides the preferred management options of the Marine Fisheries Commission that is scheduled for adoption in February 2017.

Session Law 2015 – 241, section 14.9: Senator Jean Preston Oyster Sanctuary Network

Session Law 2015-241, Section 14.9 required the NCDMF to develop a 10-year plan to enhance shellfish habitat within the Albemarle and Pamlico sounds and their tributaries to benefit fisheries, water quality, and the economy. In this 10-year plan, the Oyster Sanctuary Program and the Cultch Planting Program will to continue the development of a network of oyster sanctuaries and cultch planting sites within the Pamlico Sound and its tributaries. The 10-year plan calls for NCDMF to design two new sampling programs which will help guide the future site future oyster rehabilitation projects. These future sites will also be constructed in a way that will provide complex fish habitat to promote hook and line fishing while minimizing the impact to commercial trawling. Through the utilization of sampling programs and alternative materials, the NCDMF aims to construct oyster sanctuaries and cultch planting sites in a manner so the highest benefit-cost ratio is achieved.

Session Law 2015-241, sections 14.10D and 14.8: Shellfish Aquaculture and Core Sound Shellfish Aquaculture Leasing

Session Law 2015-241, Section 14.10D, requires the NCDMF to develop recommendations covering nine topics for shellfish aquaculture. Section 14.8 requires the NCDMF to create a proposal to open shellfish cultivation leasing certain areas of Core Sound that are currently subject to a moratorium

The division provided a report which addresses these topics ranging from shellfish aquaculture to oyster restoration. Identifies existing bottlenecks, deficiencies and inefficiencies, and recommends ways to improve existing programs. The recommendations on new ways to develop the shellfish industry will benefit the state shellfish aquaculture industry and the overall shellfish resource. Some of the recommendations in this study are also included in the Senator Jean Preston Marine Oyster Sanctuary Program Plan, which was mandated by Session Law 2015-241, Section 14.9. That law required the division to develop a 10-year plan that includes recommendations for oyster sanctuary construction, cultch planting, funding and any other resources needed.

To develop this plan, division staff met with shellfish and aquaculture experts from North Carolina and Virginia, shellfish growers, non-governmental organizations, and internal division shellfish experts. This included meeting with the existing steering committee of stakeholders that oversees the implementation of the N.C. Oyster Restoration and Protection Plan: Blueprint for Action that covers 2015 to 2020. Cumulatively, the recommendations listed in this report create a holistic approach to shellfish aquaculture and resource enhancement by linking research, permitting, outreach and extension and support services of several state agencies

with private shellfish aquaculture organizations and interests as well as to non-governmental organizations.

The success of aquaculture operations goes beyond permitting and site selection functions that have traditionally been the role of the division. Achieving and sustaining a successful shellfish aquaculture industry will depend on use of sound scientific principles, solid business planning, marketing, training and assistance from other groups.

Section 14.8 of Session Law 2015-241 requires the NCDMF to create a proposal to open shellfish cultivation leasing certain areas of Core Sound that are currently subject to a moratorium. Division staff met with the Carteret County Fisheries Association, which represents commercial fishing interests, the president of the N.C. Shellfish Growers Association, and aquaculture experts from the National Oceanic and Atmospheric Administration. The report provides a conservative, methodical approach to re-opening limited areas of Core Sound to shellfish leasing. A proposal was developed to open portions of western Core Sound to shellfish leasing in a controlled manner with oversight from the Marine Fisheries Commission through the Shellfish and Crustacean Advisory Committee. The eastern side of Core Sound was not considered in the proposal because of high densities of submerged aquatic vegetation, it is part of the Cape Lookout National Seashore, has an existing pound net fishery, and other commercial and recreational uses that make this area unsuitable for considering shellfish cultivation. An action plan is also provided in the report to allow limited shellfish leases in Core Sound.

MANAGEMENT AND RESEARCH NEEDS

Table 3, provides the NCMFC selected management strategy from Amendment 2 and Table 5 provides the NCMFC selected management strategy for Supplement A to Amendment 2. Table 6 provides the selected management strategy for Amendment 3. Table 7 shows the preferred management options in draft Amendment 4 that is scheduled for adoption in February 2017. The specific research recommendations from draft Amendment 4, with its priority ranking are provided below. The prioritization of each research recommendation is designated either a HIGH, MEDIUM, or LOW standing. A low ranking does not infer a lack of importance but is either already being addressed by others or provides limited information for aiding in management decisions. A high ranking indicates there is a substantial need, which may be time sensitive in nature, to provide information to help with management decisions.

Draft Amendment 4

Many environmental considerations are applied throughout the CHPP and are not part of this list but are still considered very important to oysters. Specifically, the proposed implementation actions on sedimentation within the CHPP are considered a high priority.

Proper management of the oyster resource cannot occur until some of these research needs are met, the research recommendations include:

- Support all proposed implementation actions under the priority habitat issue on sedimentation in the CHPP - HIGH
- Improve the reliability for estimating recreational shellfish harvest (Section 6.0) - HIGH
- Survey commercial shellfish license holders without a record of landings to estimate oyster harvest from this group (Section 6.0) - HIGH

- Develop regional juvenile and adult abundance indices (fisheries-independent)(Section 6.0) - HIGH
- Complete socioeconomic surveys of recreational oyster harvesters (Section 9.4) - MEDIUM
- Continue to complete socioeconomic surveys of commercial oyster fishermen (Section 9.4) - LOW
- Determine alternative substrates for reef development and monitoring of intertidal and subtidal reefs (cost-benefit analysis for reefs and cultch planting)(Section 10.5) - HIGH
- Identify number and size of sanctuaries needed (Section 10.5) - LOW
- Identification of larval settlement cues which influence recruitment to restored reefs (i.e. sound, light, current, etc.)(Section 10.5) - LOW
- Support collaborative research to more efficiently track bacterial sources for land-based protection and restoration efforts (Section 11.3) - MEDIUM
- Quantify the impact of current fishing practices on oyster habitat suitability in North Carolina (Section 11.9) - HIGH
- Quantify the relationship between water quality parameters and the cumulative effect of shoreline development units (e.g., docks, bulkhead sections)(Section 11.9) - MEDIUM
- Develop peer reviewed, standardized monitoring metrics and methodologies for oyster restoration and stock status assessments (Section 11.9) - MEDIUM
- Further studies on the effects of dredge weight and size on habitat disturbance and oyster catches (Issue 12.6) - LOW
- Develop a program to monitor oyster reef height, area and condition (Issue 12.6) - HIGH
- Estimate oyster mortality associated with relay (Issue 12.2) - LOW
- Estimate longevity and yield of oysters on cultch planting sites (Issue 12.2) – HIGH
- Develop methods to monitor abundance of the oyster population (Issue 12.2) - HIGH

FISHERY MANAGEMENT PLAN RECOMMENDATION

Recommend maintain the current timing of the Benchmark Review. Amendment 4 of the N.C. Oyster FMP is currently in development and scheduled for NCMFC adoption in February 2017 with any recommended rules changes in effect by May 2017.

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TABLES

Table 1. Status of shellfish waters in acreage from 2006-2015 From NCDMF Shellfish Sanitation & Recreational Water Quality.

	Open	Closed	Approved	Conditionally Approved Open	Conditionally Approved Closed	Prohibited
2006	1,366,933	365,885				
*2007	1,777,523	441,448	1,734,339	43,184	12,512	428,936
2008	1,777,473	441,527	1,734,192	43,281	12,788	428,739
2009	1,777,777	441,276	1,734,246	43,531	12,552	428,724
2010	1,777,992	440,966	1,734,938	43,054	12,552	428,414
2011	1,777,992	440,966	1,734,938	43,054	12,552	428,414
2012	1,777,534	441,498	1,732,902	44,632	11,834	429,664
2013	1,777,349	441,684	1,733,067	44,282	11,832	429,852
2014	1,776,967	442,102	1,733,118	43,849	11,739	430,363
**2015	1,462,222	756,908	1,418,373	43,849	11,739	745,169

*In 2007 the NC Division of Environmental Health – Shellfish Sanitation Section started calculating acreage from GIS, whereas prior figures were hand-tallied by planimeter on NOAA Charts. Data will be slightly higher than previous data calculated by hand beginning in 2007.
**314,710 acres administratively closed on 2/4/15 due to budget cuts and office closures

Table 2. Percentage of legal-sized oysters by area for the 2015/16 season in the mechanical fishery. Number of boats seen while out sampling is in parentheses. *Neuse River closed on Feb. 25, 2016 (Proclamation SF-1-2016) +Northern Dare County closed on Feb. 28, 2016 (Proclamation SF-2-2016)

Neuse River*		Pamlico River		Northern Hyde County		Northern Dare County+	
Date	Percent	Date	Percent	Date	Percent	Date	Percent
	Pre-season		Pre-season		Pre-season		Pre-season
10/2/15	39.0	10/20/15	28.7	10/30/15	28.3	10/22/15	26.0
11/16/15	40.0 (12)	11/17/15	37.1 (35)	11/16/15	33.1 (9)	11/17/15	23.0 (12)
		12/1/15 &					
12/1/15	30.7 (14)	12/2/15	32.7 (33)	12/1/15	39.4 (6)	12/2/15	27.5 (6)
12/14/15	28.0 (15)	12/30/15	35.3 (12)	12/15/15	29.3 (7)	12/16/15	27.0 (12)
1/20/16	30.8 (4)	1/12/16	29.5 (3)	1/15/16	45.2 (42)	1/20/16	27.4 (3)
2/2/16	17.4 (6)	1/26/16	29.5 (16)	2/1/16	37.8 (10)	2/17/16	19.0 (6)
				2/19/16 &			
2/17/16	16.8 (8)	3/1/16	26.0 (15)	2/22/16	30.5 (4 & 1)	2/23/16	21.1 (0)
3/7/16*	Closed 17.1			3/7/16	24.6 (1)		
				3/15/16	23.4 (0)		

Table 3. The annual average number of oyster spat across all sampling sites, 2006-2015 (NCDMF Habitat and Enhancement Section).

Year	Number of sites sampled	Annual average number of spat across all sampling sites	Standard error
2006	130	1.7736	0.1054
2007	132	1.8890	0.1308
2008	107	2.3810	0.1599
2009	111	3.1462	0.1935
2010	112	2.7676	0.1974
2011	99	2.1027	0.2196
2012	89	3.0416	0.3050
2013	82	1.8955	0.1898
2014	76	2.9216	0.2488
2015	92	1.8610	0.1940

Table 4. Summary of the NCMFC management strategies and their implementation status for Amendment 2 of the Oyster Fishery Management Plan.

Management Strategy	Implementation Status
HARVEST ISSUES	
Recommend no change to the open shellfish harvest license	Accomplished
Recommend a 15 bushel hand/mechanical harvest limit in Pamlico Sound mechanical harvest areas outside the bays, 10 bushel hand/mechanical harvest limit in the bays and in the Mechanical Methods Prohibited area along the Outer Banks of Pamlico Sound.	Accomplished
Define recreational shellfish gear	Accomplished
Allow no sale of weekend shellfish harvest except from leases	Accomplished
Propose repeal of G.S. 113-169.2 license exemption.	Accomplished
Set recreational limits in rule and proclamation	Accomplished
Require all shellfish to be tagged at the dealer level	Accomplished
Adopt a new rule limiting mechanical harvest of other shellfish to areas where and season when mechanical harvest gear for shellfish is allowed in existing fisheries	Accomplished
10 bushel mechanical gear harvest limit in the Pamlico Sound bays with a six week (mid-November through December) season (until triggers are established)	Accomplished
Collect more data comparing the effects of 50 and 100 lb dredges prior to making a decision on this issue	Accomplished
Change existing rule to set the latest season closure date at March 31	Accomplished
PRIVATE CULTURE ISSUES	
Leave regulations as is for depuration facilities.	Accomplished
Utilize user coordination plans for shellfish lease issuance coast wide	Funding required but was not sought due to budget situation
Support private oyster larvae monitoring programs	Accomplished
Support construction of an integrated system of shellfish hatcheries and remote-setting sites	Accomplished

Management Strategy	Implementation Status
Develop a subsidized, fee-for-service disease diagnosis program.	Not under consideration at this time
Update seed oyster management in statutes and rule.	Accomplished
Monitor seeded oyster sanctuaries for cownose ray predation.	Research underway
Propose an exemption from G.S. 113-168.4(b)(1) when the sale is to lease, UDOC permit, or Aquaculture Operations Permit holders for further rearing	Accomplished
Require an examination with a passing score based on pertinent information in the training package irrespective of whether the applicant has obtained instruction voluntarily or is reviewing the information independently	Accomplished
Request that appropriate agencies such as the Oyster Hatchery and N.C. Sea Grant conduct shellfish lease training as part of their educational and outreach activities	Needed
Modify G.S. 113–201 to include a requirement of an examination with a passing score for persons acquiring shellfish leases by lawful transfers unless they have a shellfish lease that is currently meeting production requirements	Accomplished
Encourage harvesters to take volunteer time and temperature control measures on their product.	Covered by new permit requirement
Change the current rule specifying a three year running production average to a five year production average and change the statutory provision for a ten year lease contract to a five year contract	Accomplished
Limit acreage per shellfish lease application to 5 acres	Accomplished
A leaseholder holding at least 5 acres of shellfish bottom is required to meet shellfish lease production requirements before being approved for any additional lease acreage	Accomplished
Require Lat./Long. coordinates on lease corner locations as part of the requirement of a registered land survey	Accomplished
Develop regional lease acreage caps based on established use of water bodies	Accomplished Statute change – No NCMFC Action
Rewrite the statutory provision limiting the amount of shellfish lease acreage that can be held by an individual to include acreage held by corporations where the individual is a member, or any combination of corporate or family holdings	Accomplished
No change to rules affecting the issuance of permits for culturing shellfish in closed harvest areas	Accomplished
INSUFFICIENT DATA	
Recommend no change (status quo) to collect information on recreational harvest of shellfish through a license	Accomplished
ENHANCEMENT ACTIVITIES	
Expand and evaluate the number of designated oyster sanctuaries to increase oyster populations	Ongoing
Include current and future oyster sanctuaries into North Carolina Fisheries Rules For Coastal Waters Subchapter 03R.	Accomplished
Plant and monitor seed oysters on existing oyster sanctuary/artificial reef sites.	Accomplished
ENVIRONMENTAL ISSUES	
Review the results of the completed USACE EIS on the proposed introduction of Suminoe oysters in Chesapeake Bay	Accomplished

Management Strategy	Implementation Status
and consult with sister states concerning use of these non-native oysters	
Support DWQ's efforts to improve stormwater rules through permit comments and CHPP implementation and co-ordinate with sister agencies	Accomplished
Recommend DWQ to designate Use-Restoration waters in conditionally closed waters where moderate contamination and healthy shellfish beds are present and develop strategies to restore and protect those waters	Accomplished URW coordinator hired by DWQ
Recommend DWQ designate Use-restoration waters in areas where moderate contamination and appropriate shellfish culture conditions are present and develop strategies to restore and protect those waters	Accomplished URW coordinator hired by DWQ
Recommend to the DWQ to accept a lower threshold of 10,000 square feet to coastal stormwater rules	Accomplished
Recommend a naturally vegetative riparian buffer width of 50 feet	Accomplished
Recommend the exclusion of all wetlands (coastal and non-coastal), from the built-upon area calculations	Accomplished
Provide educational materials to harvesters in license offices and on NCDMF webpage, through other training opportunities, and through NCDMF Port Agent contact with harvesters and dealers and include other state and federal regulatory agencies to reach all coastal waters users	Partially Accomplished
Leave current management practices in place for Ward Creek	Accomplished
Recommend repeal of G.S. 113-207 (a) and (b) to end the requirement that all oyster rocks must be posted by the Department	Accomplished
Recommend that conservation leasing for constructed oyster rock habitat be studied by DENR counsel for development of a proper mechanism and to develop siting criteria	Not under consideration at this time

Table 5. Summary of the NCMFC management strategies and their implementation status for Supplement A to Amendment 2 of the Oyster Fishery Management Plan.

Management Strategy	Implementation Status
Proclamation authority up to 20 bushels per fishing operation with a harvest closure trigger when sampling indicates the number of legal-size oysters in the area has declined to 26% of the live oysters sampled	Accomplished

Table 6. Summary of the NCMFC management strategies and their implementation status for Amendment 3 of the Oyster Fishery Management Plan.

Management Strategy	Implementation Status
Create seed oyster management areas at Swan Point and Possum Bay in Onslow County	Accomplished

Table 7. Summary of the NCMFC management strategies and their implementation status for draft Amendment 4 of the Oyster Fishery Management Plan scheduled for adoption February 2017.

Management Strategy	Implementation Status
OYSTER MANAGEMENT	
Maintain the cost of the Shellfish License, establish a daily limit of two bushels of oysters per person with a maximum of four bushels of oysters per vessel off public bottom with the Shellfish License.	Existing proclamation authority
Increase efforts to plant and monitor cultch material.	No new action required
Implement a five percent cull tolerance for oysters	Rule change to 15A NCAC 03K .0202 required
Pursue elimination of the Shellfish License for oysters only and require all oyster harvesters to have a Standard or Retired Commercial Fishing License with a shellfish endorsement to harvest commercially.	Amend G. S. 113-169.2
Allow Shellfish License holders to be eligible to acquire a Standard Commercial Fishing License after they show a history of sale of shellfish. Continue to allow commercial harvest of all other shellfish as currently allowed.	No action required
Status quo (Maintain the shallow bays (< 6 feet) as defined in 15A NCAC 03R .0108)	No action required
Recommend a six week opening timeframe for deep bays to begin on the Monday of the week prior to Thanksgiving week through the Friday after Thanksgiving. Reopen two weeks before Christmas for the remainder of the six week season.	Existing proclamation authority
Status quo (Maintain the 15 bushel hand/mechanical harvest limit in Pamlico Sound mechanical harvest areas outside the bays, 10 bushel hand/mechanical harvest limit in the bays and in the Mechanical Methods Prohibited area along the Outer Banks of Pamlico Sound)	Existing proclamation authority
Adopt the provisions of Supplement A – a flexible harvest limit up to 20 bushels, a trigger of 26 percent legal-sized oysters for closing an area to mechanical harvest and set the upper harvest limit of 20 bushels in rule (rule change required).	Existing proclamation authority
Attempt to develop and ground-truth a fishery dependent metric of effort to better inform management decisions in the future	Additive to NCDMF monitoring
PRIVATE CULTURE	
Support modification of G.S. 113-208 and G.S. 113-269 to add minimum fines for violations on shellfish leases and franchises. With minimum fines set at $500 for the first violation and $1,000 for the second violation	Amend G.S. 113-208 and G.S. 113-269
Support modification of G.S. 113-269 to include protection to all shellfish leases and franchises, not just those with water column amendments	Amend G.S. 113-269
Modify Rule 15A NCAC 03O .0114, regardless whether statute changes occur, so that a first conviction under G.S. 113-208 or G.S. 113-269 the Fisheries Director shall revoke all licenses issued to the licensee	Rule change to 15A NCAC 03O .0114 required

Management Strategy	Implementation Status
Status quo (Adhere to Regional Conditions of USACE NWP48 with no adverse effect to SAV from shellfish leases and following measure identified in the interim)	No action required
Continue the moratorium of shellfish leases in Brunswick County	No action required
Establish a rule to support extensions for where "Acts of God" prevent lease holder from making production, with a two year extension and only one extension allowed per term	Rule change to 15A NCAC 03O .0201 required
Allow leases returned to the state to remain delineated for a period of one year to allow the pre-existing leased bottom to be re-issued to other shellfish growers	Amend G.S. 113-202
Improve public notice of proposed lease applications on the physical lease, at fish houses, and/or through electronic notices	No action required
Allow a maximum of 10 acres in both mechanical methods prohibited areas and mechanical methods allowed areas	Rule change 15A NCAC 03O .0201(a)(3)

FIGURES

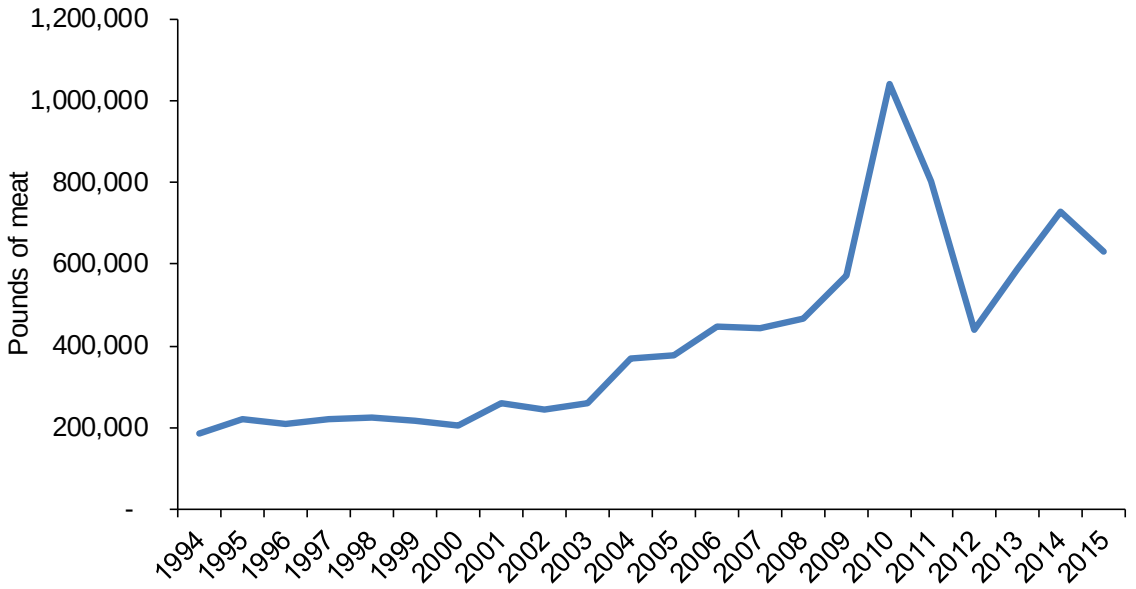

Figure 1. Annual commercial oyster landings (pound of meat) from private and public bottom in North Carolina, 1994-2015 (NCDMF Trip Ticket Program).

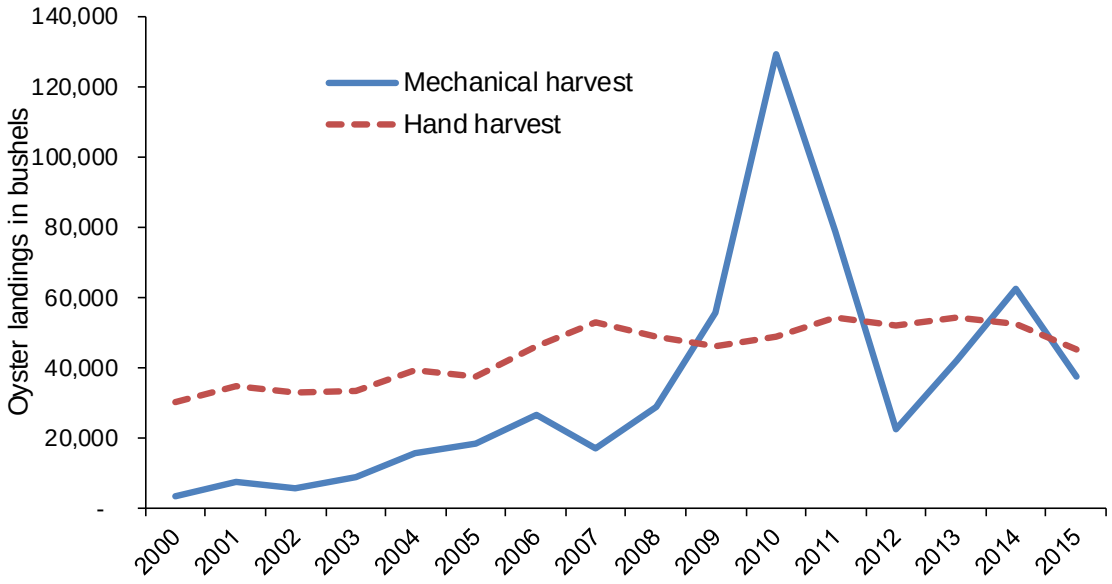

Figure 2. Annual commercial oyster landings (bushels) from public bottom in the mechanical and hand harvest oyster fisheries, 2000-2015 (NCDMF Trip Ticket Program).

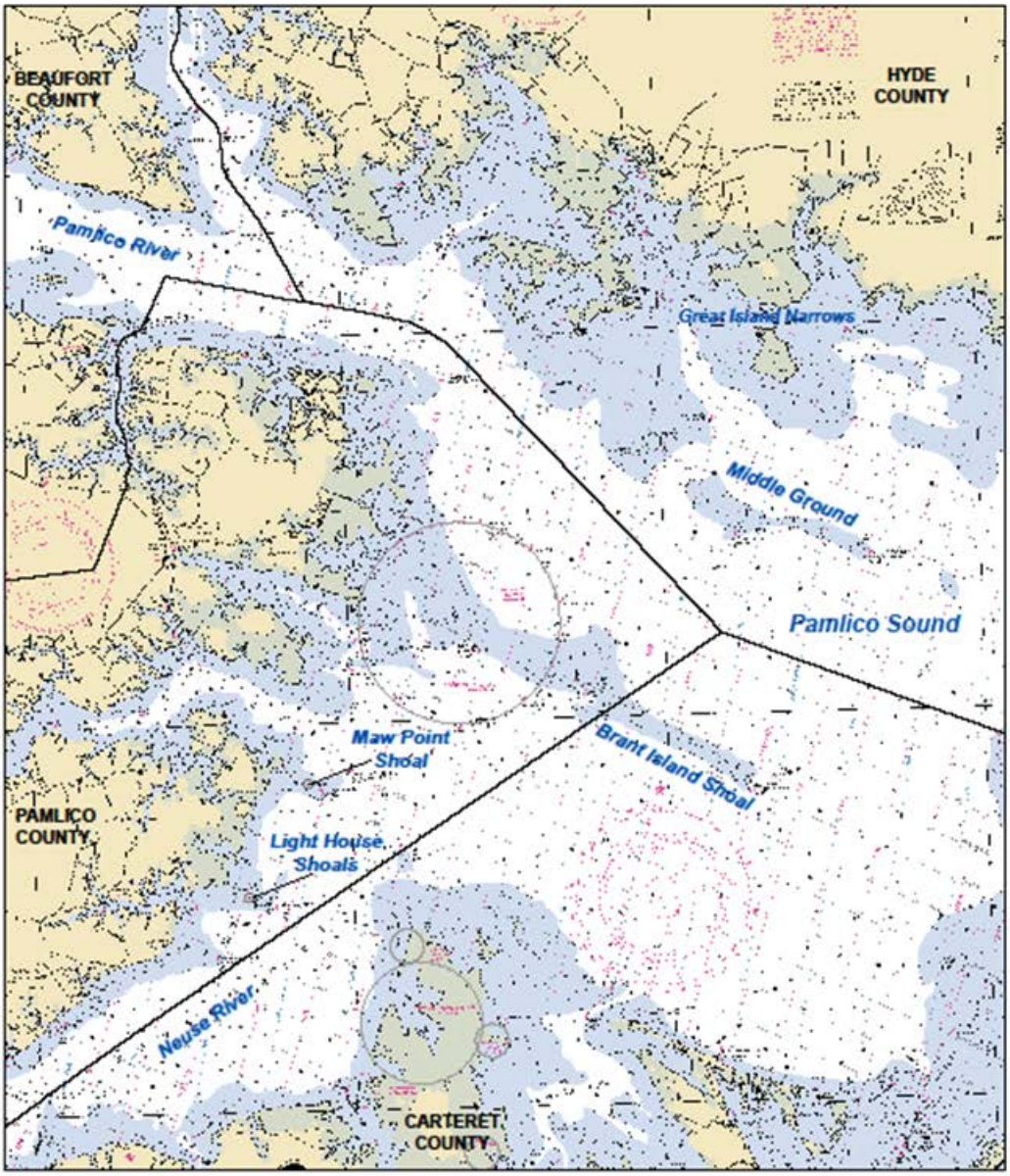

Figure 3. Map of areas referenced in the commercial landings section (NCDMF GIS database).

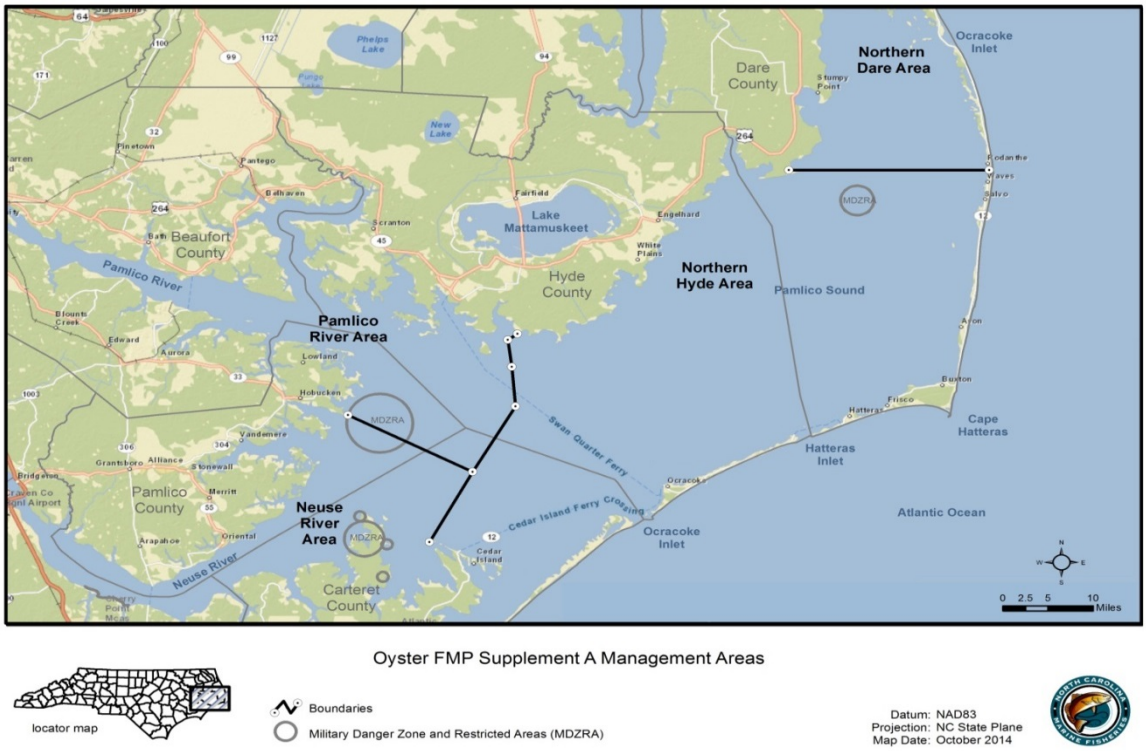

Figure 4. Mechanical harvest management areas from Supplement A to Amendment 2 of the Oyster FMP.

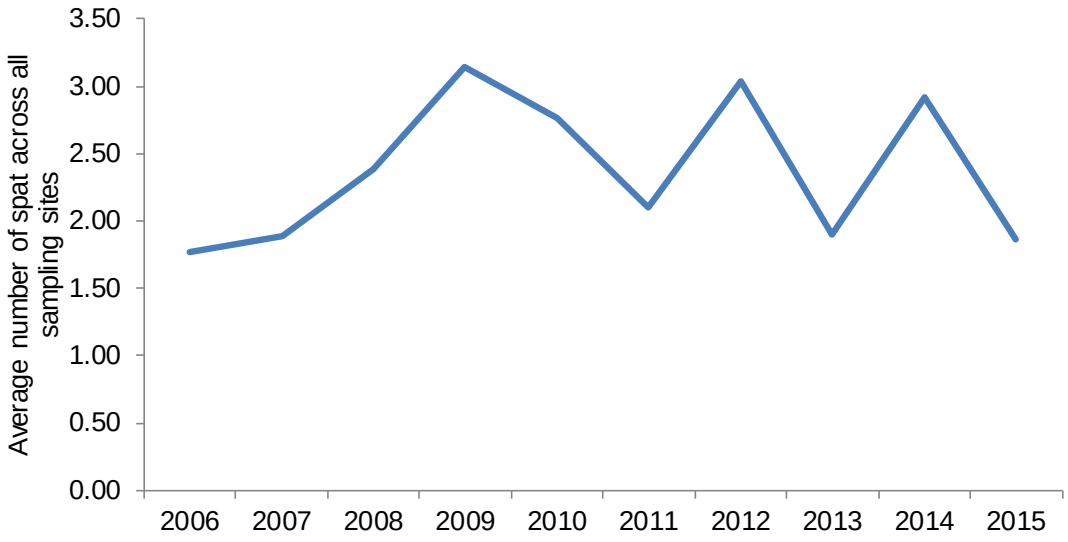

Figure 5. The annual average number of oyster spat across all sampling sites, 2006-2015 (NCDMF Habitat and Enhancement Section).

FISHERY MANAGEMENT PLAN UPDATE
ESTUARINE STRIPED BASS
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	1994
Amendments:	Amendment 1 – May 2013
Revisions:	November 2014
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	July 2018

Estuarine striped bass *(Morone saxatilis)* in North Carolina are currently managed under Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan (FMP) and its subsequent revision (NCDMF 2014). It is a joint plan between the North Carolina Marine Fisheries Commission (NCMFC) and the North Carolina Wildlife Resources Commission (NCWRC). Amendment 1, adopted in 2013, lays out separate management strategies for the Albemarle/Roanoke (A/R) stock and the Central and Southern stocks in the Tar/Pamlico, Neuse, and Cape Fear rivers. Management programs in Amendment 1 utilize daily possession limits, open and closed harvest seasons, gill net mesh size and yardage restrictions, seasonal attendance requirements, barbless hook requirements in some areas, minimum size limits, and slot limits to maintain a sustainable harvest and reduce regulatory discard mortality in all sectors. Amendment 1 also maintains the stocking regime in the Central and Southern systems and the harvest moratorium on striped bass in the Cape Fear River and its tributaries (NCDMF 2013). Striped bass fisheries in the Atlantic Ocean of North Carolina are managed under ASMFC's Amendment 6 to the Interstate FMP for Atlantic Striped Bass and subsequent addenda.

In response to the results of the 2013 benchmark A/R striped bass stock assessment that indicated fishing mortality was above its target, the NCMFC approved a Revision to Amendment 1 in November 2014 (NCDMF 2014). Management programs for the A/R in the November 2014 Revision utilize total allowable landings (TAL) instead of total allowable catch (TAC). The term TAC does not accurately describe the existing management strategy, because the term "catch" refers to landings and discards. Since its inception the quota used to maintain striped bass harvest in the A/R and the Central and Southern systems at sustainable levels is for landings only, not landings and discards. The revision reduced the TAL for the A/R stock from 550,000 lb to 275,000 lb, to be split evenly between the commercial and recreational sectors. Stock assessment projections indicated a TAL of 275,000 lb would maintain fishing mortality and spawning stock at their respective targets and provide a sustainable harvest. The Central and Southern stocks continue to be managed under a 25,000 lb commercial TAL, daily possession

limits and a closed summer season to control recreational harvest, and a total harvest moratorium in the Cape Fear River and its tributaries.

The North Carolina Estuarine Striped Bass FMP approved in May 2004 was the first FMP developed under the criteria and standards of the 1997 Fisheries Reform Act (NCDMF 2004). The plan focused on identifying water flow, water quality, and habitat issues throughout the state, reducing discard mortality in the commercial anchored gill net fisheries, continued stocking of striped bass in the Central and Southern areas of the state, and developing creel surveys in the Tar/Pamlico, Neuse, and Cape Fear rivers to estimate recreational harvest in those systems.

The NCMFC and the NCWRC implemented a Memorandum of Agreement in 1990 to address management of striped bass in the Albemarle Sound and Roanoke River. The original Estuarine Striped Bass FMP was approved by the NCMFC in 1994 and was targeted at the continued recovery of the A/R stock, which at the time was at historically low levels of abundance and was experiencing chronic spawning failures (Laney et. al. 1993). The comprehensive plan for the first time addressed the management of all estuarine stocks of striped bass in the state. The plan also satisfied the recommendation, contained in the Report to Congress for the North Carolina Striped Bass Study (U.S. Fish and Wildlife Service 1992) that such a plan be prepared.

Management Unit

There are two geographic management units and four striped bass stocks included in Amendment 1 to the North Carolina Estuarine Striped Bass FMP. The northern management unit is comprised of two harvest management areas; the Albemarle Sound Management Area (ASMA) and the Roanoke River Management Area (RRMA). The ASMA includes the Albemarle Sound and all its coastal, joint and inland water tributaries, (except for the Roanoke, Middle, Eastmost and Cashie rivers), Currituck, Roanoke and Croatan sounds and all their joint and inland water tributaries, including Oregon Inlet, north of a line from Roanoke Marshes Point across to the north point of Eagle Nest Bay in Dare county. The RRMA includes the Roanoke River and its joint and inland water tributaries, including Middle, Eastmost and Cashie rivers, up to the Roanoke Rapids Dam. The striped bass stock in these two harvest management areas is referred to as the A/R stock, and its spawning grounds are located in the Roanoke River in the vicinity of Weldon, NC. Management of recreational and commercial striped bass regulations within the ASMA is the responsibility of the NCMFC. Within the RRMA commercial regulations are the responsibility of the NCMFC while recreational regulations are the responsibility of the NCWRC. The A/R stock is also included in the management unit of Amendment 6 to the Atlantic States Marine Fisheries Commission (ASMFC) Interstate FMP for Atlantic Striped Bass.

The southern geographic management unit is the Central Southern Management Area (CSMA) and includes all internal coastal, joint and contiguous inland waters of North Carolina south of the ASMA to the South Carolina state line. There are spawning stocks in each of the major river systems within the CSMA; the Tar/Pamlico, the Neuse, and the Cape Fear. These stocks are collectively referred to as the CSMA stocks. Spawning grounds are not clearly defined in these systems as access to spawning areas is influenced by low river flows as well as impediments to migration. Management of striped bass within the CSMA is the sole responsibility of the NCMFC and the NCWRC, and is not subject to compliance with the ASMFC Interstate FMP for Atlantic Striped Bass.

Goals and Objectives

The goals of Amendment 1 to the North Carolina Estuarine Striped Bass FMP are to achieve sustainable harvest through science based decision-making processes that conserve adequate spawning stock, provide and maintain a broad age structure, and protect the integrity of critical habitats. To achieve these goals, the following objectives must be met:

1. Identify and describe population attributes, including age structure, necessary to achieve sustainable harvest.

2. Restore, improve, and protect striped bass habitat and environmental quality consistent with the Coastal Habitat Protection Plan (CHPP) to increase growth, survival and reproduction.

3. Manage the fishery in a manner that considers biological, social, and economic factors.

4. Initiate, enhance, and/or continue programs to collect and analyze biological, social, economic, fishery, habitat, and environmental data needed to effectively monitor and manage the fishery.

5. Initiate, enhance, and/or continue information and education programs to elevate public awareness of the causes and nature of issues in the striped bass stocks, habitat, and fisheries, and explain management programs.

6. Develop management measures, including regulations that consider the needs of all user groups and provide sustainable harvest.

7. Promote practices that minimize bycatch and discard mortality in recreational and commercial fisheries.

STATUS OF THE STOCK

Stock Status

A/R stock

The A/R striped bass stock status is currently listed as “concern”. Although the 2014 A/R striped bass benchmark stock assessment indicated the resource is not overfished or experiencing overfishing relative to the new reference points, both reference points have crossed their targets and are approaching their thresholds, meaning the point estimate is very close to the overfishing and overfished definitions (Mroch and Godwin 2013). Declining trends in landings and independent indices of abundance also contribute to the “concern” designation.

CSMA stocks

The lack of adequate data causes the CSMA stocks to be quantitatively assessed as unknown and to be listed as “concern”. The need for continued conservation management efforts are supported by the truncated size and age distributions, low overall abundance, and the absence of older fish in the spawning ground surveys (NCDMF 2013, Appendix 14.7).

Stock Assessment

A/R stock

The most recent A/R stock assessment (data through 2012) utilized the ASAP3 statistical catch at age model. The benchmark assessment was peer reviewed and approved for management use by an outside panel of experts and the ASMFC Atlantic Striped Bass Technical Committee. The model incorporated all commercial and recreational harvest and discard data, as well as abundance data from fishery independent surveys conducted by North Carolina Division of Marine Fisheries (NCDMF) and NCWRC staff.

Results from the assessment indicated the stock is not overfished or experiencing overfishing relative to its biological reference points (Table 1, Figures 1 and 2). Although the stock is not overfished, female spawning stock biomass has declined steadily since its peak in 2003, and is estimated at 835,462 lb, just above the threshold of 772,588 lb. Albemarle/Roanoke striped bass experienced a period of unusually strong recruitment (number of age-1 fish entering the population) from 1994-2001 followed by a period of lower recruitment from 2002-2013 (Figure 1). Total stock abundance reached its peak in the late 1990s and has declined gradually since, averaging about 1.5 million fish in recent years. Additionally, fishing mortality is estimated at 0.34, just above the target of 0.33 (Figure 2).

An update of the A/R stock assessment with data through 2014 is scheduled to be completed in the fall of 2016.

CSMA stocks

The index-based method of catch curve analysis was used to assess the status of striped bass populations in the CSMA (NCDMF 2013, Appendix 14.7). Exploitation and mortality were estimated for the Tar/Pamlico and Neuse river stocks using catch-per-unit-effort (CPUE) from the NCWRC electrofishing spawning grounds survey and the NCDMF Program 915 independent gill net survey. The large confidence intervals and lack of precision in the catch curve Z estimates (total mortality rate) made them unsuitable for making a stock status determination (NCDMF 2013). For this reason, catch curve results (especially annual estimates of mortality) were supplemented with additional quantitative information (such as trends in mean CPUE).

Improvements in the age structure of the CSMA striped bass stocks are expected from the regulatory restrictions implemented under the 2004 FMP and from the protective measures for endangered species implemented in May 2010 (NCDMF 2010) and further codified in Incidental Take Permits for sea turtles and Atlantic sturgeon from the National Oceanic and Atmospheric Administration.

STATUS OF THE FISHERY

Annual spawning success of anadromous fish and fish that spawn in or use estuaries for nursery habitat, is largely dependent upon environmental conditions, both natural and manmade. Even when female spawning stock biomass is very high, very poor reproductive success can still occur due to unfavorable environmental conditions. This fact is important to keep in mind when discussing trends in landings data and stock abundance. For species that have long term juvenile abundance surveys, this phenomenon is evident when we observe a

year with tremendous spawning success (termed a “strong year class”) followed by a year when practically no eggs survive to the juvenile stage (a “weak year class”). This cycle of spawning success and failure results in annual harvests that increase and decrease depending on the abundance of the year classes available to the fishery.

Current Regulations

ASMA

Harvest in the commercial sector is limited by an annual TAL of 137,500 lb (see the November 2014 Revision of Amendment 1 to the North Carolina Estuarine Striped Bass FMP for a thorough discussion of how the current TAL was determined). There is also an 18 in minimum total length (TL) size limit. The commercial fishery is prosecuted as a non-directed bycatch fishery, with the majority of landings occurring in large mesh (≥ 5 in stretched mesh (ISM)) floating gill nets during the spring American shad fishery. Pound nets and flounder nets account for the remainder of the harvest. Daily trip limits are set by proclamation. Daily reporting of the number and pounds of striped bass landed from all licensed striped bass dealers ensure the TAL is not exceeded. There is a fall harvest season from October 1 through December 31 and a spring harvest season from January 1 through April 30. The harvest season is closed from May 1 through September 30 each year. The seasons may be closed early by proclamation if the TAL is reached. There is mandatory attendance on all small mesh (< 5 ISM) gill nets during the summer closed season to reduce discard mortality in that fishery. There are areas within the ASMA that are closed to all gill netting to further reduce undersize discards and to protect females as they enter the mouth of the Roanoke River during their spring spawning migration.

Harvest in the recreational sector is limited by an annual TAL of 68,750 lb. The recreational sector also has an 18 in TL minimum size limit and a two fish per person daily possession limit. The harvest seasons are the same as the commercial sector. Harvest is estimated via a creel survey designed for striped bass in the ASMA. The daily possession limit may be changed and/or seasons closed early by proclamation to ensure the TAL is not exceeded.

Check with the NCDMF for the most recent proclamation on striped bass harvest limits including trip limits and bycatch requirements.

RRMA

Commercial harvest in the RRMA is prohibited. The RRMA recreational sector also has an annual TAL of 68,750 lb. The harvest season is open from March 1 through April 30 each year. There is an 18 in TL minimum size limit and a no possession slot where fish between 18 in TL and 27 in TL may not be possessed. There is a two fish per person daily possession limit and only one of those fish may be greater than 27 in TL. Only a single barbless hook may be used in inland waters of the RRMA upstream of the U.S. Highway 258 Bridge from April 1 – June 30.

CSMA

Both commercial and recreational fishermen are subject to an 18 in TL minimum size limit for striped bass within the CSMA. As a protective measure in joint and inland CSMA waters, it is unlawful for recreational fishermen to possess striped bass between 22 to 27 in TL. Recreational fishermen are subject to a two fish per person per day creel limit. Commercial fishermen are subject to 10 fish per person per day limit with a maximum of two limits per commercial operation. Recreational harvest season for striped bass within the CSMA is October 1 through April 30. The commercial season opens by proclamation and may occur between January 1 and April 30, and is closed by proclamation once the annual 25,000 pound TAL is reached or on April 30, whichever occurs first. After the closure of the commercial harvest

season through December 31, commercial fishermen are required to use a 3 foot tie down in large mesh (≥5 in stretch mesh) gill nets in internal coastal fishing waters west of the 76 28.0000' W longitude line. They must also maintain a minimum distance from shore (DFS) of 50 yards for these nets upstream of the existing DFS line (see proclamation M-3-2015 for area descriptions). There is a harvest moratorium for all recreational and commercial fisheries in the Cape Fear River and its tributaries.

Commercial Landings

ASMA

Commercial landings in the ASMA have been controlled by an annual TAL since 1991 (Table 2). Due to gill net mesh regulations and minimum size limits in place since 1993, the majority of harvest consists of fish 4-6 years of age (Figure 3). From 1990 through 1997 the TAL was set at 98,000 lb because the A/R stock was at historical low levels of abundance. The stock was declared recovered in 1997 and the TAL was gradually increased as stock abundance increased. The TAL reached its maximum level of 275,000 lb in 2003 as the stock reached record levels of abundance.

Through 2004 the TAL was reached easily. As stock abundance started to decline, commercial landings no longer reached the annual TAL, even with increases in the number of harvest days and daily possession limits. From 2005 through 2009 landings steadily declined and averaged about 150,000 lb, even though gill net trips remained steady during that period (Figure 4). Gill net trips in this instance are all anchored gill net trips occurring in the ASMA as reported through the North Carolina Trip Ticket Program. Because of several caveats, including this is not a directed fishery, the trip data cannot be used to calculate any type of catch per unit of effort, but are shown to provide a general idea about the trends in anchored gill net effort in the ASMA.

The decline in landings during 2005-2009 was due to poor year classes produced from 2001 to 2004. An increase in landings in 2010 to over 200,000 lb was due to the fairly strong 2005- year class. In 2013 and 2014 landings were reduced in part because of a very weak 2009-year class and a shortened American shad season resulting from triggers being met in the American Shad Sustainable Fishery Plan.

CSMA

Commercial landings in the CSMA have been controlled by an annual TAL of 25,000 lb since 1994. Over the past ten years, landings have closely followed the annual TAC, with the exception of 2008 when less than half of the TAL was landed. The majority of landings have been split between the Pamlico and Pungo rivers and the Neuse and Bay rivers, with the remainder coming from the Pamlico Sound (Figure 5). Since 2004 there has only been a spring harvest season, recently opening March 1 each year and closing when the TAL is reached, usually near the end of March. Unlike the fishery in the ASMA, this is a directed fishery for striped bass primarily using anchored gill nets.

Recreational Landings

ASMA

The recreational sector's landings in the ASMA are dominated by fish age 3-6 due in part to a statewide rule that prohibits possession of river herring over six in while engaged in fishing activities, the migratory nature of larger, older fish, and general angling techniques in the ASMA. Very few anglers use the large size artificial lures or natural bait required to catch striped bass over 28 in, so very few fish over nine or ten years old are observed in the creel survey.

Landings in the ASMA have been controlled by a TAL since 1991 (Table 2). Starting in 1998 the TAL was split evenly between the commercial and recreational sectors. The recreational TAL increased incrementally from 29,400 lb in 1997 to 137,500 lb in 2003. The recreational sector reached its TAL consistently until 2002, when landings started declining. Recreational landings peaked in 2001 at 118,506 lb. Landings have averaged about 32,000 lb for years 2006-2015, well below the ASMA recreational TAL at the time of 137,500 lb (Figure 6). The harvest season increased from four days a week to seven in the fall of 2005 and the daily recreational possession limit increased from two to three fish in the fall of 2006, but landings continued to decline. Several poor year classes produced since 2001 have accounted for the decline in stock abundance and recreational harvest since 2006.

RRMA

The recreational sector's landings in the RRMA are dominated by fish age 3-6 due to a no possession rule of fish between 22 and 27 in TL in the RRMA, a statewide rule that prohibits possession of river herring over six in while engaged in fishing activities, and general angling techniques in the RRMA. Very few anglers use the large size artificial lures or natural bait required to catch striped bass over 28 in, so very few fish over nine or ten years old are observed in the creel survey.

The recreational TAL in the ASMA and RRMA has been split evenly since 1990. Landings in the RRMA followed the TAL closely through 2002. From 2003 through 2013 landings averaged 64,749 lb, with a few noticeable low years (2003, 2008, and 2013) (Figure 7). The total number of fish caught per angler during the spring fishery in the RRMA can be large; catches of 100 fish per day are not uncommon. But angler catch rate can be impacted by spring water flows. The hydropower company operating the dams on the Roanoke River, along with the U.S. Army Corps of Engineers and biologists with the USFWS and NCWRC, coordinate releases to best mimic natural flow conditions during the spring spawn. However, droughts or heavy rainfall may still result in very low, i.e. 2,000-3,000 cubic feet per second (cfs) or very high, (20,000 cfs) flood stage flow conditions in some years. During these low or high flow years, angler success can be greatly diminished.

CSMA

Recreational landings have fluctuated since 2004 and have ranged from a low in 2008 and 2009 averaging 3,026 lb to highs of 22,959 lb in 2004 and 20,003 lb in 2013 (Table 3). In recent years both the number of trips and the hours spent targeting striped bass within the CSMA have increased. Since 2011 harvest in the Tar/Pamlico and Neuse has been similar, ranging from about 4,000 lb to 9,000 lb, and has been two to three times greater than harvest in the Pungo River (Figure 8). Harvest on the Pungo River has remained consistent at a relatively low level compared to fluctuations experienced by the Tar/Pamlico and Neuse rivers. Legal sized striped bass discards have increased over the past five years, as well as fish released that are within the slot limit, with the exception of 2015 (Table 3). There is also a significant catch-and-release fishery during the summer in the middle reaches of the Tar/Pamlico and Neuse rivers.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

A/R Stock

The length, weight, sex, and age of the commercial harvest of striped bass has been consistently monitored through sampling at fish houses conducted by the division since 1982. For the last several decades anchored gill nets have accounted for >90% of the harvest in the ASMA. Pound nets account for most of the remaining landings with minor catches coming from fyke nets, hoop nets, and pots. The majority of annual landings were from age four to six-year-old fish (Table 4). The majority of harvest was between 21 and 26 in TL (Table 5). The total number of fish sampled from the commercial fishery is presented in Table 6.

The recreational harvest of striped bass in the ASMA and RRMA has been consistently monitored by the NCDMF since 1990 and the NCWRC since 1988 respectively. Age length keys generated by staff are applied to the total annual recreational harvest to create recreational catch at age matrices used in stock assessments (Tables 7 and 8). The majority of harvest is usually between 18 and 22 in TL (Tables 9 and 10). The numbers of fish sampled from the ASMA and RRMA recreational fisheries are presented in Tables 11 and 12.

CSMA Stocks

Monitoring of the commercial fishery in the CSMA follows the same methodology as in the ASMA. The NCDMF started collecting recreational striped bass data in the major rivers of the CSMA in 2005. There has been a harvest moratorium in the Cape Fear River since 2008. Length data from the commercial harvest in the Pamlico Sound and tributaries shows that striped bass in the Neuse and Bay rivers are slightly larger than fish harvested in the Pamlico and Pungo rivers (Table 13).

Fishery-Independent Monitoring

A/R Stock

A young-of-year (age-0) A/R striped bass juvenile abundance index (JAI) was initiated by Dr. William Hassler of North Carolina State University in 1955. The NCDMF took over the survey in 1985 in preparation of Dr. Hassler's retirement so the long term dataset could continue. Sampling occurs at seven fixed stations in the western Albemarle Sound from July through mid-October. Sampling gear is an 18-foot semi-balloon trawl towed for 15 minutes. Catch per unit of effort is the number of striped bass captured per tow. The JAI provided by the survey is usually a reliable indicator of relative abundance and future harvest potential. Data from the survey reveal the highly variable inter-annual spawning success of striped bass. Years of great spawning success can be immediately followed by years of spawning failure. The long time series of data also clearly shows the extended period of spawning failure that occurred when the stock was at historical levels of low abundance during the 1980s. Starting in 1993 the stock began producing successful spawns once again, due to severe management restrictions, improved water quality, agreements about a water flow regime on the Roanoke River during the spawning season, and favorable environmental conditions during the spawning season. Within an eight-year period spanning 1993-2000, the stock produced the four highest JAI values in the entire 46-year time series. The average JAI during 1993-2000 was 24.04, over three times higher than the average of the JAI prior to the stock crashing (1955-1977 JAI = 7.9; Figure 9). Based on this level of recruitment, the stock was declared recovered by the ASMFC in 1997. However, from 2001 to 2013 spawning success has been below average for most years, with only two well above average spawns and several years, some back to back, considered

spawning failures. This cycle since 1993 led to overall stock abundance increasing steadily through the mid-2000s followed by a period of stock decline from those all-time highs. The data generated from the survey is used in the A/R stock assessment as an independent measure of stock abundance (Table 14). The index is also used as a trigger. If the JAI is below 75% of all other values for three consecutive years, the ASMFC Striped Bass Technical Committee will make a recommendation to the ASMFC Striped Bass Management Board.

A fall/winter fishery independent gill net survey has been conducted by the NCDMF throughout the Albemarle and Croatan sounds since the fall of 1990. The survey utilizes a stratified random sampling design, employing mesh sizes from 2 ½ in to 10 in stretch mesh to characterize the resident and overwintering portion of the A/R stock. The survey is conducted from November through February. Catch per unit of effort is measured as the abundance of fish per 40-yard net soaked for 24 hours.

A spring survey employs the same methodology but is conducted in the western Albemarle Sound only, in the vicinity of the mouth of the Roanoke River. The goal of the survey is to characterize the spawning portion of the A/R stock. The survey is conducted from March through May. Data from surveys are used in the A/R stock assessment as an independent measure of stock abundance (Tables 15 and 16).

The independent gill net surveys do a good job of tracking relative abundance, but the trend in total abundance is often masked by the highly variable and often very large number of two and three-year-old fish captured in the survey, so trends in total abundance are less informative than trends in 4-6-year-old abundance. The trend in 4-6 year olds show the stock increasing in abundance through the early 2000s, then declining to levels similar to the late 1990s (Figure 10). The main weakness of the gill net surveys is they collect very few older fish, and under-represent the expansion of fish in the 9+ age group that has occurred since 2002. They also don't capture the decline in abundance of age 9+ fish that has occurred since the period of poor spawning success starting in 2001.

An electrofishing spawning ground survey has been conducted by the NCWRC since the spring of 1990. The survey goals are the same as the gill net survey but takes place on the Roanoke River in the vicinity of Weldon, the location of the fall line and historical center of spawning activity for A/R striped bass. The survey uses a stratified random sampling design. Catch per unit of effort is measured as the number of fish captured per hour of electrofishing. The survey is used in the A/R stock assessment as an independent measure of stock abundance.

The trend in total abundance from the electrofishing survey is similar to the trends of age 4-6 fish in the gill net surveys, increasing from low levels of abundance in the early 1990s to a peak in the early 2000s, then decreasing since (Figure 11). Both surveys exhibit a few years with high inter-annual variability, but this is common with fisheries surveys in which environmental conditions affect relative abundance in the survey area and the catch efficiency of the gear. The electrofishing survey does a better job at tracking the abundance of the age 9+ group, and clearly shows the emergence of the 1993 cohort into this age group in 2002 (Figure 12). The strong year classes produced from 1993-2000 supported the increased abundance of fish in the 9+ age group, but since the below average spawning and several years of spawning failure since 2001, the 9+ age group is also declining. The oldest fish seen recently in the population is 17 years old, indicating that fishing mortality has decreased significantly since the implementation of minimum size limits and a TAL. When the survey started in 1990 fish older than seven were rarely observed in the survey.

Taken together, all the independent surveys track A/R stock dynamics well, and indicate the stock is healthy and female spawning stock biomass is adequate to produce large year classes; the most recent occurred in 2011. The major factors currently contributing to annual spawning success, and hence stock abundance, are water quality and environmental conditions; the most important of these being river flow during the spring spawning season and for the following 3-5 weeks afterwards, as eggs and larval fish are transported the 137 river miles down the Roanoke River to their nursery areas in the western Albemarle Sound and lower Chowan River.

CSMA Stocks

A fishery independent gill net survey in the Central and Southern portion of the state was initiated by the NCDMF in May of 2001 in Pamlico Sound. This survey was expanded to the Pamlico, Pungo, and Neuse rivers in 2003 and expanded to the Cape Fear and New rivers in 2008. Data from the Fishery-Independent Gill Net Survey (Program 915) on the Pamlico, Pungo, and Neuse Rivers demonstrated the majority of all striped bass were captured in the upper and middle portions of the rivers. Annual striped bass CPUE ranged from 0.9 to 2.15 fish per sample during the reporting period (Table 17).

MANAGEMENT STRATEGY

A/R Stock

Estuarine striped bass in North Carolina are managed under Amendment 1 to the North Carolina Estuarine Striped Bass FMP and subsequent revisions. Striped bass fisheries in the Atlantic Ocean of North Carolina are managed under ASMFC's Amendment 6 to the Interstate FMP for Atlantic Striped Bass and subsequent addenda. The A/R stock is managed using biological reference points for spawning stock biomass and fishing mortality that are aimed at maintaining a sustainable harvest and adequate spawning stock biomass. Stock status is determined through a formal, peer reviewed stock assessment process that evaluates annual estimates of fishing mortality and biomass against their target and threshold values. An annual harvest quota for the A/R stock is calculated to keep these metrics below their targets.

CSMA Stocks

The need for continued conservation management efforts at this time are supported by the constrained size and age distributions, low abundance, and the absence of older fish in all stocks. Since the 2004 FMP there has been little change in the size and age distribution with few age 6 and older fish observed in any system, however age 6 and older CPUE in 2014 was the highest since the sample record began, and continued an increasing trend since 2008 (Rachels and Ricks 2015). Management strategies in place to constrain harvest in an effort to allow for rebuilding of the stocks include a total harvest moratorium in the Cape Fear River, an annual commercial TAC of 25,000 lb, daily creel limits, a closed summertime harvest season, a protective slot limit for the recreational fisheries, a 3 foot tie down requirement in large mesh (>=5 in stretch mesh) gill nets in internal coastal fishing waters west of the 76 28.0000' W longitude line, and a minimum distance from shore (DFS) of 50 yards for these nets upstream of the existing DFS line (see proclamation M-3-2015 for area descriptions). Annual stockings in all CSMA systems are designed to augment the populations during this period of low abundance until which time successful natural reproduction in these stocks occurs.

MANAGEMENT AND RESEARCH NEEDS

Several management issues were identified and explored in Amendment 1. Table 18 outlines the specific issue and implementation status. Several management and research needs were also identified. Table 19 outlines the progress on recommendations identified in Amendment 1 to the North Carolina Estuarine Striped Bass FMP.

FISHERY MANAGEMENT PLAN RECOMMENDATION

On June 22, 2016 NCDMF staff met with NCWRC staff to discuss a broad range of topics pertaining to striped bass management in the CSMA. Discussion focused on results from relatively recent genetic research that indicates the striped bass stocks in the Tar/Pamlico, Neuse, and Cape Fear rivers are comprised of nearly 100% hatchery stocked fish, indicating there is extremely limited natural reproduction and survival occurring in the CSMA. After careful consideration of this new information, reviewing the time frame for the anticipated completion of several ongoing striped bass research projects, and review of the NCMFC's fishery management plan schedule, NCDMF and NCWRC staff developed a jointly recommended approach to address the issue of high hatchery contribution and apparent lack of natural spawning success of striped bass in the CSMA. It is recommended that the NCMFC, during their August 2016 business meeting, adjust the Fishery Management Plan Review Schedule so the review of Amendment 1 to the North Carolina Estuarine Striped Bass Fishery Management Plan is initiated in August 2017 instead of August 2018. Division and NCWRC staff will continue to collaboratively prepare for the review ahead of the August 2017 review period.

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TABLES

Table 1. Albemarle/Roanoke striped bass spawning stock biomass and fishing mortality targets and thresholds. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

Reference Point	Fishing Mortality (F)	Spawning Stock Biomass (SSB lb)	Total Allowable Landings lb (TAL)
Target	0.33	969,496 lb.	305,762 lb.
Threshold	0.41	785,150 lb.	325,905 lb.
Estimate from 2014 A/R stock assessment	0.34	835,462 lb.	N/A

Table 2. Striped bass commercial and recreational harvest and discards in lb from the ASMA/RRMA, NC.

Year	Harvest (lb)						Discard (lb)					Combined
	ASMA Comm.	ASMA Rec.	RRMA Comm.	RRMA Rec.	Total Harvest	TAL	ASMA Comm.	ASMA Rec.	RRMA Comm.	RRMA Rec.	Total Discards	Harvest and Discards
1982	228,004	24,098	17,369	23,693	293,164		No estimates for shaded years					293,164
1983	228,742	27,320	8,861	26,861	291,784							291,784
1984	475,641	17,181	1,703	16,892	511,417							511,417
1985	269,671	6,603	6,200	6,492	288,966							288,966
1986	172,683	18,755	50	18,440	209,928							209,928
1987	228,861	37,621	0#	36,989	303,471							303,471
1988	108,791	52,434	0	74,639	235,864							235,864
1989	97,061	26,857	0	32,107	156,025							156,025
1990	103,757	36,976	0	42,204	182,937							182,937
1991	108,460	30,021	0	72,529	211,010	156,800				17,048	17,048	228,058
1992	100,544	51,167	0	36,016	187,727	156,800				4,370	4,370	192,097
1993	109,475	54,835	0	45,146	209,456	156,800				11,546	11,546	221,002
1994	102,201	39,704	0	28,084	169,989	156,800	151,810			12,613	164,423	334,412
1995	89,502	30,564	0	28,884	148,950	156,800	348,255			14,539	362,794	511,744
1996	89,624	29,185	0	28,173	146,982	156,800	200,429			36,634	237,063	384,045
1997	95,671	26,724	0	28,929	151,324	156,800	120,840			55,863	176,703	328,027
1998	122,454	64,885	0	73,527	260,866	250,860	135,855			21,149	157,004	417,870
1999	155,176	60,897	0	72,966	289,039	275,946	139,043			31,513	170,556	459,595
2000	218,888	116,163	0	119,584	454,635	450,000	137,996	11,951		33,810	183,757	638,392
2001	220,227	118,533	0	112,825	451,585	450,000	92,047	10,540		29,284	131,871	583,456
2002	222,834	92,649	0	112,698	428,181	450,000	128,664	7,710		10,897	147,271	575,452
2003	266,555	51,794	0	39,170	357,519	550,000	162,115	5,278		8,598	175,991	533,510
2004	273,666	98,403	0	120,697	492,766	550,000	89,832	9,244		62,523	161,599	654,365
2005	232,645	63,477	0	107,530	403,652	550,000	45,393	3,360		34,313	83,066	486,718
2006	156,314	35,985	0	84,523	276,822	550,000	54,529	1,453		13,799	69,781	346,603
2007	173,509	26,633	0	64,986	265,128	550,000	43,475	1,914		11,330	56,719	321,847
2008	74,926	31,628	0	32,725	139,279	550,000	108,176	4,969		37,624	150,769	290,048
2009	96,134	37,313	0	69,581	203,028	550,000	32,494	5,452		29,523	67,469	270,497
2010	199,829	11,460	0	72,037	283,326	550,000	44,838	3,318		25,263	73,419	356,745
2011	134,538	42,536	0	71,561	248,635	550,000	52,741	2,870		29,409	85,020	333,655
2012	115,605	71,456	0	88,271	275,332	550,000	34,253	3,995		10,251	48,499	323,831
2013	68,338	14,897	0	25,197	108,432	550,000	29,006	3,453		15,675	48,134	156,566
2014	71,372	16,867	0	33,717	121,956	550,000	5,010	1,365		32,843	39,218	161,174
2015	113,475	62,376	0	58,962	234,813	225,000	14,982	3,458		14,552	32,992	267,805

Table 3. Recreational striped bass effort, harvest, and discards in the CSMA, NC, 2004-2015.

	All Effort		Striped bass Effort		Striped bass Harvest		Striped bass Discards (numbers)				
Year	Trips	Hours	Trips	Hours	Number	Pounds	Over Creel	Under size	Legal size	In slot	Total
2004	77,233	277,981	21,421	63,790	6,142	22,959	85	11,726	1,743	0	13,554
2005	64,018	302,159	13,205	44,313	3,833	14,966	152	15,611	1,000	78	16,841
2006	62,663	259,344	10,609	30,889	2,483	7,356	33	12,549	2,314	0	14,896
2007	65,764	296,031	10,974	37,088	3,600	10,795	147	21,673	1,707	0	23,527
2008	52,887	246,585	6,621	21,296	842	2,990	2,838	11,719	3,316	91	17,964
2009	45,907	201,319	5,642	20,695	896	3,062	7	4,472	1,768	719	6,966
2010	37,518	152,662	6,558	16,060	1,758	5,536	28	5,201	2,402	361	7,992
2011	45,246	160,610	12,608	33,353	2,727	9,475	9	16,661	5,397	2,128	24,195
2012	110,527	369,171	18,340	71,899	3,871	15,198	351	26,250	13,614	2,986	43,201
2013	113,999	409,353	20,143	86,090	5,452	20,076	438	19,329	10,368	2,324	32,459
2014	87,708	352,040	15,657	69,616	3,302	13,354	765	18,885	7,175	1,622	28,447
2015	102,225	436,472	18,443	80,590	3,904	14,152	40	22,896	8,193	825	31,954

Table 4. Striped bass commercial landings at age in thousands of fish from the ASMA, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Age									
Year	1	2	3	4	5	6	7	8	9+	Sum N fish
1982	0.000	31.449	22.724	6.186	3.190	1.172	0.195	0.000	0.195	65.111
1983	0.000	23.841	27.694	11.921	4.070	2.253	1.672	0.800	0.436	72.687
1984	0.000	101.035	5.889	23.244	18.285	2.789	2.324	0.000	1.395	154.961
1985	11.562	80.428	30.113	2.287	1.271	0.762	0.508	0.127	0.000	127.058
1986	0.000	48.219	7.860	4.554	0.000	0.437	0.437	0.000	0.873	62.380
1987	0.000	31.392	13.525	12.160	4.157	0.248	0.000	0.434	0.124	62.040
1988	0.000	17.717	9.843	4.640	1.687	0.703	0.176	0.281	0.105	35.152
1989	0.000	13.577	9.073	7.947	1.383	0.129	0.064	0.000	0.000	32.173
1990	0.000	33.369	3.359	5.241	1.389	0.493	0.269	0.269	0.403	44.792
1991	0.000	6.820	19.875	4.157	0.877	0.292	0.292	0.000	0.162	32.475
1992	0.000	0.000	8.163	18.226	0.187	0.062	0.062	0.064	0.000	26.764
1993	0.000	0.000	1.076	15.794	10.965	0.756	0.262	0.116	0.116	29.085
1994	0.000	0.000	0.130	3.095	7.035	11.018	0.281	0.000	0.087	21.646
1995	0.000	0.000	0.240	4.829	11.161	3.647	0.160	0.000	0.000	20.037
1996	0.000	0.000	1.735	1.925	6.311	7.321	1.294	0.316	0.190	19.092
1997	0.000	0.000	0.997	3.846	3.647	9.107	3.462	0.274	0.040	21.373
1998	0.000	0.000	1.599	7.233	9.701	6.549	3.253	0.045	0.134	28.514
1999	0.000	0.000	0.000	3.344	20.972	9.513	1.134	0.230	0.430	35.623
2000	0.000	0.000	0.000	6.380	23.169	14.119	2.158	0.516	0.564	46.906
2001	0.000	0.000	2.818	16.908	25.018	3.361	0.445	0.643	0.246	49.439
2002	0.000	0.000	1.165	10.785	18.074	4.411	1.178	1.119	3.236	39.968
2003	0.000	0.000	4.779	15.036	15.270	5.584	1.505	0.515	2.141	44.830
2004	0.000	0.000	3.100	16.840	10.756	2.366	1.001	1.457	6.557	42.077
2005	0.000	0.000	0.707	9.151	19.515	7.864	1.854	0.764	3.244	43.099
2006	0.000	0.000	0.407	7.241	16.263	5.661	0.558	0.379	3.109	33.618
2007	0.000	0.000	0.168	3.953	13.225	5.473	1.217	0.583	2.958	27.577
2008	0.000	0.000	0.473	5.931	6.377	2.195	2.620	0.292	0.483	18.371
2009	0.000	0.000	1.264	11.497	6.713	2.665	0.906	0.354	0.602	24.001
2010	0.000	0.000	5.543	22.129	18.757	4.230	1.260	0.399	0.708	53.026
2011	0.000	0.000	1.698	12.237	12.170	2.645	1.128	0.447	0.373	30.698
2012	0.000	0.000	0.090	5.916	5.647	6.857	5.423	1.031	0.313	25.277

Table 5. Striped bass length data from commercial landings from the ASMA, NC.

Year	Mean Total Length	Minimum Total Length	Maximum Total Length	Total Number Measured
2006	23	18	44	938
2007	24	17	48	623
2008	22	18	47	553
2009	21	18	42	813
2010	21	17	48	940
2011	21	18	39	1,004
2012	22	18	39	643
2013	22	18	45	563
2014	23	18	43	483
2015	22	18	43	733

Table 6. Striped bass sample counts for length, weight, sex, and age from commercial landings, ASMA, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Samples Collected			
Year	Length	Weight	Sexed	Aged
1982	1,089	1,089	1,089	612
1983	1,013	1,010	1,013	728
1984	919	919	919	679
1985	552	552	550	547
1986	422	422	422	375
1987	690	690	690	581
1988	566	566	564	421
1989	525	508	525	378
1990	520	520	520	398
1991	560	559	560	430
1992	335	335	334	141
1993	437	436	437	187
1994	455	454	454	353
1995	282	282	281	146
1996	603	602	605	297
1997	1,090	1,090	1,089	600
1998	633	633	633	440
1999	405	405	405	386
2000	835	832	834	562
2001	912	912	893	354
2002	920	920	917	505
2003	723	722	723	333
2004	455	454	451	386
2005	719	718	719	314
2006	926	926	924	437
2007	860	856	860	425
2008	547	545	545	391
2009	813	812	813	419
2010	940	940	939	563
2011	977	976	977	579
2012	649	642	649	451

Table 7. Striped bass recreational landings at age in thousands of fish from the ASMA, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Age									
Year	1	2	3	4	5	6	7	8	9+	Sum N fish
1982	0.000	3.598	2.600	0.708	0.365	0.134	0.022	0.000	0.022	7.449
1983	0.000	2.327	2.703	1.164	0.397	0.220	0.163	0.078	0.043	7.095
1984	0.000	3.662	0.213	0.843	0.663	0.101	0.084	0.000	0.051	5.617
1985	0.290	2.016	0.755	0.057	0.032	0.019	0.013	0.003	0.000	3.185
1986	0.000	5.239	0.854	0.495	0.000	0.047	0.047	0.000	0.095	6.777
1987	0.000	5.160	2.223	1.999	0.683	0.041	0.000	0.071	0.020	10.197
1988	0.000	1.711	2.762	4.185	3.473	2.152	1.677	0.610	0.373	16.943
1989	0.000	2.128	2.876	1.976	1.353	0.338	0.098	0.062	0.071	8.902
1990	0.000	9.896	3.703	1.245	0.683	0.208	0.176	0.032	0.016	15.959
1991	0.000	2.501	6.397	0.065	0.026	0.000	0.000	0.000	0.000	8.989
1992	0.000	0.092	9.912	3.342	0.137	0.092	0.023	0.023	0.000	13.621
1993	0.000	0.145	2.133	10.990	1.193	0.108	0.000	0.000	0.000	14.569
1994	0.000	0.017	0.749	2.485	5.090	0.085	0.000	0.000	0.000	8.426
1995	0.000	0.000	0.554	2.137	3.680	0.919	0.053	0.000	0.000	7.343
1996	0.000	0.000	0.561	2.163	3.725	0.930	0.054	0.000	0.000	7.433
1997	0.000	0.106	3.100	0.784	1.125	0.353	0.009	0.000	0.000	5.477
1998	0.000	0.000	0.092	11.431	6.114	1.316	0.627	0.024	0.000	19.604
1999	0.000	0.000	0.428	6.903	7.059	2.103	0.344	0.026	0.015	16.878
2000	0.000	0.000	0.003	19.792	14.359	3.311	0.439	0.097	0.038	38.039
2001	0.000	0.000	12.033	20.777	6.819	0.411	0.020	0.019	0.000	40.079
2002	0.000	0.000	4.564	13.910	8.491	0.695	0.171	0.059	0.008	27.898
2003	0.000	0.000	4.173	7.704	3.371	0.431	0.112	0.044	0.047	15.882
2004	0.000	0.000	0.252	11.258	12.630	3.248	0.420	0.168	0.028	28.004
2005	0.000	0.072	2.206	7.875	6.729	0.893	0.021	0.087	0.074	17.957
2006	0.000	0.048	0.903	3.414	5.135	1.094	0.019	0.060	0.037	10.710
2007	0.000	0.000	0.532	2.797	2.823	0.807	0.093	0.023	0.068	7.143
2008	0.000	0.000	3.858	2.943	2.140	0.936	0.076	0.055	0.039	10.047
2009	0.000	0.000	3.640	6.315	1.372	0.449	0.175	0.087	0.030	12.068
2010	0.000	0.000	0.444	1.131	1.330	0.458	0.132	0.008	0.000	3.503
2011	0.000	0.000	5.928	3.939	1.764	0.995	0.356	0.112	0.246	13.340
2012	0.000	0.000	1.955	10.997	4.413	3.442	1.227	0.197	0.113	22.344

Table 8. Striped bass recreational landings at age in thousands of fish from the RRMA, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Age									
Year	1	2	3	4	5	6	7	8	9+	Sum N fish
1982	0.000	2.307	1.670	1.311	0.798	0.850	0.220	0.139	0.029	7.324
1983	0.000	0.335	1.995	1.535	1.451	0.746	0.579	0.209	0.126	6.976
1984	0.000	2.789	0.237	0.950	0.828	0.359	0.122	0.177	0.061	5.523
1985	0.000	1.663	1.030	0.110	0.263	0.000	0.066	0.000	0.000	3.132
1986	0.000	3.072	2.052	1.539	0.000	0.000	0.000	0.000	0.000	6.663
1987	0.000	5.224	2.467	1.634	0.541	0.040	0.080	0.040	0.000	10.026
1988	0.000	1.680	2.721	4.109	8.146	0.000	0.000	0.000	0.000	16.656
1989	0.000	2.088	2.834	1.948	1.893	0.000	0.000	0.000	0.000	8.763
1990	0.000	9.714	3.643	1.245	1.093	0.000	0.000	0.000	0.000	15.695
1991	0.000	2.310	23.387	0.730	0.507	0.000	0.000	0.000	0.000	26.934
1992	0.000	0.168	10.458	2.731	0.034	0.000	0.000	0.000	0.000	13.391
1993	0.000	0.000	3.896	9.669	0.759	0.000	0.000	0.000	0.000	14.324
1994	0.000	0.000	1.549	4.134	2.469	0.132	0.000	0.000	0.000	8.284
1995	0.000	0.000	0.514	1.233	3.460	2.210	0.034	0.000	0.007	7.458
1996	0.000	0.000	1.899	2.736	2.201	1.364	0.167	0.000	0.000	8.367
1997	0.000	0.031	3.794	3.285	1.275	0.694	0.225	0.051	0.010	9.365
1998	0.000	0.024	3.190	13.344	4.724	1.339	0.244	0.146	0.097	23.108
1999	0.000	0.066	5.016	10.916	4.897	1.426	0.066	0.079	0.013	22.479
2000	0.000	0.103	13.334	18.653	4.265	1.515	0.128	0.128	0.077	38.203
2001	0.000	0.000	9.815	15.133	7.273	2.190	0.195	0.195	0.430	35.231
2002	0.000	0.019	3.347	18.107	11.094	3.253	0.282	0.112	0.208	36.422
2003	0.000	0.000	0.979	5.839	3.018	0.489	0.049	0.163	0.602	11.139
2004	0.000	0.000	7.607	9.595	5.619	3.128	0.106	0.080	0.374	26.509
2005	0.000	0.000	8.861	15.125	6.824	2.139	0.178	0.280	0.660	34.067
2006	0.000	0.000	2.682	16.304	4.788	1.245	0.072	0.024	0.219	25.334
2007	0.000	0.000	1.007	6.644	10.456	1.062	0.082	0.054	0.000	19.305
2008	0.000	0.158	4.741	3.856	1.138	0.569	0.048	0.000	0.032	10.542
2009	0.000	0.022	9.085	10.444	3.051	0.601	0.000	0.000	0.045	23.248
2010	0.000	0.000	6.029	11.634	4.145	0.542	0.000	0.048	0.047	22.445
2011	0.000	0.000	8.756	6.869	2.702	3.483	0.196	0.000	0.098	22.104
2012	0.000	0.000	5.482	19.189	3.374	0.337	0.421	0.042	0.000	28.845

Table 9. Striped bass length data from recreational landings from the ASMA, NC.

Year	Mean Total Length	Minimum Total Length	Maximum Total Length	Total Number Measured
2006	21	18	32	773
2007	21	15	39	415
2008	20	18	30	632
2009	20	18	42	549
2010	20	17	28	337
2011	20	18	34	979
2012	20	18	36	1,059
2013	20	18	32	527
2014	19	18	28	802
2015	20	17	30	1,523

Table 10. Striped bass length data from recreational landings from the RRMA, NC.

Year	Mean Total Length	Minimum Total Length	Maximum Total Length	Total Number Measured
2006	20	17	39	1,058
2007	20	18	39	709
2008	19	17	35	667
2009	19	17	32	1,049
2010	20	18	28	954
2011	20	18	31	679
2012	20	17	28	688
2013	20	17	27	512
2014	19	17	30	559
2015	19	17	45	1,332

Table 11. Striped bass sample counts for length, weight, sex, and age from recreational landings, ASMA, NC. ALK=age length key used. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Samples Collected			
Year	Length	Weight	Sexed	Aged
1994	1,179	1,179	0	ALK
1995	954	954	0	ALK
1996	1,062	1,062	0	ALK
1997	1,088	1,088	0	ALK
1998	3,276	3,276	0	ALK
1999	2,417	2,417	0	ALK
2000	3,153	3,153	0	ALK
2001	4,346	4,346	0	ALK
2002	3,173	3,173	0	ALK
2003	1,178	1,178	0	ALK
2004	2,854	2,854	0	ALK
2005	1,656	1,656	0	ALK
2006	769	769	0	ALK
2007	430	430	0	ALK
2008	633	633	0	ALK
2009	549	549	0	ALK
2010	269	269	0	ALK
2011	978	978	0	ALK
2012	1,059	1,059	0	ALK

Table 12. Striped bass sample counts for length, weight, sex, and age from recreational landings, RRMA, NC. ALK=age length key used. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Samples Collected			
Year	Length	Weight	Sexed	Aged
2005	359	353	357	ALK
2006	1,059	1,059	1,058	ALK
2007	709	709	709	ALK
2008	667	667	667	ALK
2009	1,049	1,049	1,049	ALK
2010	954	954	954	ALK
2011	679	679	679	ALK
2012	688	688	688	ALK
2013	512	512	512	ALK
2014	559	559	559	ALK

Table 13. Striped bass length data (fork length) from commercial landings from the CSMA, NC, 2000-2015. All lengths and numbers (N) of fish sampled are for striped bass, no length data are presented for hybrid striped bass.

	Pamlico / Pungo Rivers					Neuse / Bay Rivers				
	Fork Length (mm)				% hybrid striped bass	Fork Length (mm)				% hybrid striped bass
Year	Mean	Min	Max	N	in samples	Mean	Min	Max	N	in samples
2000	550.0	470	828	126	1.6	598.0	530	747	5	0.0
2001	556.8	498	614	116	8.7	589.3	546	750	12	0.0
2002	579.7	455	942	92	31.4	593.4	456	682	31	0.0
2003	541.9	420	889	163	39.9	579.1	454	890	19	5.0
2004	575.0	468	999	131	34.2	604.7	462	895	69	1.3
2005	551.0	465	888	127	9.3	582.3	480	870	70	1.4
2006	516.6	420	873	119	17.4	574.1	457	871	101	0.7
2007	527.9	462	778	112	4.3	527.8	449	632	56	4.5
2008	537.6	428	1020	54	4.5	553.4	440	1060	39	0.0
2009	519.1	440	741	99	1.0	538.7	449	737	70	2.3
2010	534.9	447	619	194	4.4	545.6	445	772	263	4.0
2011	545.7	428	647	281	2.4	555.1	456	1006	195	0.0
2012	576.8	363	712	234	9.6	583.2	443	702	96	1.0
2013	586.2	435	965	212	12.8	582.3	434	894	155	3.2
2014	508.2	431	587	24	89.7	557.3	482	716	26	47.7
2015	550.1	455	747	39	75.4	570.5	469	1045	91	21.8

Table 14. Striped bass GLM-standardized index of relative abundance and coefficient of variation (CV) from the Albemarle/Roanoke juvenile abundance survey, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

Year	GLM Index	CV[Index]
1982	3.01	0.354
1983	1.39	0.367
1984	0.36	0.270
1985	0.95	0.449
1986	0.10	0.328
1987	0.27	0.243
1988	4.81	0.226
1989	6.09	0.250
1990	1.32	0.271
1991	0.72	0.255
1992	2.22	0.220
1993	42.4	0.218
1994	56.0	0.224
1995	14.2	0.219
1996	31.1	0.232
1997	4.82	0.263
1998	5.60	0.283
1999	0.94	0.222
2000	56.2	0.245
2001	3.50	0.228
2002	6.32	0.381
2003	0.25	0.262
2004	1.75	0.221
2005	24.1	0.234
2006	2.87	0.224
2007	5.50	0.238
2008	5.52	0.314
2009	0.36	0.223
2010	6.88	0.220
2011	15.1	0.240
2012	5.11	1.23

Table 15. Striped bass catch proportion at age and GLM-standardized index of relative abundance and coefficient of variation (CV) from the fall/winter component of the Albemarle Sound IGNS (Program 135), NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Age										
Year	1	2	3	4	5	6	7	8	9+	GLM Index	CV[Index]
1991	0	0.76	0.22	0.022	0.0000	0	0	0	0	0.655	0.129
1992	0	0.17	0.74	0.083	0.0000	0	0	0	0	0.534	0.132
1993	0	0.12	0.13	0.70	0.026	0.0050	0	0.0011	0	0.769	0.128
1994	0	0.094	0.064	0.28	0.55	0.0057	0	0.0010	0	0.892	0.132
1995	0	0.51	0.10	0.11	0.24	0.036	0.00062	0	0.00062	0.289	0.144
1996	0	0.17	0.42	0.080	0.16	0.16	0.011	0	0	1.99	0.122
1997	0	0.20	0.36	0.23	0.127	0.064	0.016	0.0015	0.00023	0.612	0.131
1998	0	0.12	0.41	0.37	0.07	0.021	0.010	0.0016	0	1.38	0.122
1999	0	0.058	0.16	0.47	0.24	0.066	0.0034	0.00084	0.00045	0.641	0.129
2000	0	0.11	0.12	0.40	0.31	0.057	0.0040	0.00089	0.00089	0.626	0.128
2001	0	0.013	0.15	0.40	0.39	0.034	0.0047	0.0012	0.0012	0.993	0.157
2002	0	0.50	0.043	0.30	0.15	0.0038	0.00044	0	0	0.816	0.125
2003	0	0.038	0.48	0.25	0.19	0.042	0.0023	0	0	1.43	0.211
2004	0	0.097	0.22	0.54	0.12	0.017	0.00077	0.0020	0.0032	0.817	0.125
2005	0	0.072	0.14	0.40	0.33	0.053	0.0026	0.0027	0.00090	0.793	0.128
2006	0	0.39	0.063	0.14	0.25	0.13	0.019	0.0018	0.0045	0.373	0.141
2007	0	0.18	0.33	0.063	0.24	0.17	0.018	0	0	1.49	0.122
2008	0	0.16	0.67	0.13	0.019	0.013	0.0071	0.0015	0.00057	1.19	0.131
2009	0	0.16	0.24	0.55	0.039	0.0055	0.0019	0.00093	0	0.897	0.127
2010	0	0.61	0.14	0.083	0.148	0.012	0.0040	0.00088	0	0.406	0.135
2011	0	0.094	0.56	0.14	0.077	0.092	0.029	0.0062	0.0021	0.311	0.142
2012	0	0.36	0.16	0.31	0.099	0.021	0.048	0.0018	0		

Table 16. Striped bass catch proportion at age and GLM-standardized index of relative abundance and coefficient of variation (CV) from the spring component of the Albemarle Sound IGNS (Program 135), NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

	Age										
Year	1	2	3	4	5	6	7	8	9+	GLM Index	CV[Index]
1991	0.010	0.77	0.22	0.0023	0.0028	0.0010	0	0	0	1.47	0.104
1992	0	0.16	0.76	0.075	0.0056	0.00093	0	0.00093	0	0.845	0.0993
1993	0	0.20	0.25	0.51	0.045	0.0016	0	0.0016	0	0.292	0.118
1994	0	0.056	0.10	0.31	0.53	0.0048	0	0.0024	0	0.294	0.128
1995	0	0.61	0.05	0.11	0.18	0.054	0.0022	0.00050	0.00050	1.42	0.0970
1996	0	0.079	0.47	0.054	0.19	0.18	0.024	0.00082	0	0.993	0.0979
1997	0	0.091	0.41	0.31	0.067	0.10	0.025	0.00059	0	1.34	0.0959
1998	0	0.060	0.27	0.51	0.12	0.018	0.014	0.00051	0	1.96	0.0964
1999	0	0.031	0.13	0.44	0.33	0.068	0.0062	0.00087	0.00043	1.79	0.0937
2000	0	0.008	0.06	0.38	0.43	0.10	0.016	0.0029	0	1.67	0.0967
2001	0	0.005	0.21	0.56	0.21	0.0083	0.0028	0.0022	0.00056	2.17	0.0966
2002	0.00035	0.14	0.02	0.42	0.40	0.015	0.0012	0.0012	0.0025	1.06	0.0986
2003	0	0.030	0.39	0.32	0.20	0.035	0.0070	0.0087	0.0057	0.664	0.135
2004	0.0010	0.095	0.44	0.30	0.13	0.033	0.0045	0.0017	0.0030	1.44	0.126
2005	0.0028	0.051	0.15	0.67	0.10	0.023	0.0021	0.0069	0.0041	1.53	0.110
2006	0	0.41	0.052	0.33	0.17	0.024	0.0032	0.0026	0.0026	1.62	0.101
2007	0.0010	0.39	0.22	0.13	0.17	0.057	0.014	0.013	0.0100	0.502	0.110
2008	0.0016	0.20	0.72	0.028	0.027	0.020	0.0017	0.0012	0.0021	1.15	0.101
2009	0.0025	0.33	0.44	0.18	0.028	0.013	0.0039	0.0049	0.0042	0.463	0.148
2010	0.0030	0.76	0.13	0.049	0.048	0.0078	0.00070	0.0014	0.0032	1.46	0.121
2011	0.00058	0.30	0.48	0.11	0.054	0.034	0.017	0.0024	0.0012	1.07	0.132
2012	0	0.86	0.023	0.077	0.021	0.0073	0.0084	0.0017	0	2.48	0.149

Table 17. Annual weighted CPUE of striped bass (number of individuals per sample), total number of striped bass collected, and the number of gill net samples (N) in the Pamlico, Pungo, and Neuse rivers, 2005-2015. The Percent Standard Error (PSE) represents a measure of precision. *Annually, 160 samples are collected from the Pamlico (120 samples) and Pungo (40 samples) rivers, and 160 samples from the Neuse River, for a combined total of 320 samples. In 2005, only 304 stations were sampled due to high gasoline prices.

Year	CPUE	No. of Striped Bass	N*	PSE
2005	2.08	596	304	12
2006	2.09	639	320	12
2007	1.39	418	320	15
2008	1.45	442	320	16
2009	1.05	324	320	14
2010	2.07	640	320	14
2011	2.15	653	320	13
2012	0.9	270	320	14
2013	1.22	364	320	15
2014	1.61	490	320	13
2015	1.37	424	320	12

Table 18. Research recommendations and progress from Amendment 1 to the North Carolina Estuarine Striped Bass FMP.

Management Strategy	Objectives	Outcome
Continued support and development of SHAs in NC.	2,4,5	Ongoing, SHAs in regions 1-3 have been designated.
Continued protection of SHAs by the cooperating agencies once they have been designated.	2,4,5	Ongoing
Work with WRC, DWQ, and others to implement management measures that will enhance water quality in areas used by striped bass.	2,4,5	Ongoing
Work with American Rivers and other partners to accelerate dam removal in priority areas.	2,4,5	Ongoing
Continue to protect NC coastal wetlands through the permit review process.	2,4,5	Ongoing
Quantify the density and distribution of striped bass eggs, fry, and juveniles in coastal rivers to estimate potential losses to entrainment and impingement	1,2,3,4,5	Ongoing in the Roanoke River through ECU. Still needed in the CSMA
Determine if contaminants are present in striped bass habitats and identify those that are potentially detrimental to various life history stages.	2,4,5	Ongoing through Division of Water Quality but could be expanded
Evaluate the effects of existing and future water withdrawals on water quality and quantity and fisheries habitat in coastal watersheds.	2,4,5	No Action
Identify and designate anadromous fish nursery areas and how early juvenile striped bass move and are distributed in NC estuarine waters.	1,2,3,4,5	No Action
Identify minimum flow requirements in the Tar/Pamlico, Neuse, and Cape Fear rivers necessary for successful spawning, egg development, and larval transport to nursery grounds.	2,4,5	No Action
Evaluate the impacts/effects of reverse osmosis plants on receiving waters and aquatic resources.	2,3,4,5	Short term studies conducted but there is a need for long term studies
Verify condition of identified SHAs used by striped bass.	2,4,5	No Action
Investigate abundance and spawning contribution of striped bass in the North Carolina and Virginia portions of the Blackwater, Nottoway and Meherrin rivers.	1,2,3,4,5	Some sampling is by VADGIF and a CRFL grant is being completed that evaluated the potential spawning contribution on the Chowan and Meherrin rivers.
Investigate striped bass use in the North Carolina portions of the Waccamaw River during the appropriate season.	1,2,3,4,5	No Action
Continue to investigate the potential for passage of striped bass above Roanoke Rapids Dam.	2,4,5	Ongoing
Support fish passage at Buckhorn Dam and Lock and Dam No.2 and No.3 and investigate anadromous fish utilization of the rock ladder at Lock and Dam No. 1.	2,4,5	Ongoing

Management Strategy	Objectives	Outcome
Investigate the feasibility of fish passage at and improved water flows from Rocky Mount Mill Dam and Tar River Reservoir Dam.	2,4,5	Ongoing
Support the removal of Milburnie Dam in Raleigh.	2,4,5	Ongoing
Support fish passage above the Yadkin chain of dams in North Carolina.	2,4,5	Ongoing
Data on the density and distribution of striped bass eggs, fry, and juveniles in coastal rivers are needed so that potential losses to entrainment and impingement can be estimated.	2,3,4,5	CSMA No Action
Identify effective engineering solutions to prevent entrainment and impingement of striped bass eggs, fry, and juveniles.	2,3,4,5	Ongoing
NCDMF and NCWRC should work with DWQ and other agencies to determine and establish more stringent water quality standards in Anadromous Fish Spawning Areas.	2,4,5	No Action
Determine if fish on the spawning grounds are stocked.	1,3,4	Ongoing through NCWRC genetics study **(High)**
Acquire life history information: maturity, fecundity, size and weight at age, egg and larval survival.	1,3,4	Ongoing through CRFL funded projects. See Knight (2015) for recent publication on maturation and fecundity in the Neuse and Tar/Pamlico rivers. **(High)**
Conduct a mark-recapture study utilizing conventional tags and telemetry approaches.	1,2,3,4	Ongoing through CRFL funded projects **(High)**
Determine if suitable striped bass spawning conditions exist in the Tar/Pamlico, Neuse, and Cape Fear rivers	1,2,3,4,5	No Action **(Medium)**
Conduct egg abundance and egg viability studies.	1,2,3,4,5	In 2016, NCWRC initiated an anadromous ichthyoplankton survey designed to investigate egg and larval fish abundance and egg viability. **(Medium)**
Determine contribution of stocked fish to spawning stock.	1,2,3,4,5	Ongoing through NCWRC genetics study **(Medium)**
Determine extent of spawning grounds.	1,2,3,4,5	Ongoing through CRFL funded grant acoustic tagging grant **(Low)**
Improve discard estimates and discard biological characteristics from commercial fisheries.	1,3,4,5,6,7	Ongoing through statewide observer coverage. See Rock et al. (2016) for recent publication on improving discard estimates through NCDMF creel survey and expanded observer program. **(Medium)**

Management Strategy	Objectives	Outcome
Obtain biological characteristics such as length, weight, age, and sex of recreational harvest.	1,3,4,5,6,7	Ongoing through creel surveys but could be expanded **(Medium)**
Obtain biological characteristics such as length, weight, age, and sex of commercial harvest.	1,3,4,5,6,7	Ongoing but sampling could be increased **(Medium)**
Improve discard estimates and discard biological characteristics from recreational fisheries.	3,4,5,6,7	Ongoing through creel survey **(Low)**
Conduct delayed mortality studies for recreational and commercial gear.	3,4,5,6,7	Ongoing for recreational fisheries **(Low)**
Conduct independent surveys that adequately capture all life stages of striped bass.	3,4,5,6,7	No Action **(High)**
Continue tagging striped bass in order to evaluate the possible contribution to the Atlantic Migratory stock and provide data to be used in stock assessment efforts. Develop means to better assess the tag recapture and reporting rate for use in tag-based stock assessments.	1,3,4,5	Ongoing through CRFL funded projects **(High)**
Conduct a short term study to determine vulnerability-at-length for survey gears	1,3,4,5	No Action **(Low)**
Apply for ITP for impacted fisheries.	3,4,5,6,7	Completed, ITP's obtained for the estuarine gill net fishery.
Continue gear development research to minimize species interactions.	3,4,5,6,7	Ongoing
Implementation of outreach programs to inform state agencies, the public, and the commercial and recreational fishing industries about issues relating to protected species and fishery management	3,4,5,6,7	Ongoing
Methodology tested to accurately capture Atlantic Ocean striped bass harvest during summer months.	1,3,4,5	Ongoing through catch card survey but compliance is uncertain.
Increase surveys of stocked systems to determine percent contribution of wild versus stocked fish.	1,3,4,5	Ongoing through NCWRC and NCDMF genetics survey.
Determine if fish produced from system-specific parentage will increase stocking contribution to spawning populations.	1,3,4,5	Ongoing through NCWRC and NCDMF genetics survey.
Determine factors impacting survivability of stocked fish in each system.	1,3,4,5	No Action
More at-sea observations made for the gill net fishery to more accurately assess the discards from this fishery.	1,3,4,5,6,7	Ongoing through NCDMF Observer Program.
Explore improvements to NCDMF programs (Trip Ticket, Fish House sampling, fisherman surveys or logbooks) in order to acquire spatially and temporally accurate gill net gear parameters.	1,4,5,6,7	No Action
Investigate the impacts of delayed mortality on striped bass captured in gill nets.	1,3,4,5,7	No Action
Clarify relationships between salinity, DO, temperature and catch and release mortality rates in the ASMA and CSMA.	1,2,3,4,5,6,7	No Action

Management Strategy	Objectives	Outcome
Year round creel survey in the ASMA.	3,4,5,6,7	No Action
Expand tagging programs to include high reward tagging.	1,3,4,5,6,7	Ongoing through CRFL funded grant
Conduct new analysis of relationship between JAI in Albemarle Sound and flows in Roanoke River	1,2,3,4,5	No Action

Table 19. Management action taken as a result of Amendment 1 to the North Carolina Estuarine Striped Bass FMP.

ISSUE	NCMFC/NCWRC SELECTED MANAGEMENT STRATEGY	OBJECTIVES ADDRESSED	REGUALTORY ACTION TAKEN
1. Recreational Striped Bass Harvest Closure – Oregon Inlet Area/Atlantic Ocean	Status Quo – Allow the fishery to continue with catch card survey (May – Oct).	3,4,5	No additional regulatory action required
2. Striped Bass Stocking In Coastal Rivers	Status quo and research needs – Goal of 100,000 Phase II striped bass stocked annually per CSMA system (Tar-Pamlico, Neuse, and Cape Fear) with 3,000 stocked fish tagged annually in each system.	3,4,5,6	No additional regulatory action required
3. Use Of Single Barbless Hooks During The Striped Bass Closed Season	Status quo (don't require barbless hooks) and continue to educate anglers on ethical angling practices, with the additional recommendation to include mortality statistics associated with various handling techniques when possible.	5,6,7	Increase angler education about proper angling and handling techniques to reduce discard mortality
4. Striped Bass Management Area – Albemarle Sound Management Area Southern Boundary Line Adjustment	Support the necessary rule changes to create a new boundary point.	2,3,6	Rule change: 15A NCAC 03J .0209; 03R .0112; and 03R .0201
5. Cashie River – Change In Joint and Coastal Waters Boundary Line	Support the necessary rule changes to create a new boundary point.	3,6	Rule change 15A NCAC 03Q .0202
6. Discard Mortality Of Striped Bass From Commercial Set Gill Nets Central Southern Management Area	Status Quo – continue the gill net requirement for tie downs and restricting gill net from within 50 yards of shore proclamation.	6,7	No additional regulatory action required
7. Hook and Line as Commercial Gear in Estuarine Striped Bass Fisheries	Status Quo (don't allow hook and line as commercial gear) and support the necessary rule changes for adaptive management.	3,6,7	Rule change 15A NCAC 03M .0201 and 03M .0202[1]

[11] These rule changes will not initiate hook and line harvest of striped bass, only make it possible to do so in the future should unforeseen gill net regulations due to Endangered Species Interactions make adaptive management necessary.

ISSUE	NCMFC/NCWRC SELECTED MANAGEMENT STRATEGY	OBJECTIVES ADDRESSED	REGUALTORY ACTION TAKEN
8. Central Southern Management Area Striped Bass Management Measures	Status Quo with the addition of instituting a pound for pound payback provision for the commercial harvest TAC[2]. Status Quo for CSMA management measures maintain the following: **CSMA Recreational Harvest (Coastal, Joint, and Inland waters)** • Unified season Oct 1 – Apr 30 • 2 fish daily creel limit • 18 in TL minimum size limit • Protective slot (no harvest) 22 – 27 in TL (joint and inland waters only) • Harvest moratorium for Cape Fear River and its tributaries **CSMA Commercial Harvest (Coastal and Joint waters)** • TAC[2] of 25,000 lb. and commercial fishery, excluding Pamlico Sound, is not a bycatch fishery • 18 in TL minimum size limit • 10 fish or less trip limit • Spring season only, anytime between Jan 1 – Apr 30 • Gill net mesh size restrictions and yardage limits • 18 in TL minimum size limit • Discards – maintain existing gill net tie-down and distance from shoreline (DFS) measures implemented by proclamation. • Harvest moratorium for Cape Fear River and its tributaries	1,2,3,4,5,6,7	No additional regulatory action required

[2] The term Total Allowable Catch does not accurately describe the existing management strategy, because the term "catch" refers to landings and discards. Since its inception the quota used to maintain striped bass harvest in the ASMA, RRMA, and CSMA at sustainable levels is for landings only, not landings and discards.

ISSUE	NCMFC/NCWRC SELECTED MANAGEMENT STRATEGY	OBJECTIVES ADDRESSED	REGUALTORY ACTION TAKEN
9. Albemarle Sound Management Area And Roanoke River Management Area Striped Bass Management Measures	Status Quo with the current management measures in the ASMA and RRMA. Status Quo for ASMA and RRMA management measures maintain the following: **Biological Reference Points** • F_{Target} = 0.25 • $F_{Threshold}$ = 0.29 **A/R stock has been managed with a Total Allowable Catch (TAC[2]) since 1990** • Maintain current TAC[2] of 550,000 lb. • The TAC[2] will continue to be split evenly between commercial and recreational sectors • ASMA commercial TAC[2] = 275,000 lb. • ASMA recreational TAC[2] = 137,500 lb. • RRMA recreational TAC[2] = 137,500 lb. **ASMA Commercial Harvest (TAC[2] = 275,000 lb.)** • 18 in TL minimum size limit (ASMFC compliance requirement) • Continue to operate as a bycatch fishery • Spring season, anytime between Jan 1 – Apr 30 • Fall Season, anytime between Oct 1 – Dec 31 • Daily trip limits for striped bass • Maintain gill net mesh size and yardage restrictions • Maintain seasonal and area closures • Maintain attendance requirements for small mesh nets (mid – May through late November)	1,2,3,4,5,6,7	No additional regulatory action required

[2] The term Total Allowable Catch does not accurately describe the existing management strategy, because the term "catch" refers to landings and discards. Since its inception the quota used to maintain striped bass harvest in the ASMA, RRMA, and CSMA at sustainable levels is for landings only, not landings and discards.

ISSUE	NCMFC/NCWRC SELECTED MANAGEMENT STRATEGY	OBJECTIVES ADDRESSED	REGUALTORY ACTION TAKEN
9. Albemarle Sound Management Area And Roanoke River Management Area Striped Bass Management Measures (cont.)	**ASMA Recreational Harvest (TAC[2] = 137,500 lb.)** • 18 in TL minimum size limit • Daily creel limit (can be adjusted as necessary to keep harvest below the TAC[2]) • Open 7 days a week all season (can be adjusted as necessary to keep harvest below the TAC[2]) • Spring season, anytime between Jan 1 – Apr 30 • Fall season, anytime between Oct 1 – Dec 31 **RRMA Recreational Harvest (TAC[2] = 137,500 lb.)** • 18 in TL minimum size limit • Protective slot (no harvest): 22-27 in TL • 2 fish daily creel, only one of which can be greater than 27 in TL • Harvest season in entire river opens on March 1 and closes on April 30 by rule since 2008 • Single barbless hook regulation from April 1 – June 30 in Inland waters above the US 258 Bridge **Management of TACs[2] for ASMA and RRMA** • Short-term Overages: if the harvest point estimate exceeds the total TAC[2] by 10% in a single year, overage is deducted from the next year and restrictive measures implemented in the responsible fishery (ies) • Long-term Overages: five-year running average of harvest point estimate exceeds the five-year running average of the total TAC[2] harvest by 2%, the responsible fishery exceeding the harvest limit will be reduced by the amount of the overage for the next five years. Should the target F be exceeded, then restrictive measures will be imposed to reduce F to the target level	1,2,3,4,5,6,7	No additional regulatory action required

[2] The term Total Allowable Catch does not accurately describe the existing management strategy, because the term "catch" refers to landings and discards. Since its inception the quota used to maintain striped bass harvest in the ASMA, RRMA, and CSMA at sustainable levels is for landings only, not landings and discards.

ISSUE	NCMFC/NCWRC SELECTED MANAGEMENT STRATEGY	OBJECTIVES ADDRESSED	REGUALTORY ACTION TAKEN
9. Albemarle Sound Management Area And Roanoke River Management Area Striped Bass Management Measures (cont.)	**Proclamation Authority for the ASMA, RRMA, and CSMA striped bass stocks:** It should also be noted that under the provisions of this FMP the NCDMF Director and the NCWRC Chief of Inland Fisheries will maintain the ability to establish seasons, authorize or restrict fishing methods and gear, limit quantities taken or possessed, and restrict fishing areas as deemed necessary to maintain a sustainable harvest.	1,2,3,4,5,6,7	No additional regulatory action required

FIGURES

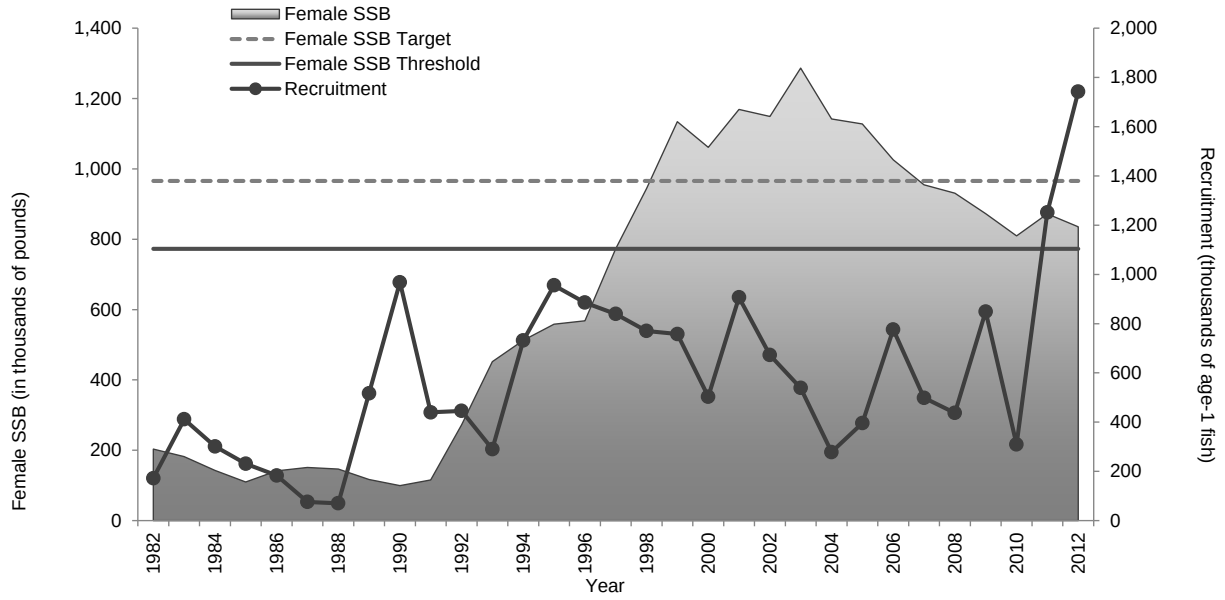

Figure 1. Albemarle/Roanoke striped bass female spawning stock biomass and recruitment (abundance of age-1). Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

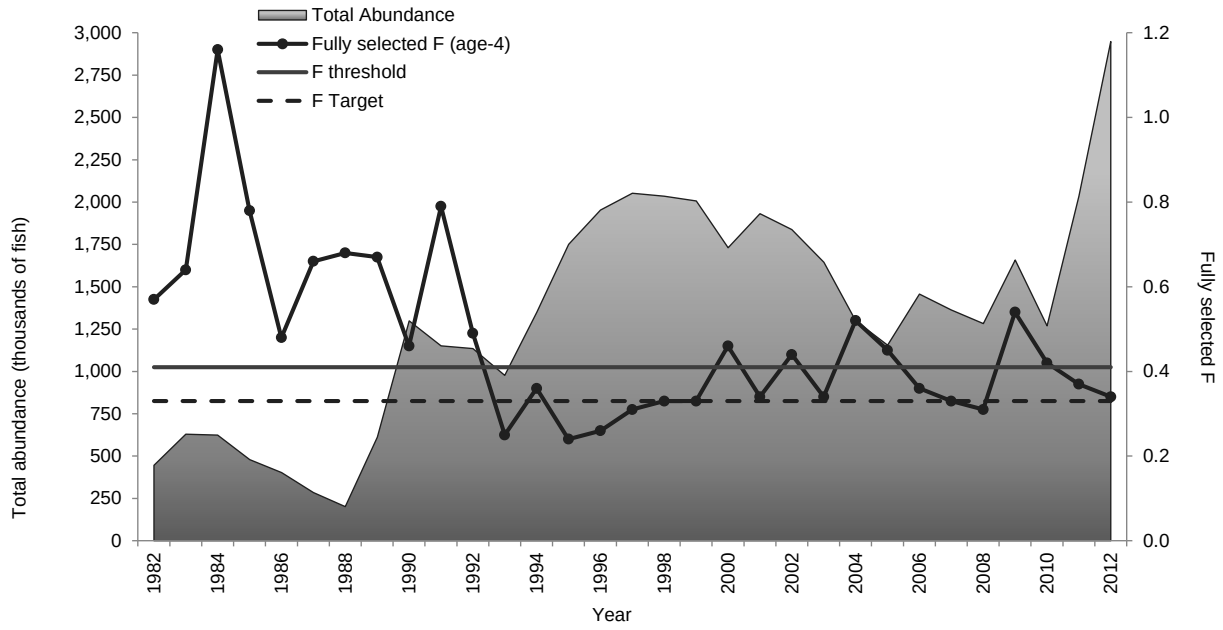

Figure 2. Albemarle/Roanoke striped bass total stock abundance and fishing mortality. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

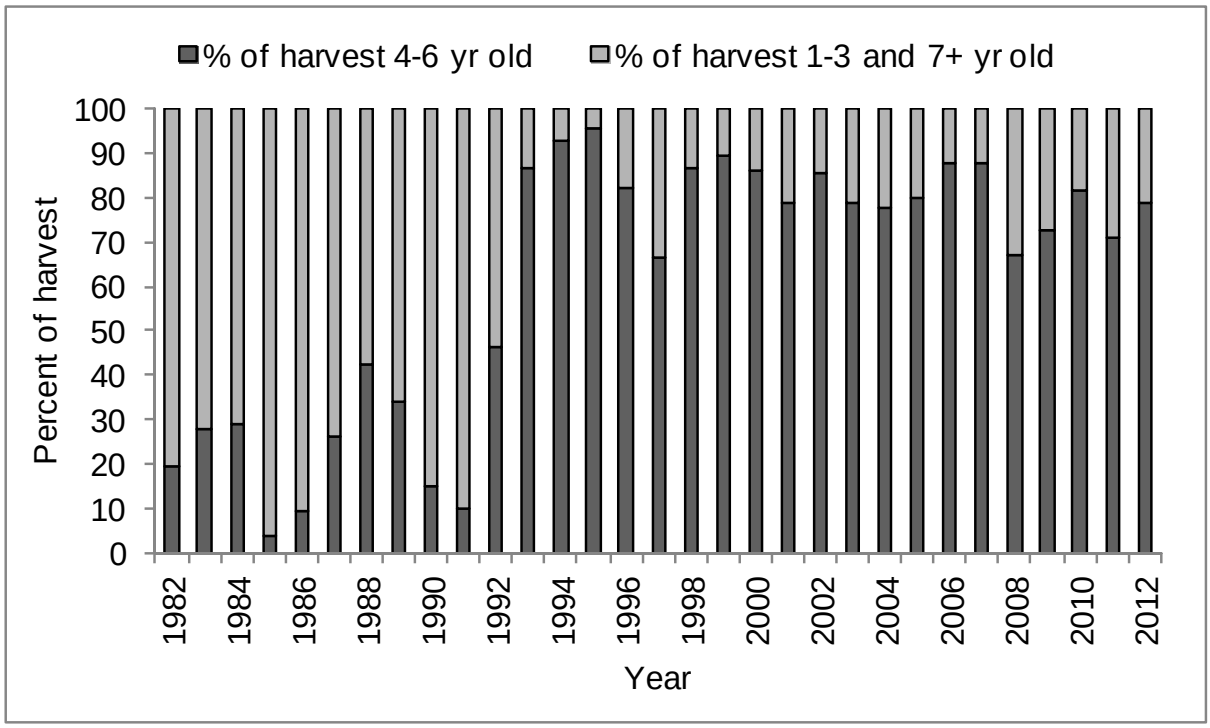

Figure 3. Percent of the total striped bass landings by 4-6-year-old and 1-3 and 7+ year-old age groups in the ASMA and RRMA, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

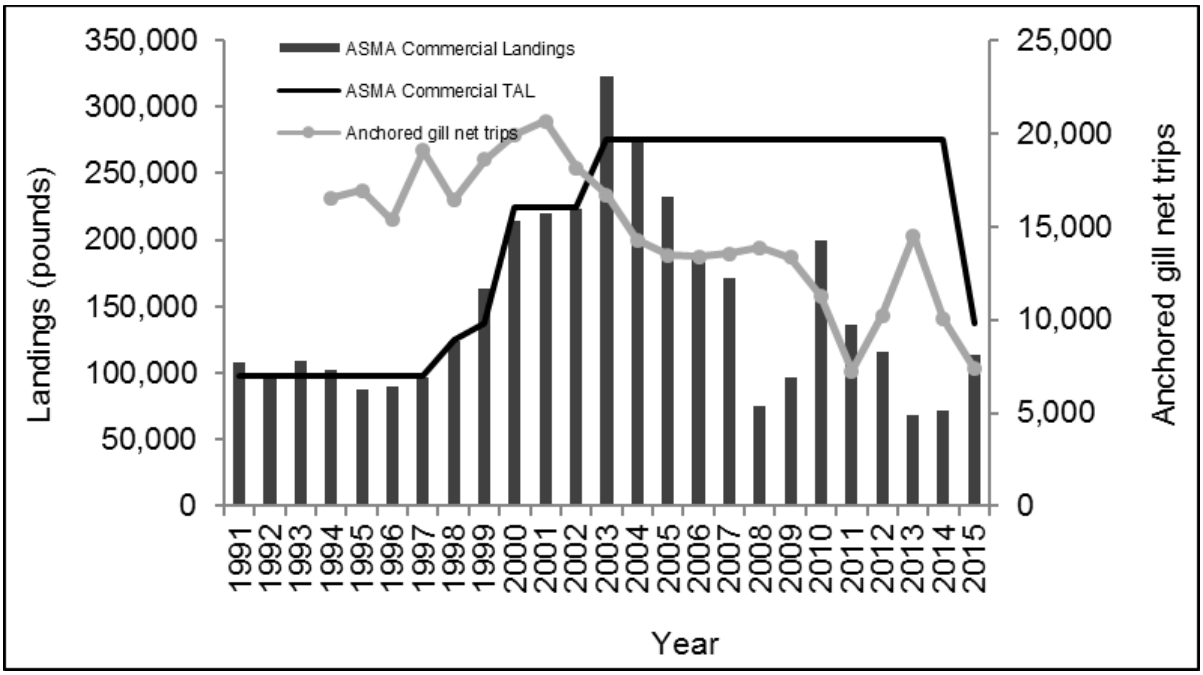

Figure 4. Commercial striped bass landings, TAL, and anchored gill net trips in the ASMA, NC.

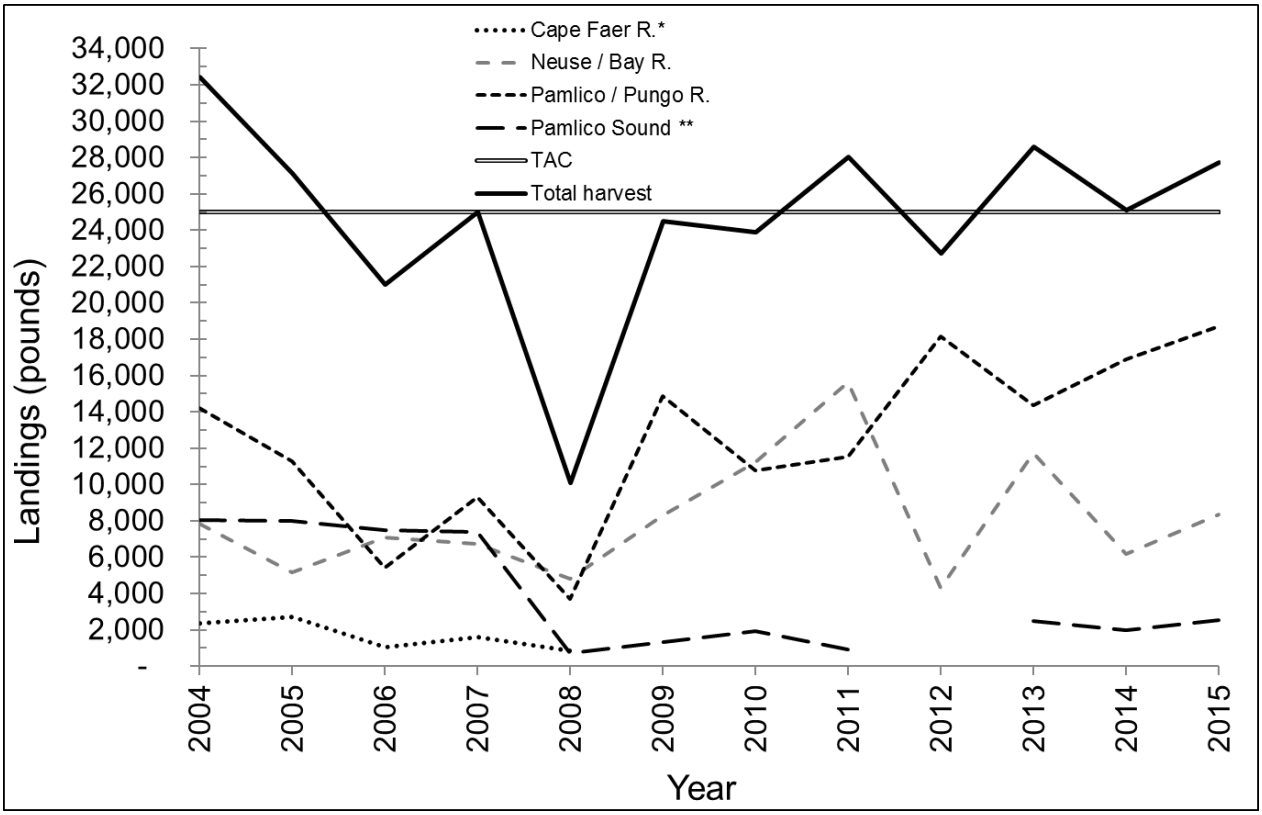

Figure 5. Commercial striped bass landings by system, and the TAC in the CSMA, NC, 2004-2015. *There has been a moratorium on harvest in the Cape Fear River since 2009. **Landings data for the Pamlico Sound in 2012 are confidential.

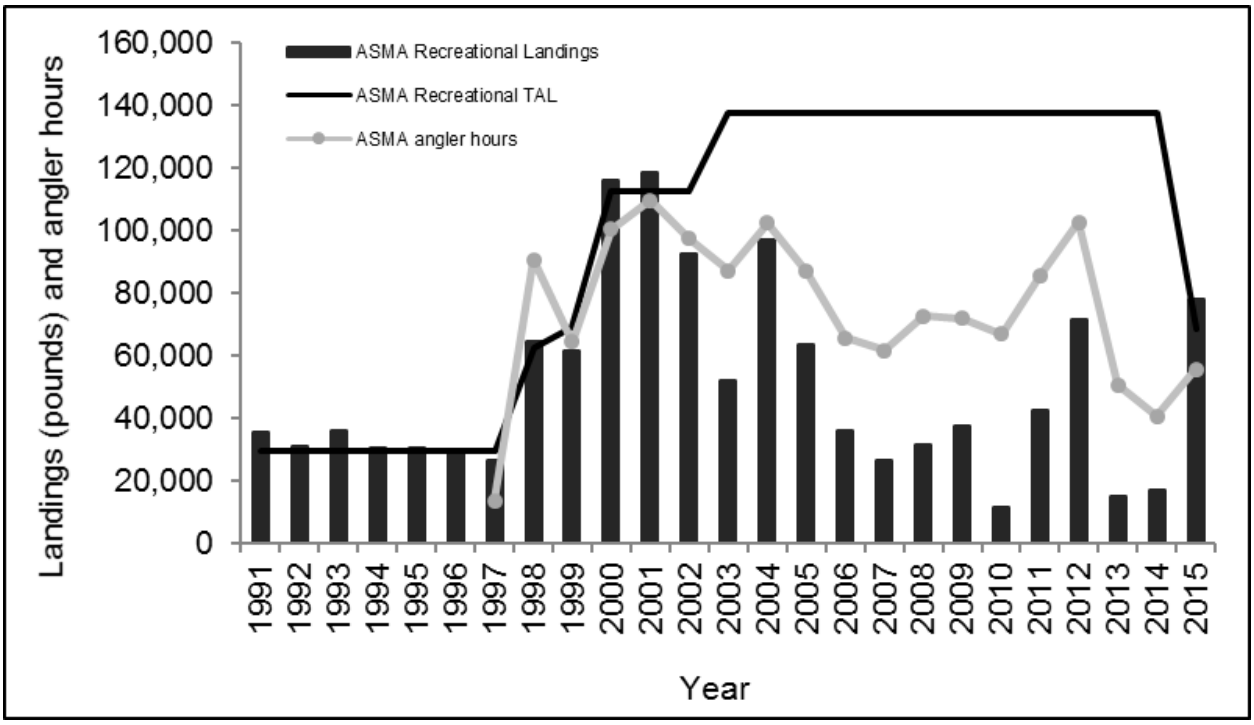

Figure 6. Recreational striped bass landings, TAL, and angler hours in the ASMA, NC.

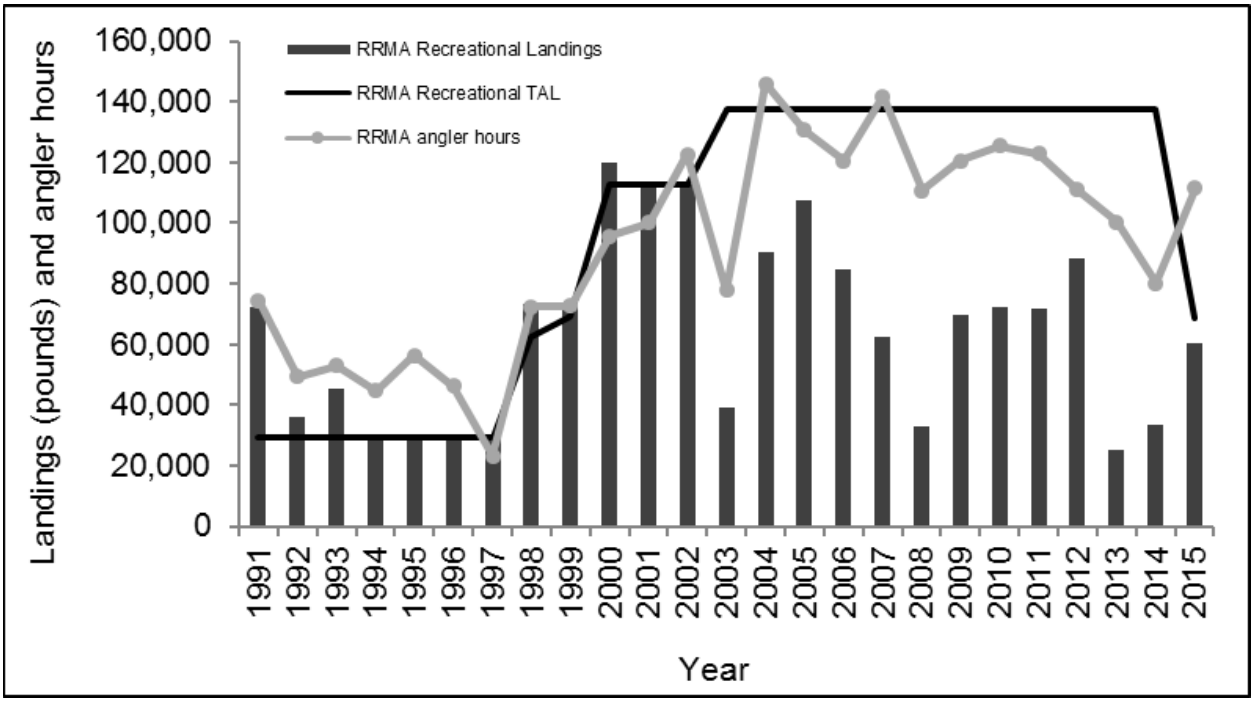

Figure 7. Recreational striped bass landings, TAL, and angler hours in the RRMA, NC.

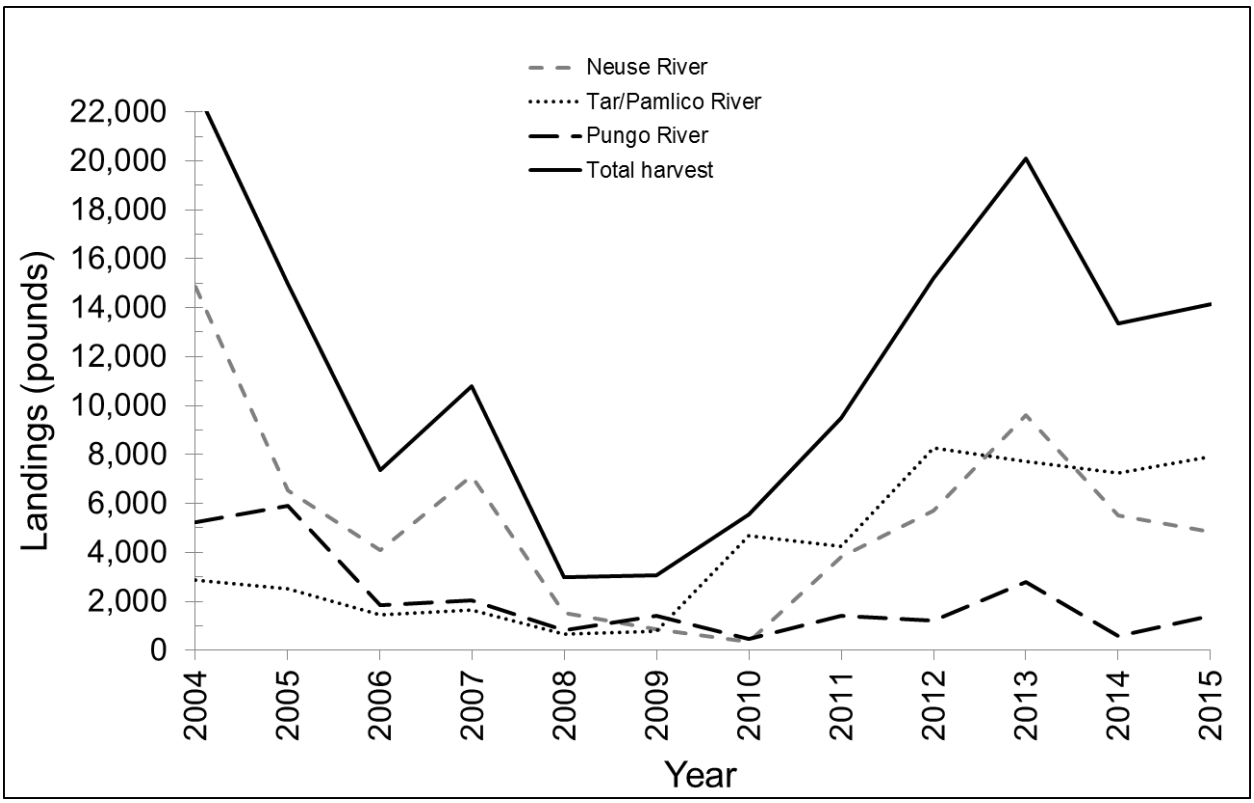

Figure 8. Recreational striped bass landings broken out by major river system in the CSMA, NC, 2004-2015.

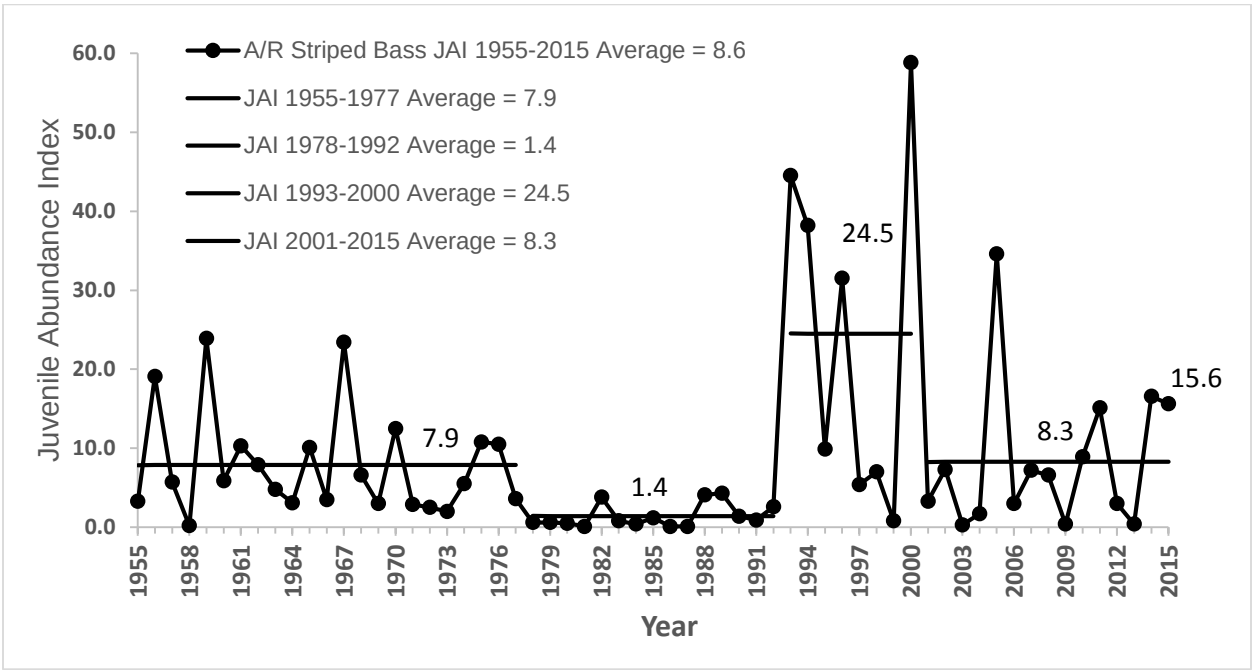

Figure 9. Juvenile abundance index (JAI) of Albemarle/Roanoke striped bass from the NCDMF juvenile trawl survey, western Albemarle Sound, NC.

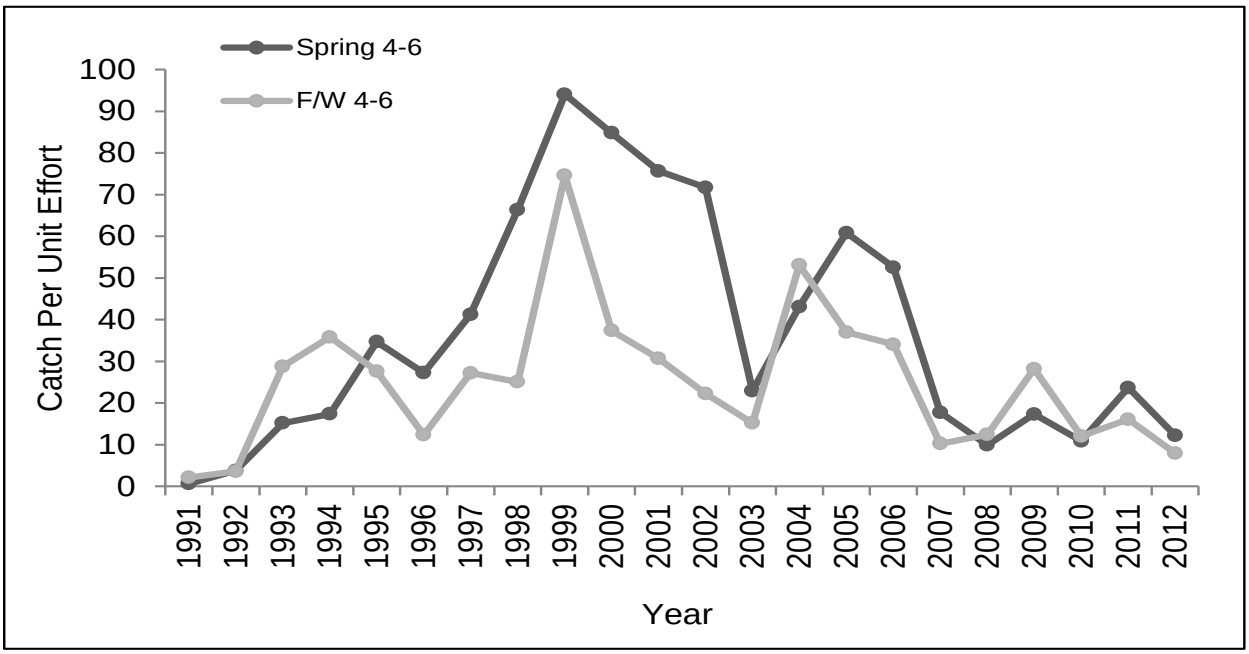

Figure 10. Relative abundance of age 4-6 Albemarle/Roanoke striped bass from the NCDMF fall/winter and spring independent gill net surveys, Albemarle Sound area, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

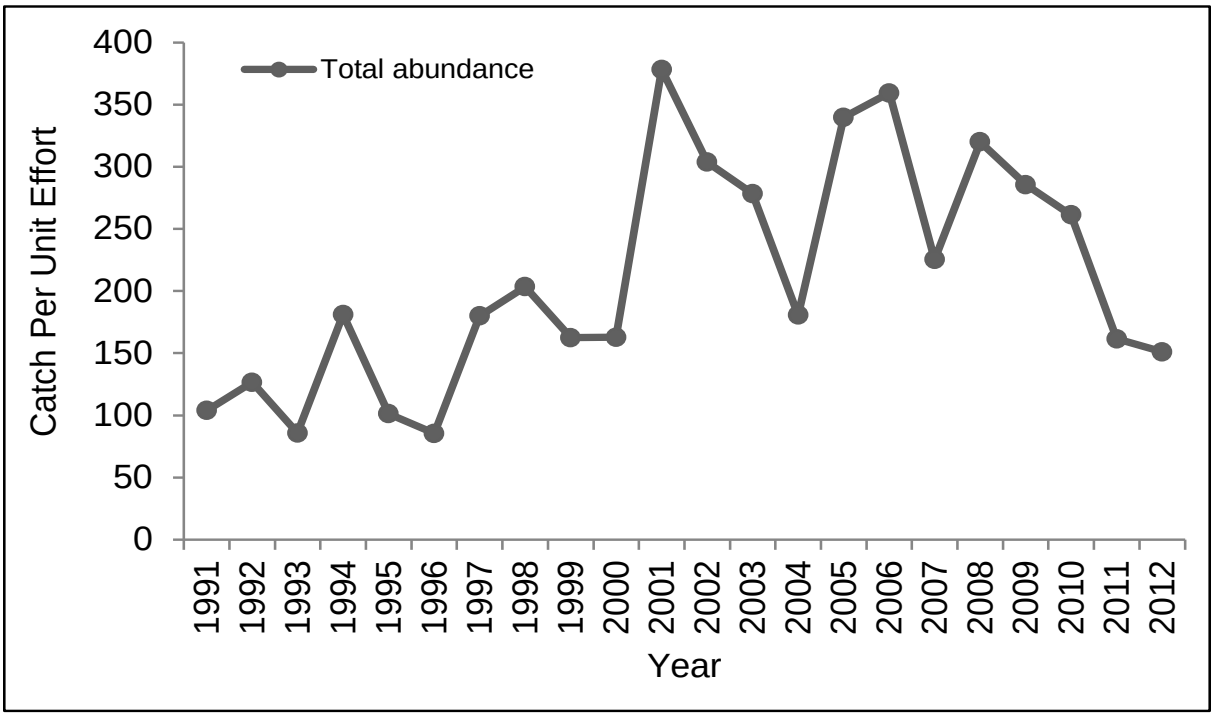

Figure 11. Relative abundance of Albemarle/Roanoke striped bass from the NCWRC spawning grounds electrofishing survey, Roanoke River at Weldon, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

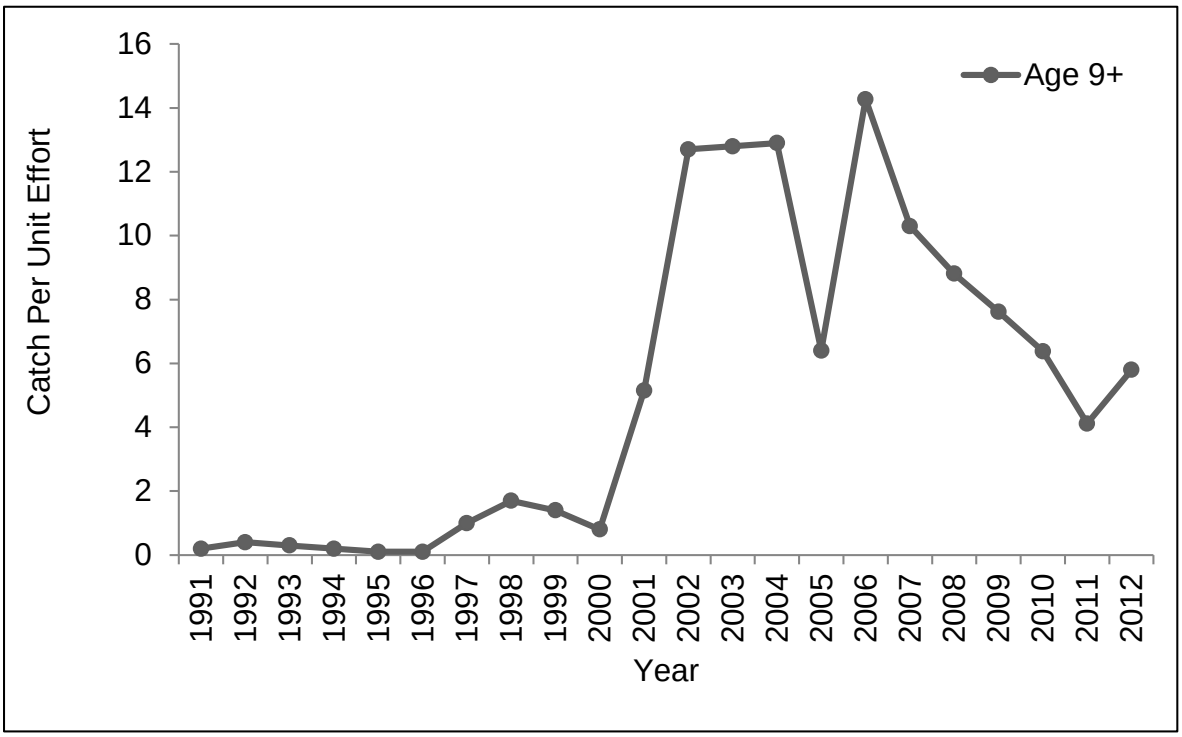

Figure 12. Relative abundance of age 9+ Albemarle/Roanoke striped bass from the NCWRC spawning grounds electrofishing survey, Roanoke River at Weldon, NC. Source: Stock Status of Albemarle Sound-Roanoke River Striped Bass, 2014.

FISHERY MANAGEMENT PLAN UPDATE
HARD CLAM
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	August 2001
Amendments:	Amendment 1 – June 2008
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	Began July 2013; Amendment 2 is currently in development and scheduled for final adoption in February 2017.

The 2001 N.C. Hard Clam Fishery Management Plan (FMP) recommendations included: adding in a new mechanical clam harvest area in Pamlico Sound and rotate openings in this area with northern Core Sound, decrease the daily harvest limit for mechanical harvest in Core Sound, change some of the lease requirements, increase relay of clams, and increase funding for Shellfish Sanitation (NCDMF 2001).

The N.C. Hard Clam FMP Amendment 1 recommended from public bottom that the hard clam fishery continue harvest at current daily limits, eliminate the mechanical clam harvest rotation in Pamlico Sound, institute a resting period in the northern Core Sound mechanical clam harvest area, and develop sampling programs to collect information necessary for the completion of a hard clam stock assessment (NCDMF 2008). Amendment 1 also endorsed several changes to the shellfish lease program to increase the accountability of the leaseholders and improve public acceptance of the program

The draft N.C. Hard Clam FMP Amendment 2 along with the draft N.C. Oyster FMP Amendment 4 is in development and scheduled for final adoption in February 2017.

Management Unit

All hard clams (*Mercenaria mercenaria*) occurring within North Carolina coastal waters.

Goal and Objectives

From the draft Amendment 2, approved by the North Carolina Marine Fisheries Commission (NCMFC) in August 2014:

The goal of N.C. Hard Clam FMP is to manage hard clam stocks in a manner that achieves sustainable harvest and protects its ecological value. To achieve this goal, it is recommended that the following objectives be met:

1. Protect the hard clam stock from overfishing, while maintaining levels of harvest at sustained production, providing sufficient opportunity for both recreational and commercial hard clamming, and aquaculture.

2. Identify, develop, and promote research to improve the understanding of hard clam biology, ecology, population dynamics, and aquaculture practices.

3. Initiate, enhance, and continue studies to collect and analyze economic, social, and fisheries data needed to effectively monitor and manage the hard clam fishery.

4. Identify, develop and promote efficient hard clam harvesting practices while protecting habitat.

5. Promote the protection, restoration, and enhancement of habitats and water quality so that the production of hard clams is optimized.

6. Consider the socioeconomic concerns of all hard clam resource user groups, including market factors.

7. Promote public awareness regarding the status and management of the North Carolina hard clam stock.

STATUS OF THE STOCK

Stock Status

The status of the hard clam stock in North Carolina has been considered unknown due to the paucity of data available to assess the population, therefore benchmark reference values could not be determined for the stock (NCDMF 2016). The NCDMF Hard Clam Plan Development Team recommends the status continue to be defined as unknown due to the continued lack of data needed to conduct a reliable assessment of the stock.

The statutory obligation to manage hard clams according to sustainable harvest cannot be met until the appropriate data are collected. While landings records reflect population abundance to some extent, the relationship is confounded by changes in harvest effort and efficiency.

Stock Assessment

Data limitations prevent NCDMF from conducting a hard clam stock assessment and calculating sustainable harvest. Currently, the only data available for the stock in most areas are the commercial landings and associated effort. For this reason, the current assessment focused on trends in catch rates in the commercial hard clam fishery from 1994 through 2013 (NCDMF 2016). These catch rates should not be considered an unbiased representation of trends in population size; fisheries-dependent data are often not proportional to population size due to a number of caveats and should be interpreted with caution if the interest is relative changes in the population.

The North Carolina commercial hard clam fishery is subject to trip limits, which could bias catch rates (Mike Wilberg), UMCES, personal communication; John Walter, NOAA Fisheries, personal communication); that is, the trip limits affect the amount of catch that is observed per unit effort—the true value of the variable cannot be observed. A censored regression approach was applied to calculate an unbiased index of relative abundance using data collected from a fishery with trip limits. Preliminary analysis found that for years in which greater than or equal to 50% of transactions equaled or exceeded the trip limit in a particular water body, the censored regression produced nonsensical results. For this reason, such years were removed from those water bodies where this occurred. Note that this was only an issue for mechanical harvest data.

Data were obtained from the North Carolina Trip Ticket Program for 1994 through 2013. The censored response variable (catch per unit effort—the number of clams per transaction) was fit within a Generalized Additive Models for Location Scale and Shape (GAMLSS) framework using the 'gamlss.cens' (Stasinopoulos et al. 2014) and 'survival' (Therneau 2014) packages in R (R Core Team 2014). Catch rates were estimated for both hand harvest and mechanical harvest in each of the major water bodies from which hard clams are harvested where sufficient data were available (see previous paragraph). Hand harvest occurs year-round and is summarized by calendar year. The majority of mechanical harvest occurs from December through March with some harvest occasionally allowed during other times of the year; therefore, mechanical harvest is summarized by fishing year (December through March). Only landings from public bottom were examined because planting of seed clams, grow-out availability, and market demand often artificially drives landings from private leases. Fisheries-dependent catch rates were expressed as numbers harvested per transaction. Catch rates were consistently higher for mechanical harvest than for hand harvest.

The Mann-Kendall test was performed to evaluate trends in the annual percentages. The Mann-Kendall test is a non-parametric test for monotonic trend in time-ordered data and allows for missing values (Gilbert 1987). The test was applied to the percentage of trip limits for hand harvest and mechanical harvest by area. Trends were considered statistically significant at □= 0.05.

Based on the Mann-Kendall test there were significant increasing trends over time detected in eight areas for hand harvest—Bogue Sound, Core Sound, Inland Waterway, New River, Newport River, North River/Back Sound, Shallotte River, and White Oak River. A significant decreasing trend was found in the hand harvest catch rates in Pamlico Sound. The remaining water bodies showed no trend in hand harvest catch rates over time. The Inland Waterway, New River, Newport River, North River/Back Sound, and Stump Sound demonstrated significantly increasing trends in mechanical harvest catch rates over time. No trends were detected in Bogue Sound, Core Sound, or White Oak River catch rates for mechanical harvest.

Trends observed in fishery-dependent indices must be interpreted with strong caveats. In order for a fisheries-dependent index to be proportional to abundance, fishing effort must be random with respect to the distribution of the population and catchability must be constant over space and time. Other factors affecting the proportionality of fishery-dependent indices to stock size include changes in fishing power, gear selectivity, gear saturation and handling time, fishery regulations, gear configuration, fishermen skill, market prices, discarding, vulnerability and availability to the gear, distribution of fishing activity, seasonal and spatial patterns of stock distribution, change in stock abundance, and environmental variables. Many agencies, such as the NCDMF, do not require fishermen to report records of positive effort with zero catch; lack of these "zero catch" records in the calculation of indices can introduce further bias.

STATUS OF THE FISHERY

Current Regulations

Hard clams cannot be taken from any public or private bottom in areas designated as prohibited (polluted) by proclamation except for special instances for: Shellfish Management Areas (NCMFC Rule 15A NCAC 03K .0103), with a permit for planting shellfish from prohibited areas (NCMFC Rule 15A NCAC 03K .0104), and for the depuration of shellfish (NCMFC Rule 15A NCAC 03K .0107). Hard clams cannot be taken between the hours of sunset and sunrise of any day. Beginning in April 2014, time and temperature control measures were initiated for hard clams to prevent post-harvest growth of naturally-occurring bacteria that can cause serious illness in humans.

Public Bottom

The minimum size limit for hard clams is 1-inch thickness (width). Daily commercial harvest limits on public bottom are no more than 6,250 hard clams (25 bags at 250 clams per bag) per fishing operation in any coastal fishing waters regardless of the harvest methods employed. Size, daily harvest limits, and season and area limitations do not apply in some situations on public bottom for: 1) temporary openings made on the recommendation of shellfish sanitation; and 2) maintenance dredging operations, where waste of the hard clam resource is apparent due to these activities and Shellfish Sanitation deem the area safe from public health risks.

The daily hand harvest limit on public bottom is 6,250 hard clams and the fishery is open year-round. Rakes no more than 12 inches in width or weighing no more than six lb to take hard clams can be used in any live oyster bed, in any established bed submerged aquatic vegetation or in and established bed of salt water cordgrass.

The public mechanical hard clam harvest season can occur from December 1 through March 31, and is opened by proclamation. Internal waters that can open to public mechanical hard clam harvest can only be in areas in Core and Bogue Sounds, Newport, North, White Oak and New Rivers and the Intracoastal Waterway north of "BC" Marker at Topsail Beach which have been opened at any time from January, 1979, through September, 1988. Public hard clam mechanical daily harvest limits vary by waterbody. In some instances, mechanical harvest areas are rotated (alternately open and close) with other areas (Table 1). The White Oak River, New River, and the Intracoastal Waterway (IWW) of Onslow and Pender counties (Marker 65 to the BC Marker at Banks Channel) are fished mainly with escalator dredges and are rotated on a yearly basis with maximum daily limits of 6,250 hard clams (25 bags at 250 hard clams per bag) per operation. The mechanical harvest area from Marker 72A to the New River Inlet is opened annually with a maximum daily harvest limit of 6,250 hard clams. The maximum daily harvest of 3,750 hard clams is allowed in North River, Newport River, and Bogue Sound (Table 1). Since 2008, upon adoption of Amendment 2 to the Hard Clam FMP, Core Sound has been divided into two areas and the northern area is open every other year while the southern portion is opened annually. Each area in Core Sound has a daily harvest limit of 5,000 hard clams per operation.

Recreational harvest limits from public bottom are 100 hard clams per person per day and no more than 200 hard clams per vessel. Hard clams can only be taken by hand for recreational purposes.

Private Bottom

Leases and franchises in internal waters must adhere to the minimum 1-inch thick size limit for the sale of hard clams for consumption. There is no daily maximum harvest limit applied to the taking of hard clams from private bottom in internal waters. Public bottom must meet certain criteria in order to be deemed suitable for leasing for shellfish cultivation and there are specific planting, production, and marketing standards for compliance to maintain a shellfish lease or franchise. Also there are management practices that must be adhered to while the lease is in operation, such as: marking poles and signs, spacing or markers, and removal of markers when the lease is discontinued.

Possession and sale of hard clams by a hatchery or aquaculture operation and purchase and possession of hard clams from a hatchery or aquaculture operation are exempt from the daily harvest limit and minimum size restrictions. The possession, sale, purchase and transport of such hard clams must be in compliance with the Aquaculture Operation Permit. Leases that use the water column must also meet certain standards as outlined in G.S. 113-202.1 in order to be deemed suitable for leasing and aquaculture purposes.

There is a specific application process to obtain a lease and a public comment process that is required before a shellfish lease is granted if anyone wishes to protest the issuance of a lease. Owners of shellfish leases and franchises must provide annual production reports to the Division. Failure to furnish production reports can constitute grounds for termination. Cancellation proceedings will begin for failure to meet production requirements and interfering with public trust rights. Corrective action and appeal information is given. And there are also requirements for the transfer of a lease before the contract term ends.

Commercial Landings

Hard clam harvest has fluctuated historically, often in response to changes in demand, improved harvesting, and increases in polluted shellfish area closures. Since 1994 it is known that about 88% (1994-2013 combined estimates) of the total commercial hard clam harvest come from public bottom in North Carolina. It is assumed that trends in hard clam landings from both sources (private and public bottom) combined can be attributed to changes in hard clam landings from public bottom since they make up the largest component to the overall harvest. Adverse weather conditions (i.e., hurricanes, heavy rain events) can impact the annual landings. One of the greatest impacts to clam harvest occurred in 1987-88 caused closures due to red tide. These closures affected 98% of the clam harvesting areas and had its greatest impact on the clam fishermen. The red tide was a dinoflagellate bloom that caused closure of over 361,000 acres of public bottoms to shellfish harvest from November 1987 to May 1988. The dinoflagellate (*Karenia brevis*) produced a neurotoxin, which was concentrated in shellfish, making them unfit for consumption. Ten tropical cyclones (hurricanes and tropical storms) have made landfall in North Carolina since 1996 (http://www.nc-climate.ncsu.edu). Freshwater runoff after storm events often increase shellfish harvest area closures and therefore reduce effort in hard clam harvest for short term periods. Hard clams are a live product that have to go to market relatively quickly after harvest. Competition with hard clams grown in private culture from other states is also a known contributor to reduced market demand for hard clams in the wild since a more consistent product can be provided from private grow out facilities.

Annual average hard clam landings from 1994-2015 was 515,637 lb of meats (Figure 1). Annual landings in 2011 were the lowest on record since 1975 at 295,467 lb of meat. There has been a slight uptick in hard clam landings since the low in 2011 still are at one-fourth at their peak in the 1980s. Hard clams are a live-product and must to go to market and sold relatively quickly after harvest because of a short shelf life. Competition with hard clams grown in private culture from other states is also a known contributor to reduced market demand for hard clams in the wild since a more consistent product can be provided from private growers.

Hand Harvest Fishery Off Public Bottom

Hand harvest from public areas is a year round fishery and has average landings of 18,791,751 clams a year (1994-2013). Most hand clamming occurs in the spring and summer when warm water is conducive to wading. Annual public harvest and the number of hand harvest trips a year for hard clams has declined overall from 1994 to 2013 (Figure 2). The annual catch per unit effort (CPUE; number of clams per trip) of hand harvest from public areas have been unchanged from 1994 to 2011, with a slight increase in the last two years of the time series (Figure 3).

Mechanical Harvest Fishery Off Public Bottom

Mechanical harvest season usually begins the second Monday in December and extends through the week of March 31st. Harvest is allowed only from 7:30 a.m. to 4:00 p.m. on Monday through Friday until before the Christmas holiday and then Monday through Wednesday after December 25th for the remainder of the open harvest season.

Hard clam landings from public harvest, using mechanical methods, has average landings of 3,934,082 clams each fishing year (1994/95 to 2012/13). The mechanical clam harvest season usually has the highest landings at the beginning of the fishing season in December and declines as the season progresses. Landings outside of the usual mechanical clam harvest season are from temporary openings for the maintenance of channels and temporary openings in Core Creek when bacteriological levels are at acceptable levels to harvest clams. Hard clam landings and trips fluctuate from fishing year to fishing year and appear to be greatly influenced by harvest from the New River mechanical harvest area (Figure 4). Since 1994, when the public mechanical harvest area of New River is open, 48 to 97 percent of the total mechanical harvest landings are from this area.

Private Culture

The NCDMF administers the shellfish lease program whereby state residents may apply to lease estuarine bottom and water columns for the commercial production of shellfish. The NCDMF does not differentiate between clam, oyster, bay scallop, and mussel leases; therefore, allowing shellfish growers to grow out multiple species simultaneously or as their efforts and individual management strategy allows. For the period of 2003-3013, roughly 35% of all private culture operations harvested only clams.

Private enterprise has provided nearly 12% of the total commercial hard clam harvest in North Carolina between 1994 and 2013. The annual average hard clam landings from 1994 to 2013 from private production were 3,236,081 clams. The number of trips harvesting hard clams has declined slightly since 2005 from private production (Figure 5).

Recreational Landings

Unknown.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Currently, the only data available for the stock in all areas are the commercial landings and associated effort from the Trip Ticket Program. Sampling of commercial catches of hard clams has been ongoing in the Southern District, Morehead City Office since 1998. Additional sampling of other areas followed later as funding became available for expansion. Hard clam catches are sampled at the dealers year round when available. Trip ticket information is also obtained of the total catch in the trip. Information on the location(s) of the catch should be obtained in as much detail as possible (e.g. water body, nearest landmark, marker number, etc.). Questions for the fisherman include: What gear or gears were used, gear parameters, (i.e. length of teeth, width of escalator, headrope length), how many minutes fished with each gear, location and depth of water fished. Additional questions include whether the catch came from public bottom or leased bottom, and if catch originated from a NCDMF Shellfish Rehabilitation area. Biological information on landed catch of hard clams is collected, including: shell length (mm) and shell width (depth) (mm) by market grade.

A total of 46,503 hard clams were measured from 2006 to 2015 (Table 2). Mean shell length (mm) has ranged from 60 mm to 69 mm in that timeframe with a minimum shell length of 27 mm to a maximum shell length of 120 mm seen in the measurements (Table 2).

Fishery-Independent Monitoring

A fisheries-independent monitoring program (Program 640) is currently underway in Core Sound to provide baseline data on hard clam abundance and gather quantitative environmental parameters. In the future it may be possible to expand this sampling into other areas to evaluate the entire population. Thirty randomly selected stations are sampled each year within three strata. The three designated strata were: Shellfish Mapping Strata (ST), Known Fishing Areas (FA), and Closed Shellfish Areas (CA). Sampling is performed at each station location within each stratum using a small patent tong on a 25-ft flat bottom boat. The patent tong has an opening of 0.51 square meters. Samples are quantified by station. Three replicates at each station location are taken.

All hard clams are measured for thickness and length to the nearest mm using calipers. Environmental data collected includes depth (m), surface and bottom salinity (ppt), surface and bottom temperature (°C), surface and bottom dissolved oxygen (mg/L), secchi depth (m), weather and wind elements, water level, distance from shore, and altered state. Sediment type is qualitatively described.

Very few hard clams are caught in this program due to the nature of the gear and random stratified sampling design. The Catch per Unit Effort (CPUE) or number of clams per station has ranged annually from 0.39 to 1.27 clams per station from 2007 to 2015 (Table 3). No trend is apparent from this sampling, but it is considered a short time series with only 8-years in development (Figure 6).

MANAGEMENT STRATEGY

There are no management triggers or methods to track stock abundance, fishing mortality, or recruitment between benchmark reviews from the current FMP. Landings and effort have decreased over time. There are no data to track the recreational fishery.

Amendment 1 to the N.C. hard clam FMP recommended from public bottom that the hard clam fishery continue harvest at current daily limits, eliminate the mechanical clam harvest rotation in Pamlico Sound, institute a resting period in the northern Core Sound mechanical clam harvest area, and develop sampling programs to collect information necessary for the completion of a hard clam stock assessment (NCDMF 2008). Amendment 1 also endorsed several changes to the shellfish lease program to increase the accountability of the leaseholders and improve public acceptance of the program. See Table 4 for current management strategies under Amendment 1.

Scheduled for adoption in February 2017, preferred management options of the Marine Fisheries Commission from draft Amendment 2 for hard clams taken from public bottom include:

- remove the Pamlico Sound mechanical clam harvest areas in rule no longer in use
- take latitude/longitude coordinates of the poles marking the open mechanical clam harvest area in New River

For private culture of hard clams, the preferred management options in draft Amendment 2 include:

- adding convictions for theft of shellfish from leases or franchises to the list of convictions that may result in revocation of fishing licenses to implement stronger deterrents to shellfish theft and intentional aquaculture gear damage
- clarify how production and marketing rates are calculated for shellfish leases and franchises to meet minimum production requirements
- expand the maximum proposed lease size to 10 acres in all areas
- specify criteria that allow a single extension period for shellfish leases of no more than two years per contract period to meet production and marketing requirements in the case of unforeseen circumstances, and reorganize the rules for improved clarity.

Draft Amendment 2 also recommended implementing shading requirements for clams on a vessel, during transport to a dealer, or storage on a dock from June through September.

See Table 5 for Marine Fisheries Commission preferred management options under draft Amendment 2.

MANAGEMENT AND RESEARCH NEEDS

See Table 2 for current management strategies and implementation status of each under draft Amendment 2.

The specific research recommendations from draft Amendment 2, with its priority ranking are provided below. The prioritization of each research recommendation is designated either a HIGH, MEDIUM, or LOW standing. A low ranking does not infer a lack of importance but is either already being addressed by others or provides limited information for aiding in

management decisions. A high ranking indicates there is a substantial need, which may be time sensitive in nature, to provide information to help with management decisions.

Draft Amendment 2

Many environmental considerations are applied throughout the CHPP and are not part of this list but are still considered very important to all shellfish. Specifically, the proposed implementation action on sedimentation within the CHPP are considered a high priority. Proper management of the hard clam resource cannot occur until some of these research needs are met, the research recommendations include:

- Support all proposed implementation actions under the priority habitat issue on sedimentation in the CHPP (Section 11.8) - HIGH
- Improve the reliability for estimating recreational shellfish harvest (Section 6.5) - HIGH
- Survey commercial shellfish license holders without a record of landings to estimate hard clam harvest from this group (Section 6.5) - MEDIUM
- Determine the consequences to hard clams from impacts to habitat due to harvest practices (Section 6.5) - LOW
- Develop regional juvenile and adult abundance indices (Section 6.5) - HIGH
- Complete socioeconomic surveys of recreational clam harvesters (Section 9.3) - MEDIUM
- Continue to complete socioeconomic surveys of commercial clam fishermen (Section 9.3) - LOW
- Support collaborative research to more efficiently track bacterial sources for land-based protection and restoration efforts (Section 11.8) - MEDIUM
- Quantify the relationship between water quality parameters and the cumulative effect of shoreline development units (Section 11.8) - MEDIUM
- Investigate impacts of clam trawls and escalator dredges on sandy bottom environments (Issue 12.2) - LOW
- Investigate the effects of mechanical harvest on clam recruitment and clam mortality in the mechanical harvest areas (Issue 12.2) - MEDIUM

FISHERY MANAGEMENT PLAN RECOMMENDATION

Recommend maintain the current timing of the Benchmark Review. Draft Amendment 2 of the N.C. Hard Clam FMP is currently in development and scheduled for NCMFC adoption in February 2017 with any recommended rules changes in effect no sooner than May 2017.

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TABLES

Table 1. Current daily mechanical hard clam harvest limits by water body. Season can only be opened from December 1 through March 31 by proclamation.

Waterbody	Daily harvest limit (number of clams)	Additional information
Northern Core Sound	5,000	Rotates one year open and one year closed opposite the open/close rotation of the New River
Southern Core Sound	5,000	Limit reduced from 6,250 in 2001. Open annually
North River	3,750	Open annually
Newport River	3,750	Open annually
Bogue Sound	3,750	Open annually
White Oak River	6,250	Rotates one year open and one year closed opposite the open/close rotation of the New River
New River	6,250	Rotates one year open and one year closed opposite the open/close rotation of the White Oak River and the ICW in the Onlsow/Pender counties areas
New River Inlet	6,250	Open annually from Marker 72A to the New River Inlet
ICW Onslow/Pender counties area	6,250	Intracoastal Waterway (maintained marked channel only) from Marker #65, south of Sallier's Bay, to Marker #49 at Morris Landing. All public bottoms within and 100 feet on either side of the Intracoastal Waterway from Marker #49 at Morris Landing to the "BC" Marker at Banks Channel. Open every other year when the New River is closed.

Table 2. Observed annual mean, minimum and maximum shell length (mm) of hard clams measured from commercial catches at the dealer, 2005 – 2015.

Year	Mean Shell Length	Min Shell Length	Max Shell Length	Total Number measured
2006	68	32	102	1,558
2007	66	41	111	1,406
2008	69	41	120	1,383
2009	64	39	112	1,862
2010	63	39	104	5,358
2011	64	38	111	10,670
2012	62	40	109	5,851
2013	63	40	108	4,750
2014	60	27	115	7,447
2015	60	34	111	6,218

Table 3. Independent hard clam sampling (Program 640) annual estimates of catch per unit effort (CPUE=Number of clams per station) and their standard deviations, 2007 to 2015 for Core Sound.

Year	Total number of stations	Number of stations with zero catch	Number of clams	CPUE (Number of clams/station)	Standard deviation
2007	30	22	20	0.67	1.54
2008	31	24	12	0.39	0.80
2009	30	15	38	1.27	1.82
2010	30	19	22	0.73	1.36
2011	30	26	14	0.47	2.03
2012	30	17	21	0.70	1.21
2013	30	25	16	0.53	1.53
2014	30	24	21	0.70	1.78
2015	30	22	15	0.50	0.50

Table 4. Summary of the management strategies and their implementation status from Amendment 1 of the N.C. Hard Clam Fishery Management Plan.

Management strategy	Implementation status
INSUFFICIENT DATA	
1. Recommend no change (status quo) to collect information on recreational harvest of shellfish	Accomplished
MANAGEMENT	
1. Rescind the proclamation but keep authority to open the designated area in the ocean for the mechanical harvest of clams if and when necessary	Accomplished; Proclamation SF-3-2009 dated May 1, 2009
2. Define recreational shellfish gear	Accomplished; Rule change to 15A NCAC 03I .0101
3. Allow no sale of weekend shellfish harvest except from leases	Accomplished; Rule change to 15A NCAC 03K .0106
4. Propose repeal of G.S. 113-169.2 license exemption.	Accomplished; Statute G.S. 113-169.2 change and Rule 15A NCAC 03K .0105 change
5. Set recreational limits in rule and proclamation	Accomplished; Rule change for 15A NCAC 03K .0105 and existing proclamation authority
6. Adopt a new rule limiting mechanical harvest of other shellfish to areas where and season when mechanical harvest gear for shellfish is allowed in existing fisheries	Accomplished; Rule change to 15A NCAC 03K .0108
7. Recommend no change to the open shellfish harvest license	Accomplished
8. Require all shellfish to be tagged at the dealer level	Accomplished; Rule change to 15A NCAC 03K .0101
9. Discontinue rotation of Pamlico Sound with northern Core Sound	Accomplished; Existing proclamation authority
10. Institute a resting period within the mechanical clam harvest area in the northern part of Core Sound	Accomplished; Existing proclamation authority
PRIVATE CULTURE	
1. Support the recommendation by the NCMFC that the Shellfish Hatchery Planning Advisory Team consider multiple uses of the demonstration shellfish hatchery facilities for different shellfish species	Accomplished
2. If clam seed grow out is initiated then the hatchery facility should work with the NCMFC Shellfish AC and DMF to determine management criteria for the uses of the clam seed stock	Accomplished
3. Propose an exemption from G.S. 113-168.4(b)(1) when the sale is to lease, UDOC permit, or Aquaculture Operations Permit holders for further rearing	Accomplished; Statute change to G.S. 113-168.4(b)(1)
4. Leave regulations in place as is for depuration facilities	Accomplished
5. Utilize user coordination plans for shellfish lease issuance coast wide	Funding required but was not sought due to budget limitations
6. Develop an independent education package in coordination with the Oyster Hatchery Program, N. C. Sea Grant, and other state agencies, and organizations to be presented at seminars with a mandatory attendance for all new leaseholders, and a mandatory completion of an examination with a passing score to meet education requirements for both new leaseholders and leaseholder transferees	Accomplished
7. Require an examination with a passing score based on pertinent information in the training package irrespective of	Accomplished

Management strategy	Implementation status
whether the applicant has obtained instruction voluntarily or is reviewing the information independently	
8. Request that appropriate agencies such as the Oyster Hatcheries and N.C. Sea Grant conduct shellfish lease training as part of their educational and outreach activities	Under development through the Resource Enhancement Section and NC Sea Grant
9. Modify G.S. 113–201 to include a requirement of an examination with a passing score for persons acquiring shellfish leases by lawful transfers unless they have a shellfish lease that is currently meeting production requirements	Accomplished
10. Support private oyster larvae monitoring programs	Accomplished
11. Support construction of an integrated system of shellfish hatcheries and remote-setting sites	Accomplished
12. Develop a subsidized, fee-for-service disease diagnosis program	Not under consideration at this time
13. Recommend status quo on the movement of seed shellfish from polluted waters	Accomplished
14. Change the current rule specifying a three year running production average to a five year production average and change the statutory provision for a ten year lease contract to a five year contract	Accomplished; Amended G.S. 113-202. Accomplished changes to rule 15A NCAC 03O .0201
15. Limit acreage per shellfish lease application to 5 acres	Accomplished; Rule change to 15A NCAC 03O .0201
16. A leaseholder holding at least 5 acres of shellfish bottom is required to meet shellfish lease production requirements before being approved for any additional lease acreage	Accomplished; Rule changes to 15A NCAC 03O .0201and 15A NCAC 03O .0210
17. Require Lat./Long. coordinates on lease corner locations as part of the requirement of a registered land survey	Accomplished; Rule changes to 15A NCAC 03O .0203
18. Develop regional lease acreage caps based on established use of water bodies	Accomplished; Amend G.S. 113-202
19. Rewrite the statutory provision limiting the amount of shellfish lease acreage that can be held by an individual to include acreage held by corporations where the individual is a member, or any combination of corporate or family holdings	Accomplished; Amend G.S. 113-202
20. Monitor seeded oyster sanctuaries for cownose ray predation	Currently under investigation through a university study
21. Provide bilingual (English and Spanish) educational materials to consumers, leaseholders, UDOC permit holders, shellfish dealers, and other DENR state regulatory agencies	Under development by the ISSC and will come through Shellfish Sanitation.
22. Encourage harvesters to take volunteer time and temperature control measures on their product	Accomplished through permit process.
HABITAT AND WATER QUALITY CONCERNS	
1. Identify and delineate Strategic Habitat Areas that will enhance protection of clam habitats; research physical factors influencing clam abundance predictably	Existing authority through the CHPP implementation plan
2. Coordinate SHAs with land-based conservation and restoration activities such as One North Carolina Naturally and DENR's green infrastructure planning	Existing authority through the CHPP implementation plan
3. Ensure oyster and SAV habitat definitions are consistent across regulating agencies	SAV definition in effect since April 2009. Existing authority through the CHPP implementation plan

Management strategy	Implementation status
4. Completely map all structured habitat (i.e., shell bottom, SAV) in North Carolina, including the deep, subtidal rocks on Pamlico Sound	Ongoing through Resource Enhancement Section Shellfish Mapping Program
5. Remap structured habitats to assess changes in distribution and abundance over time	Ongoing through Resource Enhancement Section Shellfish Mapping Program
6. Restore historical distribution and acreage of oysters and SAV where possible; coordinate with land-based protection and restoration efforts	Existing authority through the CHPP implementation plan
7. Balance protection of oyster beds and SAV (as habitat) with harvest provisions and expand oyster sanctuary planting and designation	Existing authority through the CHPP implementation plan; Accomplished expansion of oyster sanctuaries
8. Monitor biological/ecological condition and effectiveness of oyster sanctuaries and restored SAV beds	Accomplished in oyster sanctuaries. Not under investigation for SAV beds.
9. Cooperate with University researchers on oyster larvae distribution and oyster recruitment studies to aid in restoration planning	Accomplished
10. Develop and implement a comprehensive coastal marina and dock management plan and policy to minimize impacts to oyster and SAV habitat	Existing authority through the CHPP implementation plan
11. Develop permit application survey protocols for shellfish and SAV habitats for CAMA applicants	Accomplished through CHPP implementation plan
12. Evaluate and adjust as necessary dredging and trawling boundaries to protect and enhance oyster and SAV habitat	Existing proclamation authority and ongoing pilot study In Archer Creek to develop protocols
13. Seek additional resources to enhance enforcement of and compliance with expanded bottom disturbing fishing gear restrictions that protect oyster and SAV habitat	Existing authority through the CHPP implementation plan
14. Evaluate making conservation leasing available to non-government organizations for the purpose of oyster restoration and sanctuary development	Scheduled for consideration by CHPP Steering Committee
15. Work with NOAA and DWQ to determine appropriate levels of TSS, turbidity, chlorophyll a, and other water clarity parameters to achieve adequate water quality conditions for SAV growth and clam production	Existing authority through the CHPP implementation plan
16. Seek additional funds and process changes to allow local communities to more rapidly address repairs and upgrades to all aspects of the municipal waste systems, including collection and treatment systems	Existing authority through the CHPP implementation plan
17. Target productive shellfish resources in conditionally approved closed areas for land-based protection and restoration efforts. This could include designation as Strategic Habitat Are or Use-Restoration Water	Existing authority through the CHPP implementation plan
18. Modify mechanical harvest lines to exclude areas currently open to mechanical harvest where oyster habitat and SAV habitat exist based on all available information	Existing proclamation authority
19. Provide educational materials to harvesters in license offices and on DMF webpage, through other training opportunities, and through DMF Port Agent contact with harvesters and dealers and include other state and federal regulatory agencies to reach all coastal waters users	Accomplished
20. Support DWQ's efforts to improve stormwater rules through permit comments and CHPP implementation and co-ordinate with sister agencies	Accomplished. Rule change occurred in Oct. 2008
21. Recommend DWQ to designate Use-Restoration waters in conditionally closed waters where moderate	Accomplished; URW Coordinator hired by DWQ

Management strategy	Implementation status
contamination and healthy shellfish beds are present and develop strategies to restore and protect those waters	
22. Recommend DWQ designate Use-restoration waters in areas where moderate contamination and appropriate shellfish culture conditions are present and develop strategies to restore and protect those waters	Accomplished; URW Coordinator hired by DWQ
23. Recommend to the DWQ to accept a lower threshold of 10,000 square feet to coastal stormwater rules	Partially accomplished. Not as restrictive through DWQ rule changes as of Oct. 2008
24. Recommend a naturally vegetative riparian buffer width of 50 feet	Partially accomplished. Not as restrictive through DWQ rule changes as of Oct. 2008
25. Recommend the exclusion of all wetlands (coastal and non-coastal), from the built-upon area calculations	Partially accomplished. Not as restrictive through DWQ rule changes as of Oct. 2008
26. Recommend repeal of G.S. 113-207 (a) and (b) to end the requirement that all oyster rocks must be posted by the Department	Accomplished; Repeal G.S. 113-207 (a) and (b)
27. Recommend that conservation leasing for constructed oyster rock habitat be studied by DENR counsel for development of a proper mechanism and to develop siting criteria	Scheduled for consideration by CHPP Steering Committee
28. Leave current management practices in place for Ward Creek	Accomplished; Existing proclamation authority

Table 5. Summary of the Marine Fisheries Commission preferred management options from draft Amendment 2 of the N.C. Hard Clam Fishery Management Plan.

Management strategies	Implementation status
MANAGEMENT OF PUBLIC BOTTOM	
1. Status quo (Continue the daily harvest limit for recreational purposes at 100 clams per person per day not to exceed 200 per clams per vessel per day)	No action required
2. Status quo (Maintain management of the mechanical clam harvest in existing areas from Core Sound south to Topsail Sound, including modifications to the mechanical clam harvest lines to exclude areas where oyster habitat and SAV habitat exist based on all available information)	No action required
3. Remove the Pamlico Sound mechanical clam harvest areas in rule no longer in use	Rule change to 15A NCAC 03K .0302
4. Take latitude/longitude coordinates of the poles marking the open mechanical clam harvest area boundary in the New River, still with the flexibility to move a line to avoid critical habitats	Completed in 2015
5. Allow mechanical clam harvesters to have access to the bottom before maintenance dredging occurs	No action required
6. Status quo (Maintain current definitions and enforcement of hand harvest methods)	No action required
7. Allow Shellfish License holders to be eligible to acquire a Standard Commercial Fishing License after they show a history of sale of shellfish. Continue to allow commercial harvest of all other shellfish (clams included) as currently allowed	No action required

Management strategies	Implementation status
PRIVATE CULTURE	
1. Support modification of G.S. 113-208 and G.S. 113-269 to add minimum fines for violations on shellfish leases and franchises. With minimum fines set at $500 for the first violation and $1,000 for the second violation	Amend G.S. 113-208 and G.S. 113-269
2. Support modification of G.S. 113-269 to include protection to all shellfish leases and franchises, not just those with water column amendments	Amend G.S. 113-269
3. Modify Rule 15A NCAC 03O .0114, regardless whether statute changes occur, so that a first conviction under G.S. 113-208 or G.S. 113-269 the Fisheries Director shall revoke all licenses issued to the licensee	Rule change to 15A NCAC 03O .0114
4. Status quo (Adhere to Regional Conditions of USACE NWP48 with no adverse effect to SAV from shellfish leases and following measure identified in the interim)	No action required
5. Continue the moratorium of shellfish leases in Brunswick County	No action required
6. Establish a rule to support extensions for where “Acts of God” prevent lease holder from making production, with a two year extension and only one extension allowed per term	Rule change 15A NCAC 03O .0201
7. Allow leases returned to the state to remain delineated for a period of one year to allow the pre-existing leased bottom to be re-issued to other shellfish growers	Amend G.S. 113-202
8. Improve public notice of proposed lease applications on the physical lease, at fish houses, and/or through electronic notices	No action required
9. Allow a maximum of ten acres in both mechanical methods prohibited areas and mechanical methods allowed areas	Rule change 15A NCAC 03O .0201(a)(3)
ENVIRONMENT AND PUBLIC HEALTH	
1. Implement shading requirements for clams on a vessel, during transport to a dealer, or storage on a dock during June through September. These requirements would be implemented as a public health protection measure under 15A NCAC 03K .0110 by proclamation annually	Existing proclamation authority

FIGURES

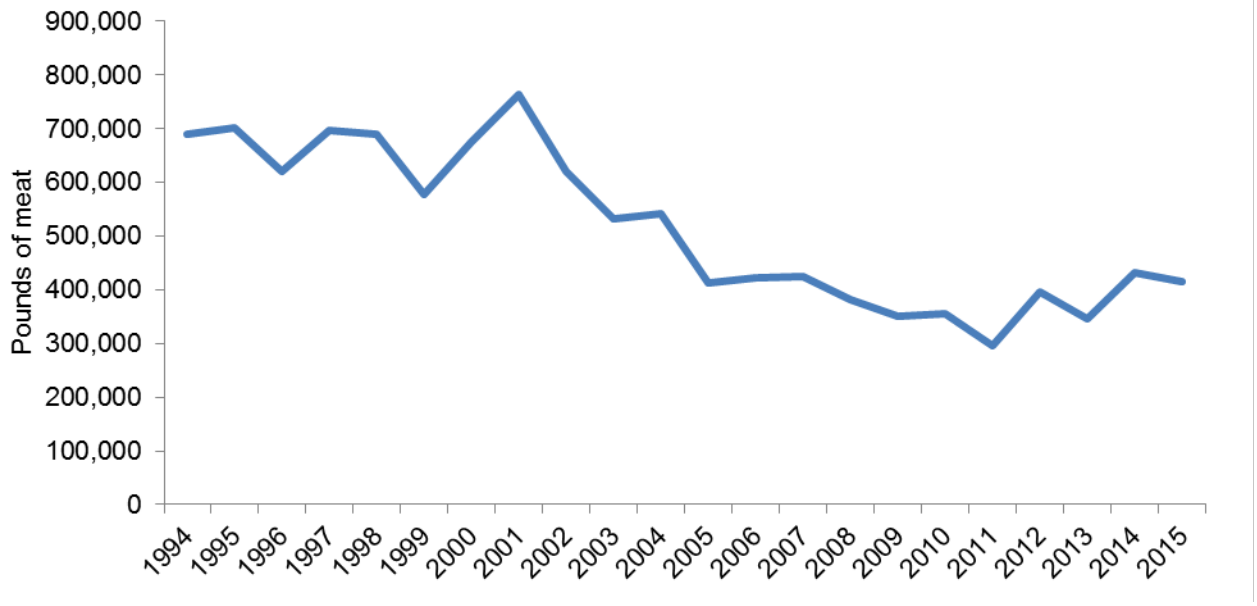

Figure 1. Annual hard clam landings (pounds of meat) from private and public bottom in North Carolina, 1994-2015.

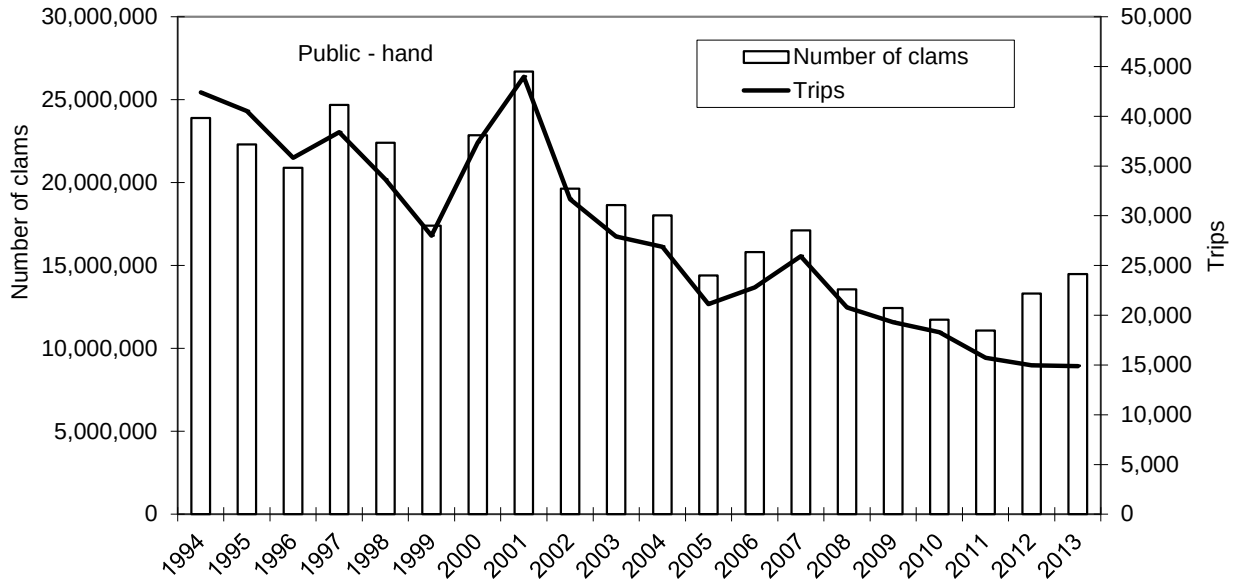

Figure 2. Annual hard clam landings (Number of clams) and trips from public harvest using hand gears, 1994-2013.

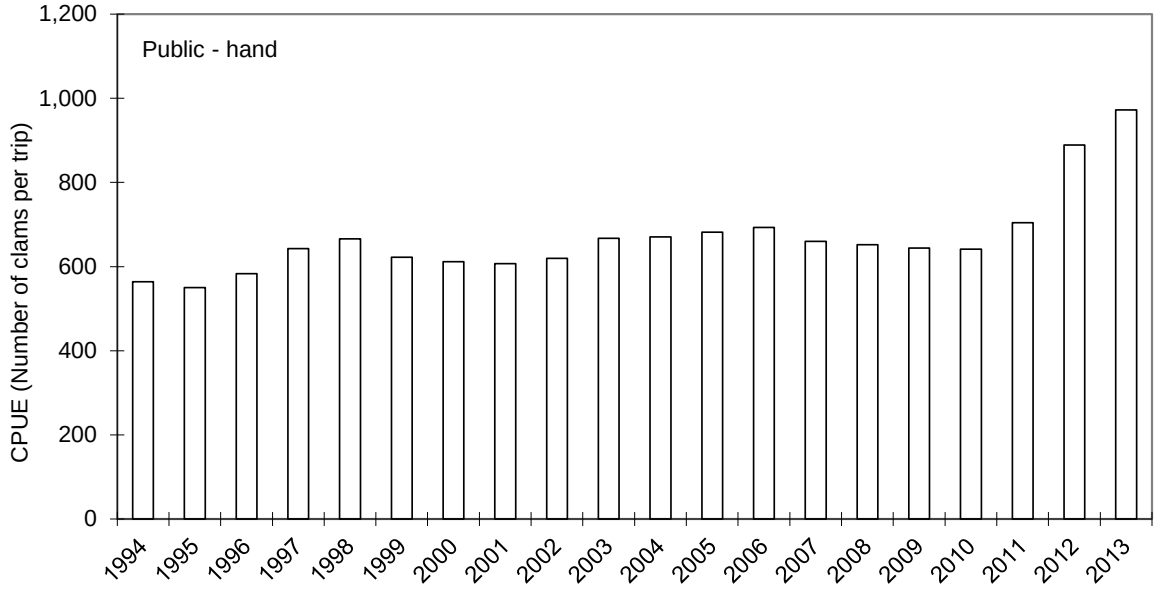

Figure 3. Annual catch per unit effort (CPUE; number of clams per trip) of hand harvest from public areas, 1994-2013.

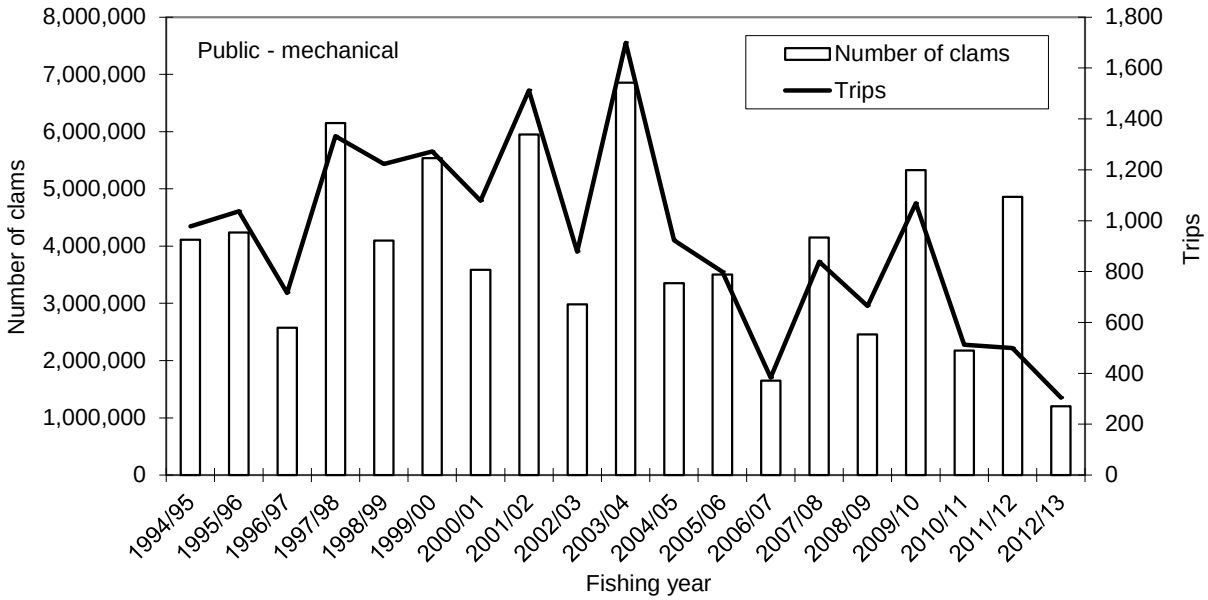

Figure 4. Hard clam landings (Number of clams) and trips from public harvest using mechanical gears by fishing year (Dec-Nov), 1994/95-2012/13.

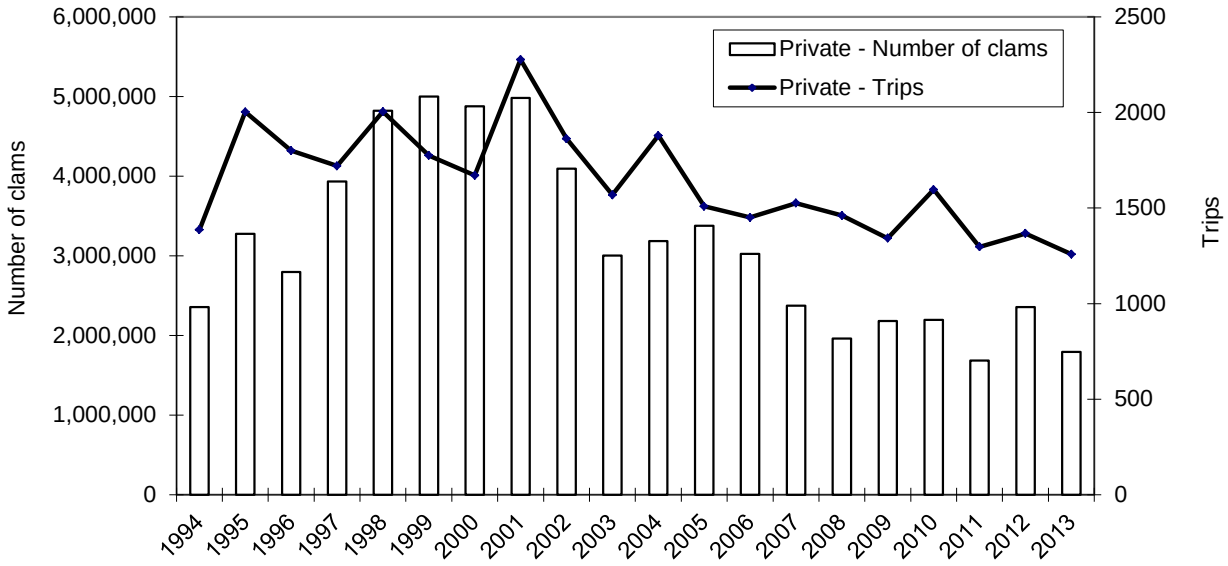

Figure 5. North Carolina commercial hard clam landings (Number of clams) and trips from private production, 1994-2013.

Figure 6. Annual catch per unit effort (Number of clams per stations) of hard clams in Core Sound from the independent sampling program 640, 2007 to 2015.

FISHERY MANAGEMENT PLAN UPDATE
KINGFISHES
August 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 2007
Amendments:	None
Revisions:	None
Supplements:	None
Information Updates:	November 2015
Schedule Changes:	None
Next Benchmark Review:	January 2020

The original 2007 Kingfish FMP developed management strategies that ensure a long-term sustainable harvest for recreational and commercial fisheries of North Carolina. The plan established the use of trend analysis and management triggers to monitor the viability of the stock. The N.C. Marine Fisheries Commission (NCMFC) also approved a rule which included proclamation authority for the NCDMF director to impose restrictions on season, areas, quantity, gear, or size of kingfish (NCMFC Rule 15A NCAC 03J .0202), to enact management action if needed. An Information Update was completed for the Kingfish FMP in November of 2015. The best available data and techniques used for the trend analysis and management triggers were refined and modified to better assess population trends as part of this FMP Information Update.

Management Unit

The North Carolina Kingfish FMP applies to all joint and coastal waters throughout North Carolina.

Goal and Objectives

The goal of the 2007 Kingfish Fishery Management Plan is to determine the status of the stock and ensure the long-term sustainability for the kingfishes stock in North Carolina (NCDMF 2007).

Objectives

1. Develop an objective management program that provides conservation of the resource and sustainable harvest in the fishery.

2. Ensure that the spawning stock is of sufficient capacity to prevent recruitment overfishing.

3. Address socio-economic concerns of all user groups.

4. Restore, improve, and protect critical habitats that affect growth, survival, and reproduction of the North Carolina stock of kingfishes.

5. Evaluate, enhance, and initiate studies to increase our understanding of kingfishes' biology and population dynamics in North Carolina.

6. Promote public awareness regarding the status and management of the North Carolina kingfishes stock.

STATUS OF THE STOCK

Stock Status

The 2015 stock status for kingfish in North Carolina is “viable”. The stock status is based on an annual evaluation of trends in various fishery independent abundance indices and relative fishing mortality. A coast-wide stock assessment is a high research priority that needs to be addressed before biological reference points relative to overfished and overfishing can be determined.

Stock Assessment

The 2007 Kingfish FMP selected the use of trend analysis and management triggers as the preferred management strategy to monitor the viability of the kingfish stock in North Carolina (NCDMF 2007). As a review of the 2007 Kingfish FMP, best available data and techniques used for the trend analysis and management triggers were refined and modified to better assess population trends as part of the 2015 FMP Information Update. The trend analysis incorporates management triggers to alert NCDMF and NCMFC to the potential need for management action based on stock conditions. The activation of any two management triggers (regardless of trigger category) two years in a row warrants further data evaluation and potential management action. The analysis is updated each year and all trends relative to management triggers are provided as part of this annual update. Current management triggers are based on fishery independent indices of abundance Young Of Year (YOY), adult fish, and proportion of catch greater than size at 50% maturity (L_{50}) and a relative fishing mortality index. YOY fish includes new young fish that enter the population that year. L_{50} is the length at which 50% of the adult population is sexually mature and ready to spawn. Based on updated analysis, no management triggers have been activated in either 2013 or 2014 and the stock is considered “viable.”

A formal quantitative stock assessment for kingfish is not available for kingfish in North Carolina; therefore, no determination can be made relative to an overfishing or overfished status. Prior attempts at a stock assessment during the 2007 FMP development were not successful, primarily due to limited data. From these prior attempts, all reviewers noted a lack of migration (mixing) data to determine the movement patterns of kingfishes along North Carolina and the entire Atlantic coast. A regional (multi-state) stock assessment approach is likely needed to best determine the stock status for kingfish along the Atlantic coast including North Carolina.

STATUS OF THE FISHERY

Current Regulations

For shrimp or crab trawls, there is a 300 lb trip limit for kingfishes south of Bogue Inlet from December 1 through March 31. (15A NCAC 03J.0202 (5))

Commercial Landings

Commercial landings for kingfishes include southern, northern, and Gulf kingfishes. Landings have fluctuated historically, but have been on an increasing trend since 2011. The 2015 landings fell from 2014 which was the highest since 1995 for the entire time series (Figure 1). The vast majority of kingfishes landed are from the ocean gillnet fishery. The average landings from 1994-2015 was 628,061 lb. Harvest of kingfishes is seasonal with peak landings in April and November. Peaks in landings coincide with seasonal movements of kingfishes along the Atlantic coast.

Recreational Landings

Recreational landings for kingfish include southern, northern, and Gulf kingfishes. Total recreational landings have been on an increasing trend since 1983 and 2015 was the highest landings on record (Figure 2). Most kingfishes are landed from the ocean and the majority of the fish from man-made structures, such as piers, jetties, or bridges, or from beaches. A smaller portion of kingfishes are caught in estuarine waters of the state and the majority of those fish are harvested by anglers fishing from private vessels. Recreational harvest of kingfishes is also seasonal with the majority of fish harvested during the spring and the fall, and lowest during the summer.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Kingfishes are sampled from a variety of commercial fishery surveys, including the estuarine long haul, ocean trawl, pound net, ocean gillnet, estuarine gillnet and ocean beach seine fisheries in NC. A total of 59,843 kingfishes were measured from 2006 to 2015 [(52,911 southern, 3,738 northern and 3,194 Gulf) (Table 1)]. Mean length for southern kingfish ranged from 290 to 308 mm, with a minimum of 137 mm and a maximum of 558 mm. Mean length for northern kingfish ranged from 315 to 340 mm, with a minimum of 110 mm and a maximum of 445 mm. Mean length for Gulf kingfish ranged from 305 to 338 mm for with a minimum of 188 mm and a maximum of 455 mm.

Fishery-Independent Monitoring

The Pamlico Sound Survey catches the most kingfishes of any of NCDMF fishery independent sampling programs, and the majority of those are southern kingfishes. This survey has been running, uninterrupted for twenty-five years. From 1991 to present, the Pamlico Sound Survey has been conducted during the middle two weeks in June and September. The stations sampled are randomly selected from strata based upon depth and geographic location. The sample area covers all of Pamlico Sound and its bays, as well as Croatan Sound up to the Highway 64 Bridge, the Pamlico River up to Blounts Bay, the Pungo River up to Smith Creek,

and the Neuse River up to Upper Broad Creek. However, most kingfish are caught in Pamlico Sound proper, and very few from the Neuse, Pamlico, and Pungo rivers.

Randomly selected stations (grids- one-minute by one-minute grid system equivalent to one square nautical mile) are sampled over a two week period, the second and third week of the month in both June and September. Tow duration is 20 minutes at 2.5 knots using the R/V Carolina Coast pulling double rigged demersal mongoose trawls. The R/V Carolina Coast is a 44-ft fiberglass hulled double rigged trawler owned and operated by the North Carolina Division of Marine Fisheries (NCDMF). Physical and environmental conditions such as temperature (^{o}C), salinity (ppt), dissolved oxygen (mg/L), bottom composition, a qualitative assessment of sediment size, and water clarity (began 2008) are recorded at the end of each tow.

Table 2 summarizes the age data for kingfishes (southern, northern, and Gulf), collected from 2006 through 2015. The majority of kingfish age samples came from Pamlico Sound independent gillnet survey, followed by the commercial ocean gillnet fishery. Southern kingfish ages ranged from 0 to 9 years old. Northern kingfish ages ranges from 0 to 5 years old. Gulf kingfish ages ranged from 0 to 7 years old. The modal ages ranged from 1 to 3 years for southern and Gulf kingfishes, and 0 to 2 for northern kingfish.

MANAGEMENT STRATEGY

The 2007 Kingfish FMP selected the use of trend analysis and management triggers as the preferred management strategy to monitor the viability of the kingfish stock in North Carolina (NCDMF 2007). A second management strategy promotes work to enhance public information and education. The trend analysis and management triggers will be updated annually and results will be presented to the NCMFC as part of the annual FMP Update. The trend analysis incorporates triggers to alert managers to the potential need for management action based on stock conditions. The activation of any two management triggers two years in a row (regardless of category) warrants further data evaluation and potential management action. The NCMFC will be alerted should this criterion be met.

The Pamlico Sound Trawl Survey (Program 195), the Pamlico and Neuse Watershed Gill Net Survey (Program 915), and the Southeast Area Monitoring and Assessment Program (SEAMAP) survey data are currently used for management triggers for kingfishes in NC. The L_{50} management trigger is based on a conservative proportion of adults in the population. This is the length at which 50% of the population is mature. For southern kingfish, this is 8.25 inches (210 mm) in length. Data sources for this management trigger come from two fisheries independent surveys; the summer component of the SEAMAP survey, and the June component of the Pamlico Sound Trawl survey. If the proportion of adults $\geq L_{50}$ falls below 2/3 of the average proportion of adults $\geq L_{50}$ for the time series, then the trigger will be considered tripped.

The September portion of the Pamlico Sound Survey is also used to calculate a young of year index of relative abundance because there are more southern fish collected in the fall, and more young-of-year fish. The summer portion (June, July, and August) is used to calculate an adult index of abundance and the fall portion of SEAMAP is used as a young of year index of abundance. The July through September portion of the Pamlico Sound Gillnet Survey where fish over 190 mm are considered adults is also used to calculate an adult index of relative abundance.

The relative index derived from Program 195 and 915 surveys were calculated using a stratified generalized linear model (GLM) approach. The indices derived from the SEAMAP survey were computed using standard (non-stratified) GLMs. A GLM is a flexible generalization of ordinary linear regression that allows for response variables that have distribution models other than a normal distribution.

Relative *F* is a simple method for estimating trends in *F* (Sinclair 1998). It is estimated as catch (commercial landings plus recreational harvest) divided by a fisheries-independent index of relative abundance. Here, catch (commercial landings plus recreational harvest) was divided by the SEAMAP spring index (Onslow, Raleigh, and Long bays, inner—shallow—strata) of relative abundance, given that the majority of catch occurs in the spring.

Biological Monitoring
Proportion of adults ≥ length at 50% maturity (L_{50}) for NCDMF Program 195 June (Figure 3)
Proportion of adults $\geq$ L_{50} for NCDMF Program 915 (Figure 4)
Proportion of adults ≥ L_{50} for SEAMAP summer (Figure 5)
→ If the proportion of adults ≥ L_{50} falls below 2/3 of the average proportion of adults ≥ L_{50} for the time series, then the trigger will be considered tripped.

Fisheries-Independent Surveys—Juvenile and Adult
NCDMF Program 195 September index of YOY relative abundance (Figure 6)
SEAMAP summer index of adult relative abundance (Figure 7)
SEAMAP fall index of YOY relative abundance (Figure 8)
→ If a fisheries-independent survey falls below 2/3 of the average abundance for the time series (through 2014), then the trigger will be considered tripped.

Other
Relative fishing mortality rate (*F*) (Figure 9)
→ If relative *F* rises above 66% of the average relative *F* for the time series (through 2014), the trigger will be considered tripped.

A summary of the various management triggers by year is provided in Table 3. Bold values indicate years when a particular management trigger was activated. None of the management triggers were activated in 2014 or 2015.

MANAGEMENT AND RESEARCH NEEDS

Table 4 provides a summary of management strategies for kingfishes and Table 5 provides a list of research needs.

FISHERY MANAGEMENT PLAN RECOMMENDATION

The NCDMF recommends maintaining the current review schedule.

LITERATURE CITED

NCDMF 2007. North Carolina Fishery Management Plan, Kingfishes. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. Morehead City, NC. 235 pp.

NCDMF 2015. North Carolina Fishery Management Plan Information Update, Kingfishes. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. Morehead City, NC. 196 pp.

Sinclair, A.F. 1998. Estimating trends in fishing mortality at age and length directly from research survey and commercial catch data. Canadian Journal of Fisheries and Aquatic Sciences 55(5):1248–1263.

TABLES

Table 1. Summary of length data sampled from the kingfish commercial fishery.

Southern Kingfish

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	301	137	438	6,562
2007	290	146	498	9,107
2008	292	160	446	9,956
2009	293	176	418	6,131
2010	295	170	558	3,927
2011	297	206	461	3,250
2012	294	203	433	4,646
2013	308	164	409	1,593
2014	302	211	532	3,179
2015	301	195	402	4,560

Northern Kingfish

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	322	182	410	433
2007	317	180	439	783
2008	319	110	423	335
2009	315	174	401	301
2010	322	228	406	186
2011	318	219	431	208
2012	323	197	445	318
2013	336	218	406	930
2014	340	277	423	160
2015	324	253	422	84

Gulf Kingfish

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	326	254	437	249
2007	305	188	447	551
2008	306	199	447	487
2009	313	251	406	351
2010	318	260	412	135
2011	338	219	455	366
2012	322	233	406	163
2013	328	235	443	545
2014	310	234	394	186
2015	324	268	413	161

Table 2. Kingfish age data collected from all sources combined.

Southern Kingfish				
Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	2	0	6	438
2007	1	0	7	852
2008	2	0	9	324
2009	2	2	5	15
2010	2	1	5	163
2011	2	0	6	243
2012	1	1	6	228
2013	2	1	5	297
2014	3	0	5	269
2015	2	0	5	353

Northern Kingfish				
Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	1	1	3	39
2007	0	0	2	20
2008	0	0	5	50
2009	1	1	3	14
2010	2	1	3	4
2011	2	0	4	115
2012	1	0	3	17
2013	2	1	3	26
2014	2	2	2	1
2015	2	0	2	40

Gulf Kingfish				
Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	1	1	4	22
2007	1	0	4	118
2008	1	0	7	47
2009	-	-	-	0
2010	3	3	3	1
2011	2	1	6	28
2012	1	0	4	98
2013	1	1	4	44
2014	2	1	4	38
2015	2	0	4	78

Table 3. Summary of management trigger organized by category. Bold indicate values that activate a trigger.

	BIOLOGICAL MONITORING			FISHERIES-INDEPENDENT SURVEYS			OTHER
	Proportion of Adults >= L50			YOY Indices		Adult Index	Relative *F*
Year	Program 195 June	Program 915 September	SEAMAP Summer	Program 195 September	SEAMAP Fall	SEAMAP Summer	Relative *F*
1987	0.602			**0.652**			
1988	0.450			**0.903**			
1989	**0.300**		0.585	**1.12**	12.3	**13.3**	17,627
1990	0.529		0.463	**2.30**	**8.92**	51.2	**92,209**
1991	0.667		0.894	**3.57**	**9.95**	67.3	31,107
1992	0.429		0.622	**2.68**	**3.77**	26.0	25,449
1993	0.542		0.456	**0.103**	**4.56**	23.7	**59,442**
1994	0.794		0.917	**3.61**	12.1	**4.86**	**137,621**
1995	0.440		0.486	6.34	**2.29**	**16.8**	**49,097**
1996	0.872		0.780	**0.318**	**10.4**	**8.15**	30,411
1997	0.576		**0.373**	**0.326**	**2.20**	**19.5**	20,276
1998	1.00		0.769	**0.170**	**9.55**	**8.72**	9,743
1999	0.920		0.608	**2.77**	13.6	48.7	24,813
2000	0.733		0.929	6.09	**7.49**	**19.1**	**83,334**
2001	0.660	0.983	**0.303**	4.18	**5.54**	40.4	20,962
2002	0.704	0.978	0.882	5.77	13.8	**20.3**	31,765
2003	0.860	0.978	0.645	5.65	**4.27**	30.7	5,706
2004	0.513	0.962	**0.284**	**3.83**	12.0	72.6	5,579
2005	0.594	0.970	0.643	**2.20**	**8.26**	29.2	5,530
2006	0.541	0.979	0.423	20.6	**4.53**	37.9	13,604
2007	**0.338**	1.00	0.521	6.89	**5.53**	**12.0**	**45,254**
2008	0.480	0.987	0.577	11.9	**8.80**	**8.01**	41,046
2009	0.591	1.00	0.398	31.9	**3.47**	26.9	33,941
2010	0.508	0.981	0.786	**1.74**	12.4	**19.8**	20,169
2011	0.447	1.00	0.507	18.5	33.0	32.1	31,533
2012	0.523	1.00	**0.368**	5.18	**7.98**	103.3	8,052
2013	0.659	0.941	0.558	17.9	**9.54**	64.3	4,048
2014	0.411	0.941	0.664	5.88	**7.91**	61.1	13,954
2015	0.542	0.983	0.588	6.89	194.2	53.3	13,954
Threshold	<0.397	<0.652	<0.396	<4.14	<10.6	<22.3	>44,219
Total Years	29	15	27	29	27	27	27
Years Trigger Activated	2	0	4	15	19	10	6

Table 4. Summary of management strategies and outcomes

MANAGEMENT STRATEGY	OUTCOME
Fisheries Management	
The proposed management strategy for kingfishes in North Carolina is to 1) maintain a sustainable harvest of kingfishes over the long-term and 2) promote public education. The first strategy will be accomplished by developing management triggers based on the biology of kingfishes, landings of kingfishes, independent surveys, and requesting a stock assessment of kingfishes be conducted by Atlantic States Marine Fisheries Commission (ASMFC). The second strategy will be accomplished by the NCDMF working to enhance public information and education.	• Management triggers are in place and were refined in the 2015 Information Update • DMF Director has proclamation authority should it be necessary to implement regulations to manage kingfish • Meetings and presentations have been utilized to educate and inform the public • NC FMP has been finalized and is the most comprehensive document available on the three kingfish species. • Stock information update completed in December 2015
Recommend ASMFC conduct a coastwide stock assessment on sea mullet.	ASMFC determined a stock assessment for the kingfishes was not necessary due to the positive trends in SEAMAP southern kingfish CPUE.
Endorse additional research to reduce bycatch in the shrimp trawl fishery, primarily shrimp trawl characterization studies involving at-sea observers and investigations into fish excluder devices with a higher success rate for reducing the harvest and retention of kingfish in shrimp trawls.	Bycatch characterization study of NC commercial shrimp trawl fishery was conducted in 2008, 2010 and 2012 to present. Bycatch reduction studies were conducted in 2015 and are scheduled for 2016 and 2017.
Implement rule giving DMF director proclamation authority to manage kingfish.	Rule **15A NCAC 3M .0518** has been approved
Habitat and Water Quality	
The NCDCM should continue promoting the use of shoreline stabilization alternatives that maintain or enhance fish habitat. That includes using oyster cultch or limestone marl in constructing the sills (granite sills do not attract oyster larvae).	Refer to CHPP

To ensure protection of kingfish nursery areas, fish-friendly alternatives to vertical stabilization should be required around primary and secondary nursery areas.	Refer to CHPP
The location and designation of nursery habitats should be continued and expanded by the NCDMF.	Refer to CHPP
No trawl areas and mechanical harvest prohibited areas should be expanded to include recovery/restoration areas for subtidal oyster beds and SAV.	Refer to CHPP
Expansion and coordination of habitat monitoring efforts is needed to acquire data for modeling the location of potential recovery/restoration sites for oysters and SAV.	Refer to CHPP
Any proposed stabilization project threatening the passage of kingfish larvae through coastal inlets should be avoided.	Refer to CHPP
All coastal-draining river basins should be considered for NSW classification because they all deliver excess nutrients to coastal waters, regardless of flushing rate.	Refer to CHPP
Efforts to implement phase II stormwater rules must be continued.	Refer to CHPP
The EEP process should be extended to other development projects.	Refer to CHPP
Reduce sediment and nutrient loading by addressing multiple sources, including: • improvement and continuation of urban and agricultural BMPs, • more stringent sediment controls on construction projects, and • implementation of additional buffers along coastal waters.	Refer to CHPP

Table 5. Research needs and outcomes.

Management Related Research Needs	**Outcome**
Determine stock structure using genetics of kingfishes along North Carolina and the Atlantic Coast (LOW)	Grant approved for UNCW and DMF to use genetic markers to delineate the population structure
Conduct a coastwide stock assessment of southern kingfish along the Atlantic Coast including estimation of biological reference points for sustainable harvest (HIGH)	No action
Validate YOY and adult indices used in trend analysis (HIGH)	UNCW has conducted seine surveys in the ocean to determine trends for all three species.
Develop a fisheries-independent survey in the ocean for juvenile and adult kingfishes (HIGH)	No action
Collect observer data from commercial fishing operations to estimate at-sea species composition of the catch, discard rates, and lengths (HIGH)	DMF has observers collecting data at sea for the shrimp fishery, flounder gill net fishery and other fisheries
Improve recreational data collection, particularly the species composition of discards, discard rates and associated biological data (HIGH)	Steps have been taken to improve sampling in recreational fisheries, including a carcass collection program
Improve dependent commercial data collection of more sample sizes for life history information (MEDIUM)	NCDMF ageing study collects kingfish from life history data
Evaluate and potentially expand the NCDMF fishery-independent gill-net survey to provide data on species composition, abundance trends, and population age structure by including additional areas of North Carolina's estuarine and near-shore ocean waters (MEDIUM)	No action
Continue bycatch reduction device studies in the shrimp trawl fishery to decrease bycatch (MEDIUM)	Ongoing research through DMF and various federal agencies.
Biological Research Needs	**Outcome**
Develop tagging study to estimate natural and fishing mortality, to investigate stock structure, and to understand movement patterns (HIGH)	No action
Collect histological data to develop maturity schedule with priority to southern kingfish (HIGH)	No action
Conduct study to estimate fecundity with priority to southern kingfish (MEDIUM)	No action
Conduct study to identify spawning areas with priority for southern kingfish (MEDIUM)	No action
Conduct an age validation study with priority to southern kingfish (HIGH)	No action
Sample inlets and river plumes to determine the importance of these areas for kingfishes and other estuarine-dependent species (LOW)	Sampling in the nearshore ocean through NC Adult Fishery Independent Survey was initiated in 2008 but discontinued in 2015. Gill net sampling in Cape Fear, New,

	Neuse, Pamlico, and Pungo rivers continues.
Determine the effects of beach re-nourishment on kingfishes and their prey (LOW).	Grant approved for UNCW to investigate effects of beach renourishment
Conduct a study to investigate how tidal stages and time of day influence feeding in kingfishes (LOW)	No action
Social and Economic Research Needs	**Outcome**
Increase the sample size of surveyed participants in the commercial kingfish fishery to better determine specific business characteristics and the economics of working in the fishery (LOW)	NCDMF conducted a study of CRFL holders in 2009/2010.
Update information on the participants in the recreational kingfish fishery (LOW)	Socioeconomic study was conducted by NCDMF on piers.

FIGURES

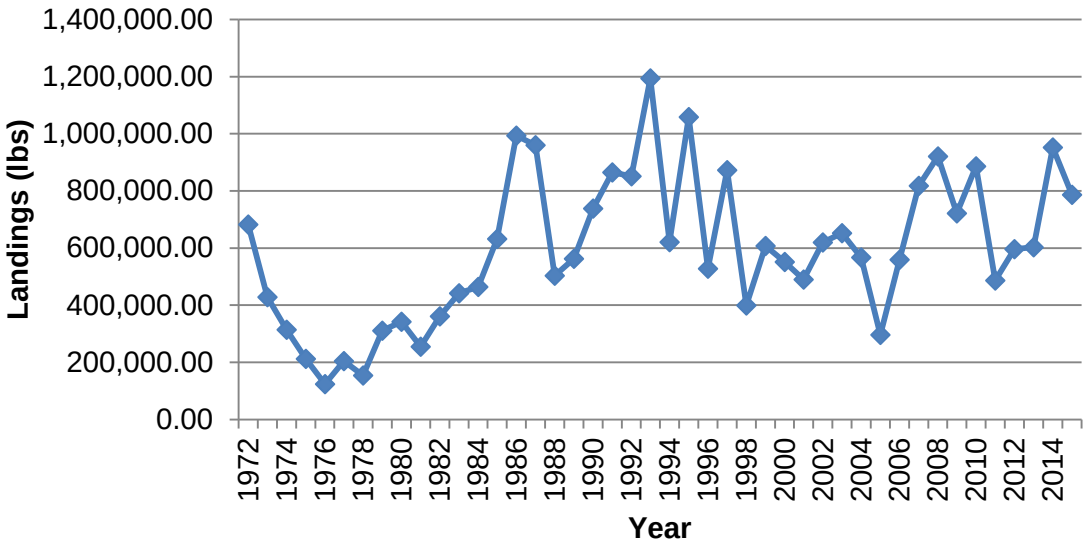

Figure 1. Commercial landings of kingfishes (southern, northern, and Gulf combined) from 1972 to 2015.

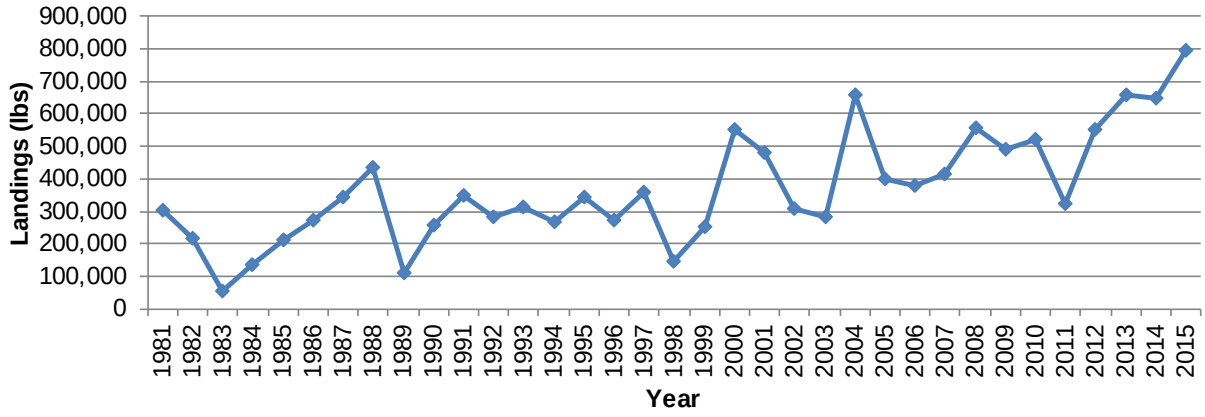

Figure 2. Recreational landings of kingfishes (southern, northern, and Gulf combined) from 1981 to 2015.

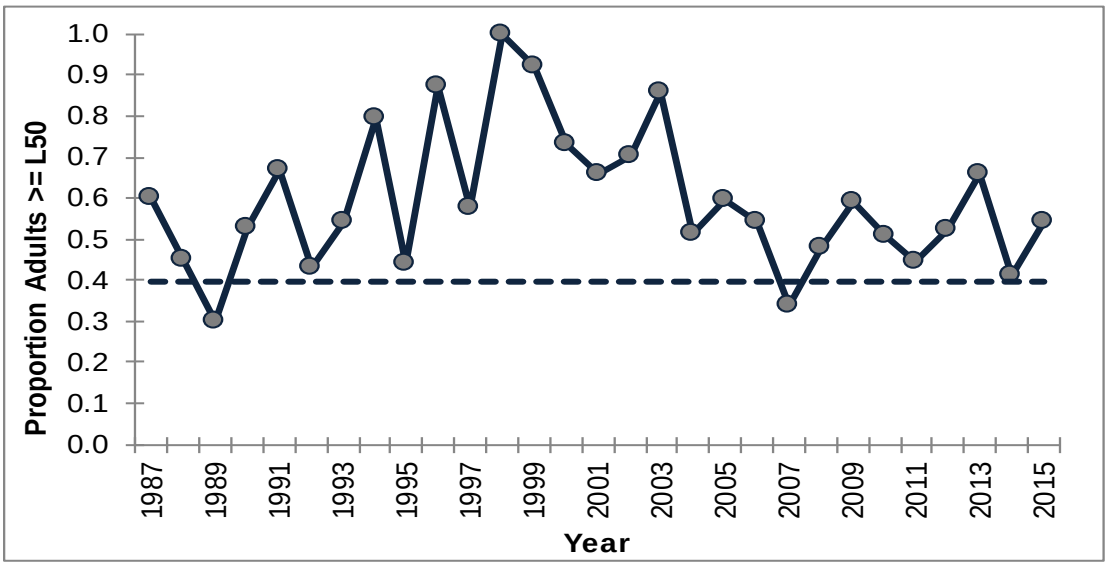

Figure 3. Annual proportions of adults (southern kingfish) greater than or equal to the length at 50% maturity occurring in the June component of the NCDMF Program 195 survey (excluding strata NR, PR, and PUN), 1987–2015. Dotted line represents 2/3 of the average of the time series.

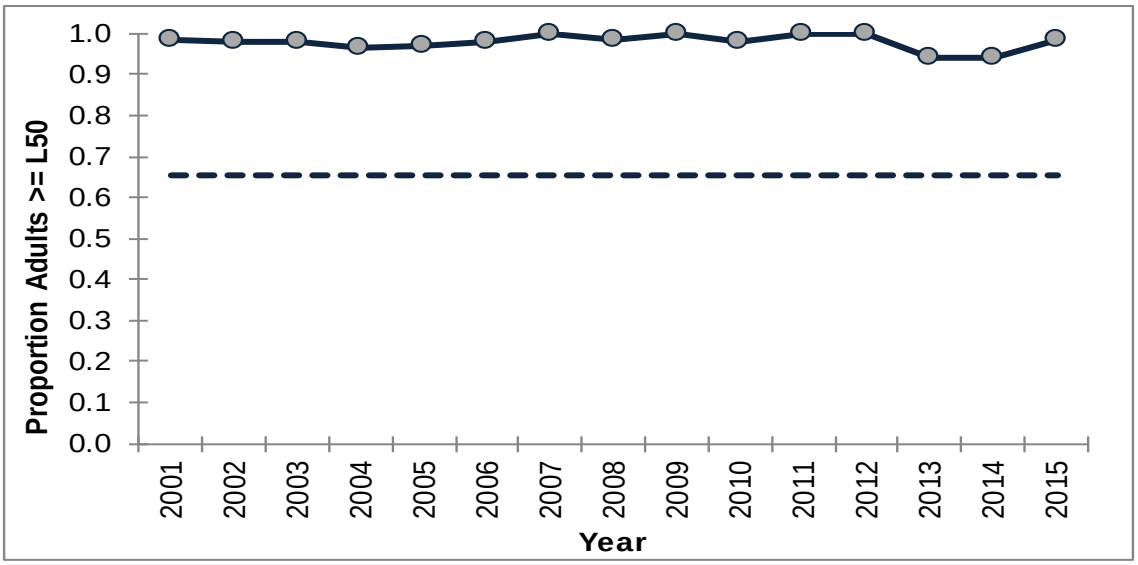

Figure 4. Annual proportions of adults (southern kingfish) greater than or equal to the length at 50% maturity occurring in the July through September component of the NCDMF Program 915 survey (Pamlico Sound, deep strata only)), 1987–2015. Dotted line represents 2/3 of the average of the time series.

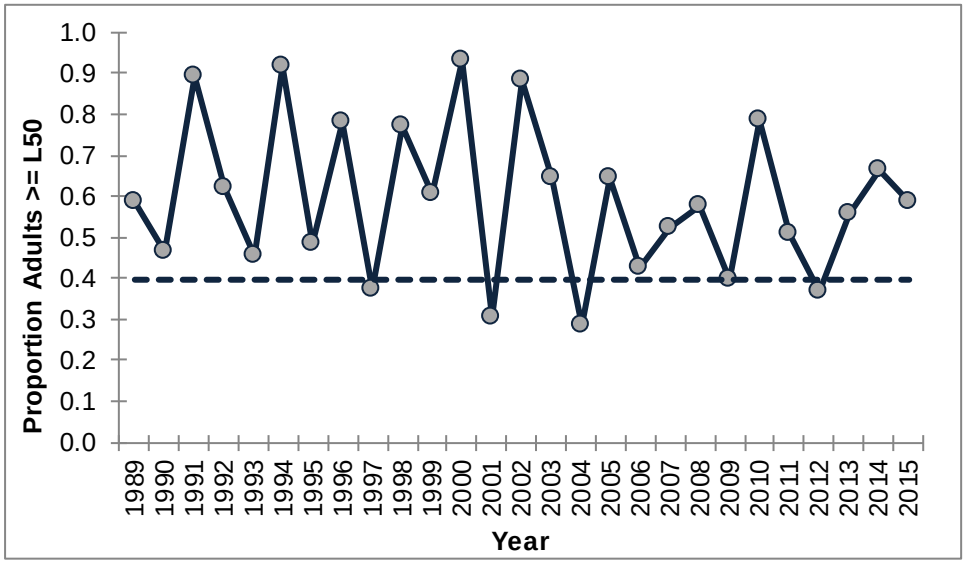

Figure 5. Annual proportions of adults (southern kingfish) greater than or equal to the length at 50% maturity occurring in the summer component of the SEAMAP survey (Onslow, Raleigh, and Long bays, inner—shallow—strata), 1989–2015. Dotted line represents 2/3 of the average of the time series.

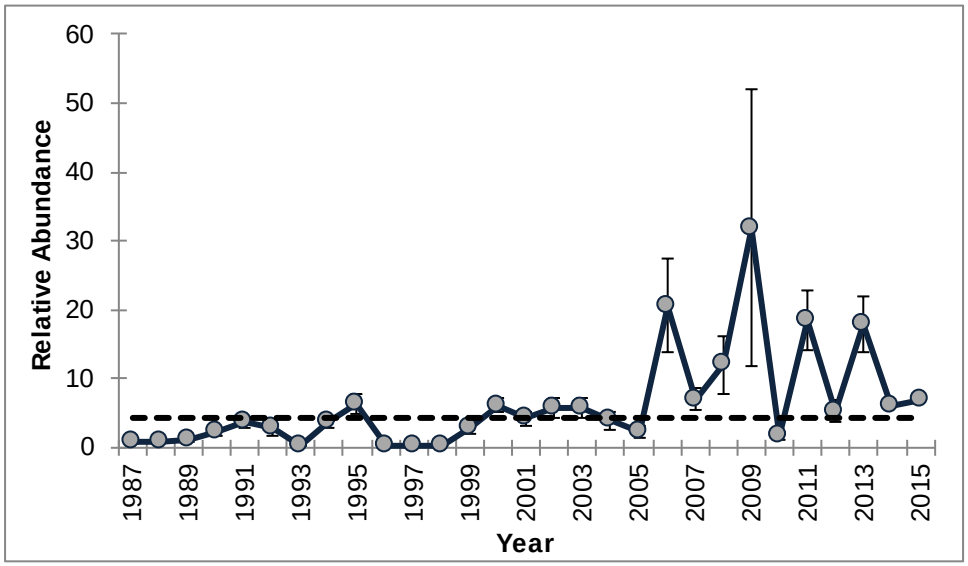

Figure 6. Annual index of relative YOY abundance for southern kingfish derived from the September component of the NCDMF Program 195 survey (excluding strata NR, PR, and PUN), 1987–2015. Dotted line represents 2/3 of the average of the time series.

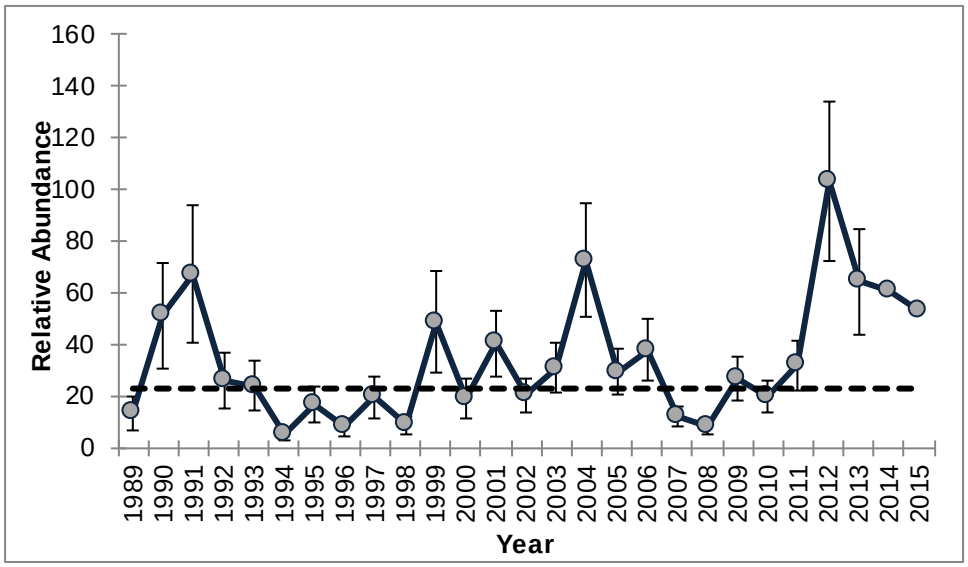

Figure 7. Annual index of relative adult abundance for southern kingfish derived from the summer component of the SEAMAP survey (Onslow, Raleigh, and Long bays, inner—shallow—strata), 1989–2015. Dotted line represents 2/3 of the average of the time series.

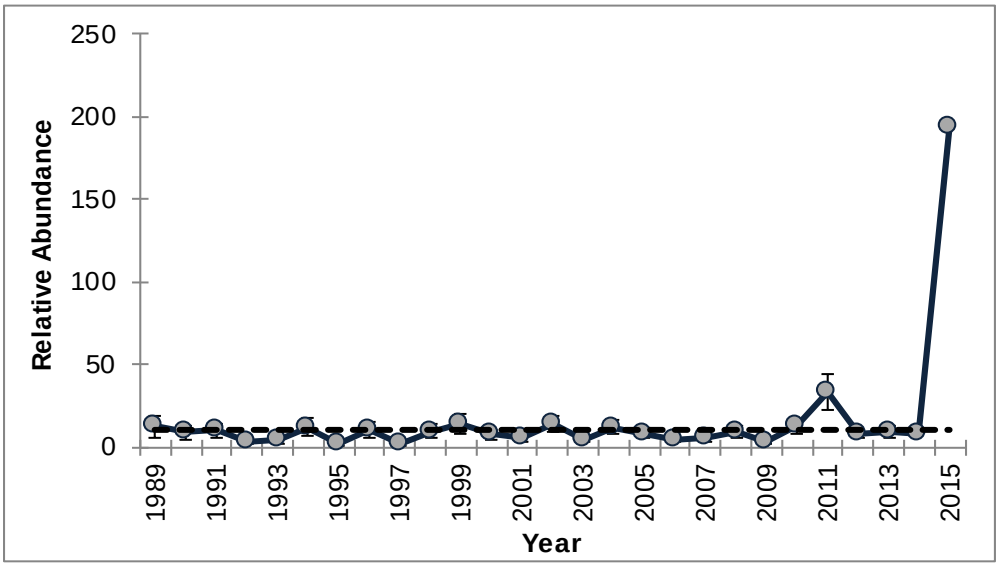

Figure 8. Annual index of relative YOY abundance for southern kingfish derived from the fall component of the SEAMAP survey (Onslow, Raleigh, and Long bays, inner—shallow—strata), 1989–2015. Dotted line represents 2/3 of the average of the time series.

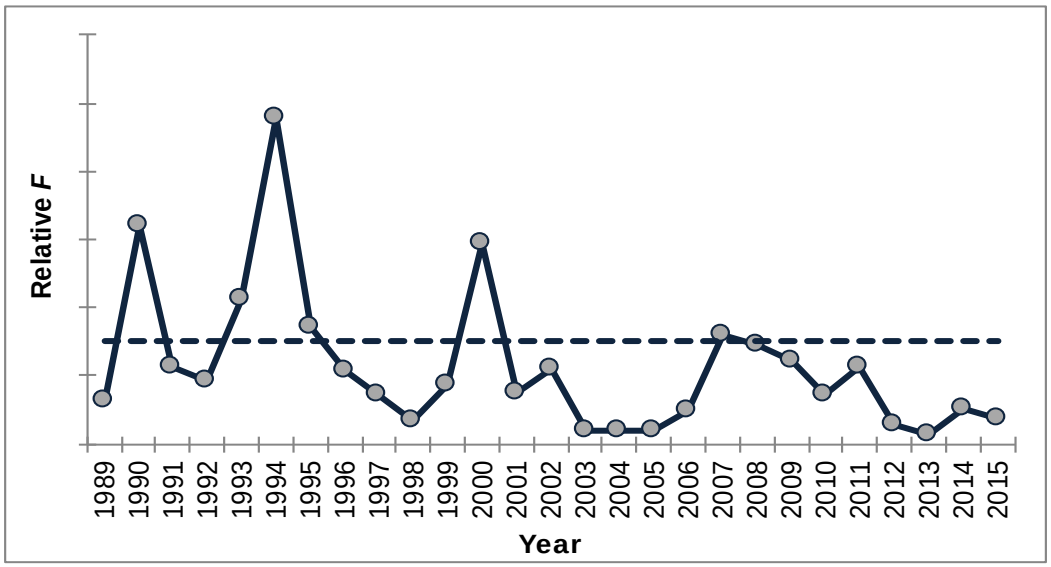

Figure 9. Annual index of relative YOY abundance for southern kingfish derived from the fall component of the SEAMAP survey (Onslow, Raleigh, and Long bays, inner—shallow—strata), 1989–2015. Dotted line represents 2/3 of the average of the time series.

FISHERY MANAGEMENT PLAN UPDATE
RED DRUM
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	March 2001
Amendments:	Amendment 1 – November 2008
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	July 2016

Red drum (*Sciaenops ocellatus*) in North Carolina are currently managed under Amendment 1 to the North Carolina Red Drum FMP. Harvest restrictions for the commercial and recreational fisheries were not required with the adoption of Amendment 1 in 2008. Overfishing was not occurring based on the 2007 North Carolina Division of Marine Fisheries (NCDMF) conducted red drum stock assessment (Takade and Paramore 2007). Amendment 1 did however, implement regulations to reduce the impact of mortality associated with regulatory discards. These included requiring circle hooks along with fixed weights and short leaders in the summer adult red drum recreational fishery in Pamlico Sound and further expanded the gill net attendance requirements that were originally implemented as part of the original 2001 North Carolina Red Drum FMP.

The 2001 North Carolina Red Drum FMP did implement restrictive harvest measures. Restrictions went in place in October of 1998 as “interim measures” to prevent overfishing on the stock. Harvest restrictions included: restricting all harvest of red drum to fish between 18 and 27 inches total length (previously allowed 1 over 27 inches), implemented a one fish recreational bag limit (previously 5 fish bag limit); implemented a daily trip limit for the commercial fishery that is set by the Director (previously no daily limit); and maintained the existing 250,000-pound annual commercial cap. The trip limit was designed to be low enough to reduce harvest and to deter targeting of red drum commercially. The original FMP also implemented seasonal small mesh gill net attendance requirements to reduce discard mortality of red drum. The North Carolina Red Drum FMP was approved in March of 2001 and maintained all the interim measures.

In addition to the state FMP, North Carolina also falls under the Atlantic States Marine Fisheries Commission (ASMFC) Red Drum FMP. This plan is currently managed under Amendment 2 to the interstate plan. Adopted in 2002, Amendment 2 required all states to implement management measures by January of 2003 that are projected to result in a 40% static Spawning Potential Ratio. Individual states are also required to maintain these management

strategies in order to ensure that overfishing is not occurring and that Optimum Yield (OY) in the red drum fishery can be obtained. Amendment 2 compliance requirements to the states include:

- Implementing bag and size limits projected by bag and size limit analysis to achieve the minimum 40% spawning potential ratio (SPR).
- Establishing a maximum size limit of 27 inches or less in all red drum fisheries.
- Maintaining current or more restrictive commercial fishery regulations.
- Requires any commercial cap overages from one fishing year to be subtracted from the subsequent year's commercial cap.

As a result of the management measures enacted through the 2001 North Carolina Red Drum FMP, no new management measures were required for North Carolina in order to comply with Amendment 2 to the ASMFC plan.

Management Unit

Red drum in North Carolina have both a state FMP and an interstate FMP through the framework of the ASMFC.

The North Carolina FMP applies to all joint and coastal waters throughout North Carolina.

The ASMFC plan applies to all states from Florida to Maine. The management unit for red drum along the Atlantic coast is divided into a northern and southern stock. North Carolina and all areas north along the Atlantic coast represent the northern stock.

Goal and Objectives

The goal of Amendment 1 to the North Carolina Red Drum FMP is to prevent overfishing in the red drum stocks by allowing the long-term sustainable harvest in the red drum fishery. To achieve these goals, it is recommended that the following objectives be met:

1. Achieve and maintain a minimum overfishing threshold where the rate of juvenile escapement to the adult stock is sufficient to maintain the long-term sustainable harvest in the fishery.

2. Establish a target SPR to provide the Optimum Yield from the fishery in order to maintain a state FMP that is in compliance with the requirements of the ASMFC Red Drum FMP.

3. Continue to develop an information program to educate the public and elevate their awareness of the causes and nature of problems in the red drum stock, its habitat and fisheries, and explain the rationale for management efforts to solve these problems.

4. Develop regulations that while maintaining sustainable harvest from the fishery, considers the needs of all user groups and provides adequate resource protection.

5. Promote harvest practices that minimize the mortality associated with regulatory discards of red drum.

6. In a manner consistent with Coastal Habitat Protection Plan, restore, improve and protect essential red drum habitat and environmental quality to increase growth, survival, and reproduction of red drum.

7. Improve our understanding of red drum population dynamics and ecology through the continuation of current studies and the development of better data collection methods, as well as, through the identification and encouragement of new research.

8. Initiate, enhance, and continue studies to collect and analyze the socio-economic data needed to properly monitor and manage the red drum fishery.

STATUS OF THE STOCK

Stock Status

The stock status of red drum is currently “recovering”. A stock assessment, conducted through the ASMFC in 2009 indicates that the red drum stock in North Carolina is not experiencing overfishing. The overfished status is undetermined. A new benchmark stock assessment was scheduled for completion in 2015. However, difficulties in developing a new modeling framework, aimed at determining the overfished status, delayed this schedule. Results are now anticipated later in 2016.

Stock Assessment

Red drum in North Carolina are currently listed as “Recovering”. Only the overfishing and not the overfished status can currently be determined for red drum. The threshold (below which the stock is experiencing overfishing) and the target fishing mortality rates correspond to those rates that achieve 30% and 40% static SPR. An assessment was last completed by the ASMFC in 2009. Based on the results of this assessment the spawning potential ratio was at or above target levels (Figure 1). Abundance of age 1 – 3 red drum increased during 1990 – 2000 after which it fluctuated widely (Figure 2). The increase in abundance of these age groups can be explained by the reduction in exploitation rates in the early part of the time series with relative stability since then (Figure 3).

Management measures in place have effectively controlled fishing mortality to a level sufficient to meet management targets. It is critical to note that reaching the target is only the first step in maintaining this fishery. In order for the red drum stock to be considered healthy and viable, the 40% static spawning potential ratio must be maintained continuously over time. Increases in the harvest rates (relaxation of current regulations) of red drum should only be allowed if those increases are not anticipated to lower the static SPR below the management goal (40%).

A new benchmark stock assessment capable of determining the overfished status was scheduled for completion in the fall of 2015. However, issues encountered in developing this new model framework and additional analysis requested by the ASMFC South Atlantic Board have delayed any finalized assessment results until at least the fall of 2016. The stock assessment results will be included as part of the upcoming formal review of the state red drum FMP.

STATUS OF THE FISHERY

Current Regulations

All harvest is limited to red drum between an 18-inch total length (TL) minimum size and 27-inch TL maximum size for both the recreational and commercial fishery. The recreational bag limit is one fish per day. A daily commercial bycatch allowance and an annual cap of 250,000 pounds, with payback of any overage, constrain the commercial harvest. The commercial annual cap is monitored from September 1 to August 31. Within a fishing year, 150,000 pounds is allocated to the period between September 1 and April 30 and the remainder is allocated to the period of May 1 to August 31. Check with the NCDMF for the most recent proclamation on red drum harvest limits including trip limits and bycatch requirements.

Commercial Landings

North Carolina's commercial landings in 2015 were 80,390 pounds; slightly below 2014 landings (90,647 pounds) and lower than the ten-year mean of 177,628 pounds (2006-2015; Table 1 and Figure 4). Gill nets dominated the catch in 2015 accounting for 93% of the commercial landings (Table 2).

Amendment 2 to the North Carolina Red Drum FMP maintained the 250,000-pound annual cap in the commercial fishery, but shifted the commercial fishing year to September 1 through August 31. Since that time, North Carolina's commercial landings during this fishing year have averaged 178,706 pounds. The 2009/2010 and 2013/2014 fishing years had overages (Table 3). All overages were deducted from the following year's cap allowance.

Recreational Landings

Recreational fishing activity is monitored through the Marine Recreational Information Program (MRIP). Recreational landings in 2015 were 154,496 pounds; below the 2006-2015 ten-year average (154,496 pounds) and a decrease from 2014 landings (596,447 pounds; Table 1 and Figure 4). Releases totaled 334,510 fish in 2015; below the average 576,307 fish from 2006-2015.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fishing activity is monitored through fishery dependent sampling conducted by the NCDMF since 1982. Data collected in this program allow the size and age distribution of red drum to be characterized by gear/fishery. Predominant fisheries for red drum include estuarine gill nets, long haul seine/swipe nets, pound nets, and beach haul seines. Over the past decade gill nets have been the dominant gear used for red drum accounting for >90% of the overall harvest. In 2015, 93% of the red drum harvest was taken in gill nets, followed by pound nets with 5% (Table 2). In all, 429 red drum, primarily from set gill nets, were measured from the commercial fishery in 2015 (Table 4). The average size was 23 inches fork length. Average size has varied little over time ranging from 21 to 23 inches fork length since 2006. With the 18 to 27-inch slot limit on harvest, nearly all landings were from age one and two-year-old fish.

Similar to the commercial fishery, average size varies little from year to year in the recreational fishery (Table 5). In 2015, the average size recreational fish harvested was 22 inches fork length. From 2006 to 2015 this range varied little (21 to 23 inches fork length).

Fishery-Independent Monitoring

The NCDMF has conducted a juvenile red drum seine survey on an annual basis since 1991. The seine survey provides an index of abundance for juvenile (age-0) red drum with sampling occurring from September through November. The relative abundance of juvenile red drum is highly variable with both high and low abundance occurring in recent years. In 2015, 586 juvenile red drum were taken in 120 seine samples for an overall state mean CPUE of 4.9 red drum per haul. The 2015 overall mean CPUE was higher than 2014 (2.3) and was slightly lower than the long term average of the survey of 5.5 (Table 6; Figure 5). Information gathered from this survey is currently used as an input parameter in the ASMFC Atlantic coast red drum stock assessment.

A fishery independent gill net survey was initiated by the NCDMF in May of 2001. The survey utilizes a stratified random sampling scheme designed to characterize the size and age distribution for key estuarine species in Pamlico Sound. By continuing a long-term database of age composition and developing an index of abundance for red drum this survey will help managers assess the red drum stocks without relying solely on commercial and recreational fishery dependent data. The overall red drum CPUE was 2.10 red drum per set in 2015, slightly below the time series average of 2.7 (Table 7; Figure 6). The survey is currently used in the ASMFC Atlantic coast red drum stock assessment as an annual index of relative abundance for age-1 and age-2 red drum.

North Carolina initiated an adult red drum longline survey in 2007 that has continued through 2015. The primary objective of the survey is to provide a fisheries independent index of abundance for adult red drum occurring in North Carolina. From July through October, a standardized, stratified random sample design is employed. A standard sample consists of 1,500 meters of mainline set with 100 gangions placed at 15 meter intervals (100 hooks/set). Soak times are approximately 30 minutes. All random sampling takes place in Pamlico Sound. During the 2015 season, 321 red drum were captured out of 72 stratified random sets (4.5 red drum per set) which is near the time series average of 5.1 red drum per set (Table 8; Figure 7). Red drum ranged from 31 to 48 inches fork length with most being >40 inches in length. Sampling is scheduled to continue in 2016 and this survey is currently being considered as an input in the pending ASMFC red drum stock assessment.

In order to describe the age structure of harvest and indices, red drum age structures are collected from various fishery independent (scientific surveys) and dependent (fisheries) sources throughout the year. In 2015, 428 red drum were collected ranging in age from 0 to 42 years (Table 9). The majority of red drum collected from harvest (18 to 27 inches total length) are ages 1-3.

MANAGEMENT STRATEGY

Red drum in North Carolina are managed under Amendment 1 to the North Carolina Red Drum FMP and Amendment 2 to the ASMFC Red Drum FMP. Both plans have an identical management threshold (overfishing) and management target (30% and 40% static Spawning Potential Ratio). Stock status is determined by a formal, peer reviewed stock assessment.

Amendment 2 to the ASMFC Red Drum FMP requires specific compliance criteria, including harvest restrictions designed to achieve the management target. Any changes to harvest that deviate from those options provided in this plan must be approved by the ASMFC South Atlantic Board. Amendment 1 to the North Carolina Red Drum FMP maintained measures for compliance and also implemented measures to reduce losses from discards in both the recreational and commercial fisheries (Table 10).

The current stock status is determined by the results of the 2009 assessment (SEDAR 18). Results of the 2009 assessment indicate that red drum in North Carolina are above the overfishing threshold and likely above the target static spawning potential ratio (Figure 1). A new stock assessment is currently underway and is slated for completion in November of 2016.

MANAGEMENT AND RESEARCH NEEDS

The following management and research needs are summarized from Amendment 1 to the North Carolina Red Drum FMP (status of need provided in parenthesis).

- Assess the size distribution of recreational discards (needed).
- Improved catch and effort data for the red drum recreational fishery, particularly for the fishery that occurs at night (needed).
- Development of independent surveys to monitor both the sub-adult and adult red drum populations. (ongoing through NCDMF gillnet and longline surveys).
- Continued life history studies for age and growth. Additional work needed to update maturity schedule and collect diet information specific to North Carolina (age and growth ongoing through NCDMF; ongoing diet work through NCSU, maturity work needed).
- Identification of spawning areas in North Carolina (studies conducted for Pamlico Sound, additional work needed).
- Characterize the adult recreational fishery with regard to tackle, geographic location, bait, water temperature, seasonality, hook types, etc. (needed).
- Obtain discard estimates from the commercial fisheries including information on size and disposition (ongoing through NCDMF observer program, recent expanded coverage).
- Collect data to determine the catch rates of red drum and targeted species with regard to distance from shore in the gill net fishery (needed, some data through Fishery Resource Grants and NCDMF Independent Gill Net Survey)
- Conduct a comprehensive study of gill net fishers including information on species targeted, gear characteristics and areas fished (needed, valuable ongoing data from fish house sampling and commercial observer program).
- Conduct studies to explore ways to reduce red drum regulatory discards with commercial gear while allowing the retention of targeted species (needed).
- Conduct additional research to determine the release mortality of red drum captured in gill nets (needed).
- Economic analysis of the adult red drum fishery (needed).
- Improved social and economic data collection on the recreational and commercial fishery, including information on current conflicts and potential for future conflicts in these fisheries (needed).
- Determine juvenile habitat preference and examine if recruitment is habitat limited (needed; study conducted by UNCW).
- Examine ecological use and importance of shell bottom to red drum (Needed; some work through CRFL by UNC).

- Identify coastal wetlands and other habitats utilized by juvenile red drum and assess relationship between changes in recruitment success and changes in habitat conditions (needed).
- Assess cumulative impact of large-scale beach nourishment and inlet dredging on red drum and other demersal fish that use the surf zone (needed).
- Determine location and significance of spawning aggregation sites throughout the coast (needed).
- Determine if navigational dredging between August and October significantly impacts spawning activity (needed).
- Determine if designation of spawning areas is needed, and if specific protective measures should be developed (needed).

FISHERY MANAGEMENT PLAN SCHEDULE RECOMMENDATIONS

The North Carolina Red Drum FMP was scheduled for review in 2014. However, a delay in this review was approved by the North Carolina Marine Fisheries Commission. This delay allows for consideration of an updated stock assessment for red drum. The stock assessment is being conducted by the ASMFC and is now slated for completion later in 2016. An important note is that there is a potential that the assessment results could prompt an initiation of a review of Amendment 2 to the ASMFC Red Drum FMP. Currently the North Carolina Red Drum FMP is scheduled to begin after completion of the ASMFC red drum stock assessment.

It is recommended that the review schedule for red drum be maintained.

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TABLES

Table 1. Red drum recreational harvest and number released (MRIP) and commercial harvest (North Carolina Trip Ticket Program) for 2006-2015. All weights are in pounds.

	Recreational				
	Numbers		Weight (lb)		
Year	Landed	# Released	Landed	Commercial Weight (lb)	Total Weight (lb)
2006	55,714	510,264	254,214	169,206	423,420
2007	66,789	416,352	310,715	243,658	554,373
2008	50,809	658,887	231,551	229,809	461,360
2009	57,543	429,776	288,958	200,296	489,254
2010	64,024	635,876	283,286	231,828	515,114
2011	45,143	207,697	212,245	91,980	304,225
2012	52,948	1,533,010	238,312	66,519	304,831
2013	164,218	654,030	676,050	371,949	1,047,999
2014	116,601	382,663	596,447	90,594	687,041
2015	36,170	327,593	186,040	80,390	266,430

Table 2. North Carolina's 2015 red drum commercial harvest (pounds and percent by gear) by gear type.

Gear	Landings (lb)	%
Long Haul/Seine Net	421	<1
Pound Net	4,186	5
Gill Net	74,712	93
Other Gears	1071	1
Total	80,390	100

Table 3. North Carolina's annual commercial harvest based on a fishing year beginning September 1 and ending August 31.

Fishing Year	Landings (lb)	Annual Cap
2008/2009	134,161	250,000
2009/2010	275,924	250,000
2010/2011*	126,185	224,142
2011/2012	94,298	250,000
2012/2013	134,372	250,000
2013/2014**	262,753	250,000
2014/2015	140,889	250,000

*adjusted to pay back overage in 2009/2010 fishing year
**2013/2014 overage has been deducted from 2014/2015 allowance

Table 4. Red drum length (FL, inches) data from commercial fish house samples, 2006-2015.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
2006	22	14	29	1,289
2007	22	16	31	1,502
2008	23	13	29	1,214
2009	22	14	35	1,168
2010	22	14	31	1,134
2011	22	17	31	647
2012	21	16	28	359
2013	21	12	27	1,677
2014	23	18	28	444
2015	23	17	28	429

Table 5. Red drum length (FL, inches) data from MRIP recreational samples, 2006-2015.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
2006	22	14	30	79
2007	22	17	27	71
2008	22	16	27	90
2009	23	18	28	136
2010	21	11	27	193
2011	22	17	29	147
2012	22	14	41	132
2013	21	17	28	333
2014	23	17	28	316
2015	22	14	27	95

Table 6. The annual juvenile (age-0) abundance index from the North Carolina Red Drum Juvenile Seine Survey for the period of 1991-2015. N=number of samples; CPUE=Catch per unit effort; SE=Standard Error; PSE=Proportional Standard Error.

Year	N	CPUE	SE	PSE
1991	105	15.12	2.18	14
1992	116	3.71	1.13	31
1993	117	12.65	2.22	18
1994	93	8.29	2.41	29
1995	119	4.61	0.72	16
1996	104	2.63	0.47	18
1997	126	13.13	3.07	23
1998	124	8.23	1.12	14
1999	98	1.84	0.41	23
2000	123	3.14	0.58	18
2001	122	0.97	0.19	19
2002	120	2.23	0.53	24
2003	120	5.01	1.23	25
2004	120	8.32	1.13	14
2005	120	9.02	1.40	16
2006	120	3.44	0.73	21
2007	119	5.46	1.52	28
2008	120	1.58	0.30	19
2009	120	1.89	0.66	35
2010	120	4.69	0.97	21
2011	116	10.82	3.28	30
2012	120	2.69	0.71	26
2013	120	1.11	0.30	27
2014	120	2.25	0.62	27
2015	120	4.88	1.04	21

Table 7. Annual weighted red drum CPUE (ages combined) from the North Carolina Pamlico Sound Independent Gill Net Survey, 2001-2015. N=number of samples; CPUE=Catch per unit effort; SE=Standard Error; PSE=Proportional Standard Error.

Year	N	CPUE	SE	PSE
2001	237	1.56	0.31	20
2002	320	3.22	0.43	13
2003	320	1.25	0.22	18
2004	320	1.99	0.29	14
2005	304	2.76	0.41	15
2006	320	2.91	0.34	12
2007	320	3.19	1.02	32
2008	320	2.31	0.34	15
2009	320	4.17	1.27	31
2010	320	2.42	0.32	13
2011	300	0.45	0.07	17
2012	308	3.13	0.59	19
2013	308	6.59	1.12	17
2014	308	3.14	0.38	12
2015	308	2.10	0.29	14

Table 8. Annual adult red drum CPUE (ages combined) from the North Carolina Longline Survey from 2007-2015. N=number of samples; CPUE=Catch per unit effort; SE=Standard Error; PSE=Proportional Standard Error.

Year	N	CPUE	SE	PSE
2007	71	5.68	0.92	16
2008	72	3.79	0.68	18
2009	70	5.97	1.08	18
2010	72	5.56	1.14	21
2011	72	5.64	1.00	18
2012	72	5.22	0.93	18
2013	72	4.94	0.78	16
2014	72	4.47	0.63	14
2015	72	4.46	0.74	17

Table 9. Summary of red drum age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources from 2006-2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	1	0	32	641
2007	1	0	43	495
2008	1	0	36	574
2009	1	0	40	644
2010	1	0	37	516
2011	1	0	38	256
2012	1	0	39	605
2013	1	0	41	721
2014	1	0	41	560
2015	1	0	42	428

Table 10. Management action taken as a result of Amendment 1 to the N.C. Red Drum FMP.

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Adult Harvest Limits	Status quo (no harvest over 27 inches TL)	1 & 2	No action required
Recreational Targeting of Adult Red Drum	It is unlawful to use any hook larger than 4/0 from July 1 through September 30 in the internal coastal fishing waters of Pamlico Sound and its tributaries south of the Albemarle Sound Management Area as defined in 15A NCAC 03R .0201 and north of a line beginning at a point 34° 59.7942' N - 76° 14.6514' W on Camp Point; running easterly to a point at 34° 58.7853' N - 76° 09.8922' W on Core Banks while using natural bait from 7:00 p.m. to 7:00 a.m. unless the terminal tackle consists of: A circle hook defined as a hook with the point of the hook directed perpendicularly back toward the shank, and with the barb either compressed or removed. A fixed sinker not less than two ounces in weight, secured not more than six inches from the fixed weight to the circle hook. (also continued education on fishing methods that minimize risk to fish)During July through September, unlawful to use J-hooks larger than 4/0 while fishing natural bait in Pamlico Sound and its tributaries, excluding the ASMA and Core Sound, south (also continued education on fishing methods that minimize risk to fish)	1, 2 & 5	Rule change 3J .0306

Recreational Bag and Size Limits	Status quo (one fish per day between 18 and 27 inches TL)	1, 2 & 4	No action required
Commercial Limits	Trip Limit and Bycatch Provision Status quo (7 fish trip limit with 50% bycatch provision). Director retains authority to modify trip limit and bycatch provision as needed. Allow the possession of up to 3 fish while engaged in fishing without requiring that they be subject to the bycatch provision. Upon landing/sale all red drum possessed would be subject to bycatch provision. Commercial Cap Continue 250,000 lb annual cap monitored from September 1 to August 31. Implement a split season on the annual commercial cap, capping the period of September 1 to April 30 at 150,000 lb and conserving the remaining portion of the cap for the period of May 1 to August 31. Unused cap in period one would be available for period two. Any annual commercial harvest limit that is exceeded one year will result in the poundage overage being deducted from the subsequent year's commercial harvest limit.	1, 2, 4 & 5	New proclamation Rule Change 3M .0501
Estuarine Gill Net Discarded Bycatch of Red Drum	Small Mesh Attendance (<5" stretch mesh) Year-round Attendance Expand year-round attendance within 200 yards of shore to include the area of the lower Neuse out to the mouth of the river. Seasonal Attendance 1) Modify the seasonal attendance requirements for small mesh gill nets (currently May 1 to October 31) to include the period of May 1 through November 30 in the following locations: a) All primary and permanent secondary nursery areas and modified no-trawl areas b) Within 200 yards of any shoreline for the areas of Pamlico, Pungo, Neuse and Bay Rivers and bays	1, 2, & 5	Rule change 3R .0112 Rule change 3J .0103 & 3R .0112

Estuarine Gill Net Discarded Bycatch of Red Drum	c) Within 50 yards of any shoreline in the areas of Pamlico and Core Sound south to the NC/SC line d) Area Core Sound and south is excluded from 50 yard shoreline attendance requirement during October and November Modification to current small mesh seasonal attendance area along the Outer Banks (i.e. modified no-trawl area) Modify attendance area between Rodanthe and Gull Island to straighten out line and allow for non-attended nets in area of deeper water Modify the current attendance line in the area of Oliver Reef, near Hatteras to allow for non-attended nets in area of deeper water. Large Mesh (>5" stretch mesh) Require all unattended large mesh gill nets to be set a minimum of 10 feet from any shoreline from June through October	1, 2, & 5	Rule change 3R .0112 Rule change 3J .0103
The use of gigs, gaffs or spears to take red drum.	Continue to prohibit and move Proclamation FF-40-2001 into rule	1 & 2	Rule change 3M .0501

FIGURES

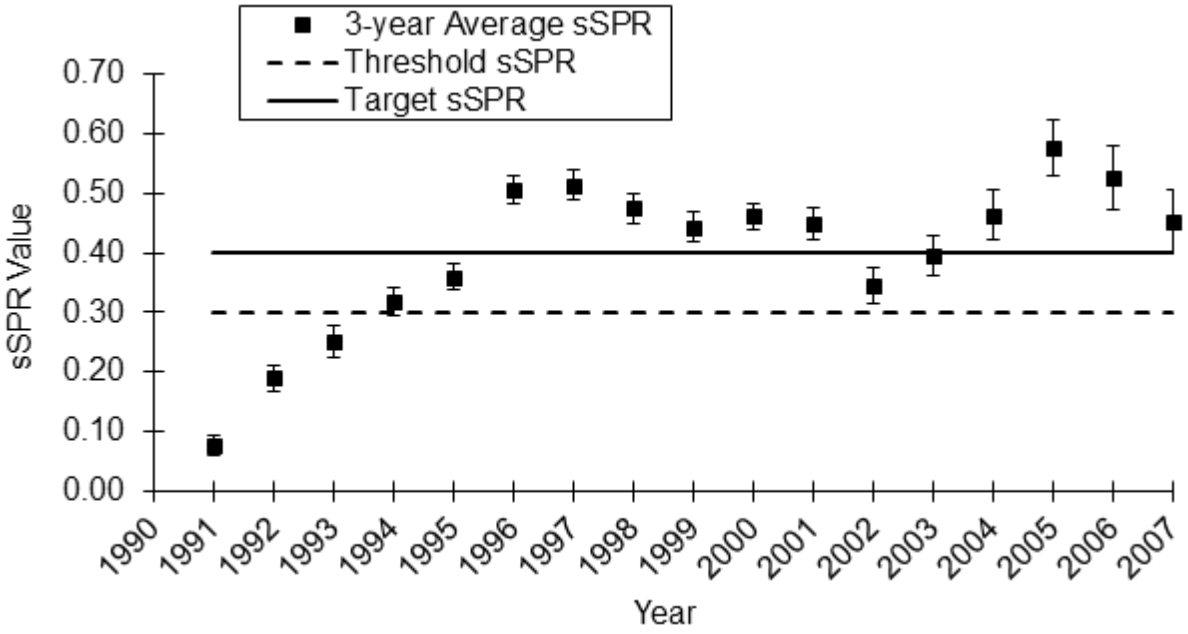

Figure 1. Northern region (North Carolina north) estimates of three-year average static spawning potential ratios. Three-year average include current and previous two year's sSPR estimates. The dashed line shows the 30% overfishing threshold and the solid line shows the 40% target sSPR.

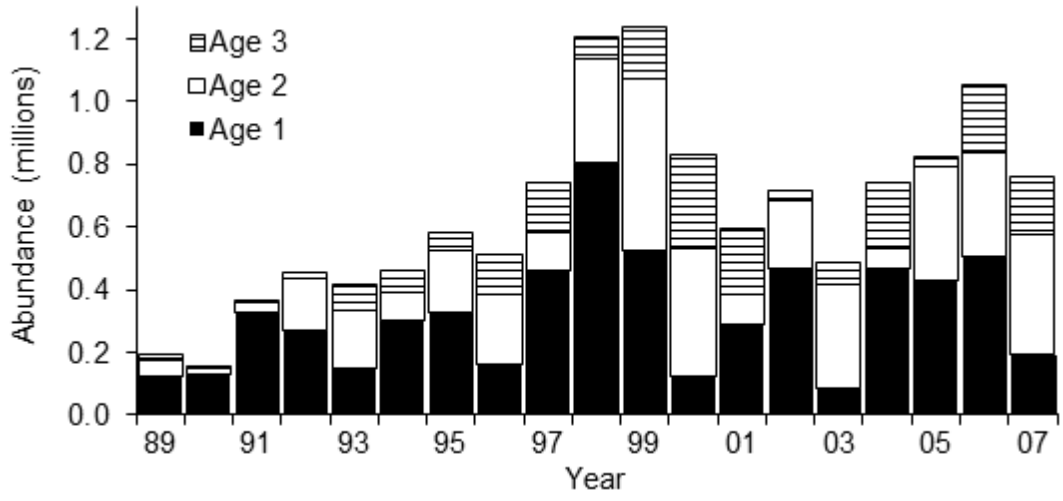

Figure 2. Estimates of abundance of red drum ages 1-3 in the northern region (North Carolina and north) during 1989-2007 (Source: SAFMC 2009).

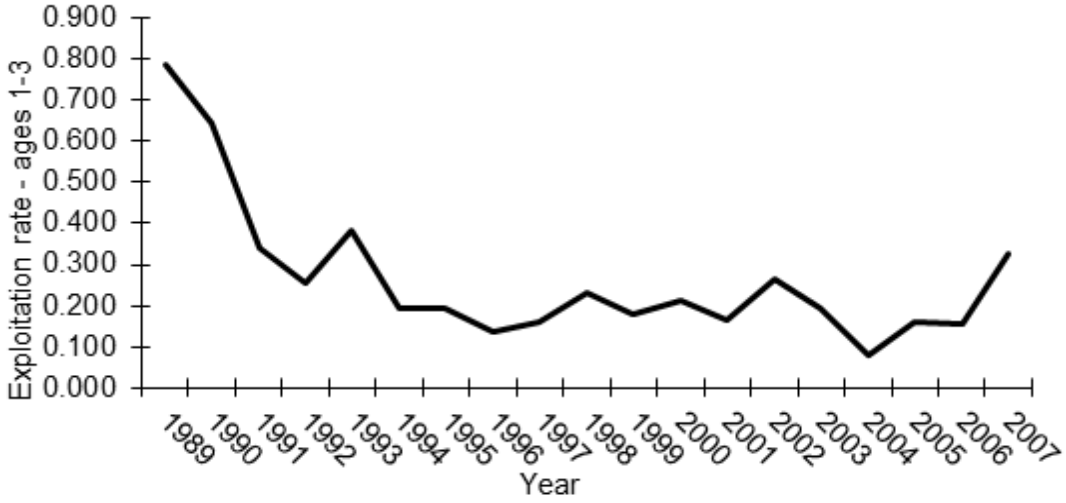

Figure 3. Estimated annual exploitation rate for red drum ages 1-3 in the northern region (North Carolina and north) during 1989-2007 (Source: SAFMC 2009).

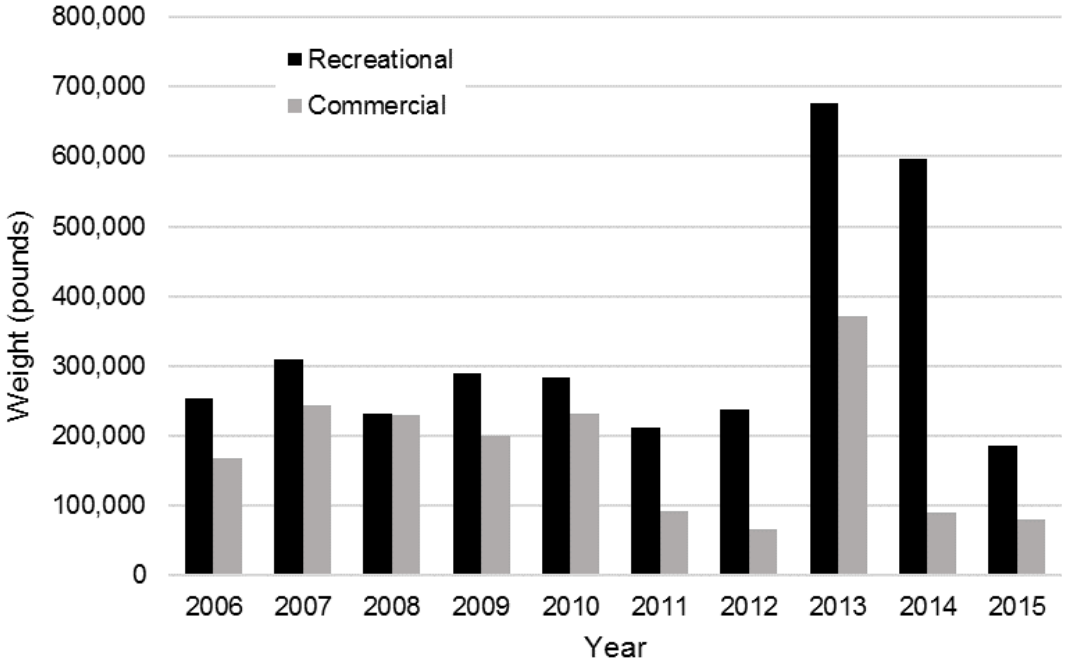

Figure 4. Annual commercial and recreational landings in pounds for red drum in North Carolina from 2005 to 2015.

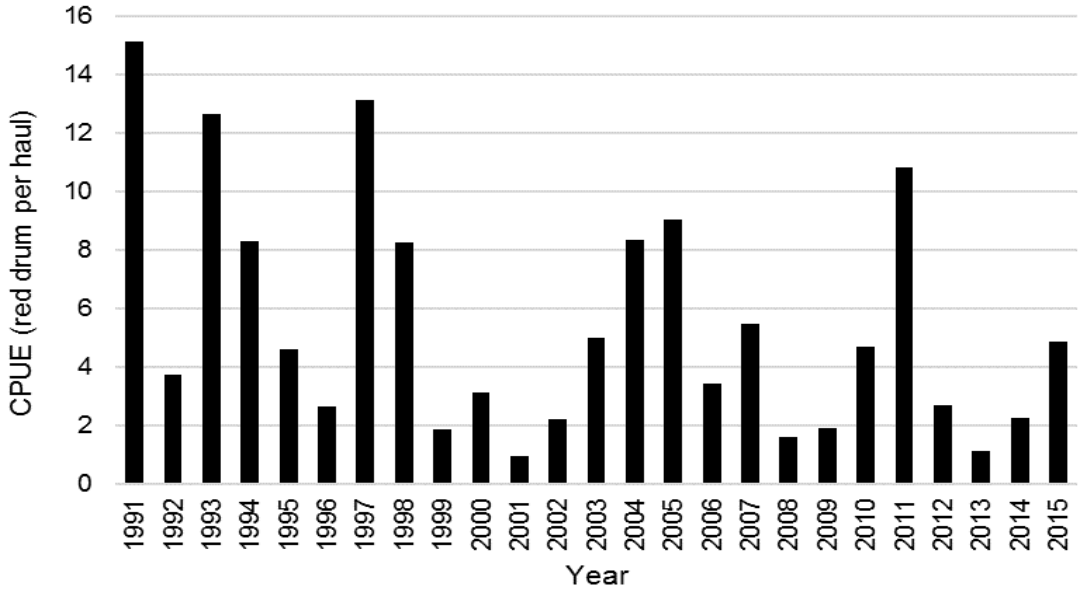

Figure 5. The annual juvenile (age-0) abundance index from the North Carolina Red Drum Juvenile Seine Survey for the period of 1991-2015.

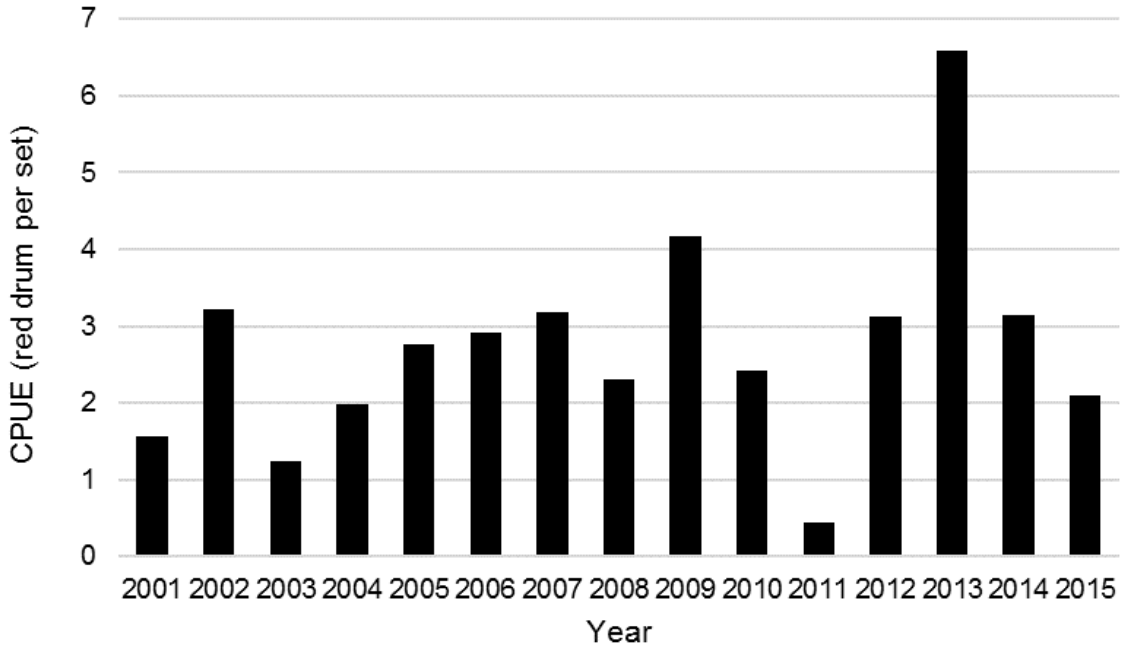

Figure 6. Annual weighted red drum CPUE (number captured ages combined) from the North Carolina Pamlico Sound Independent Gill Net Survey from 2001-2015.

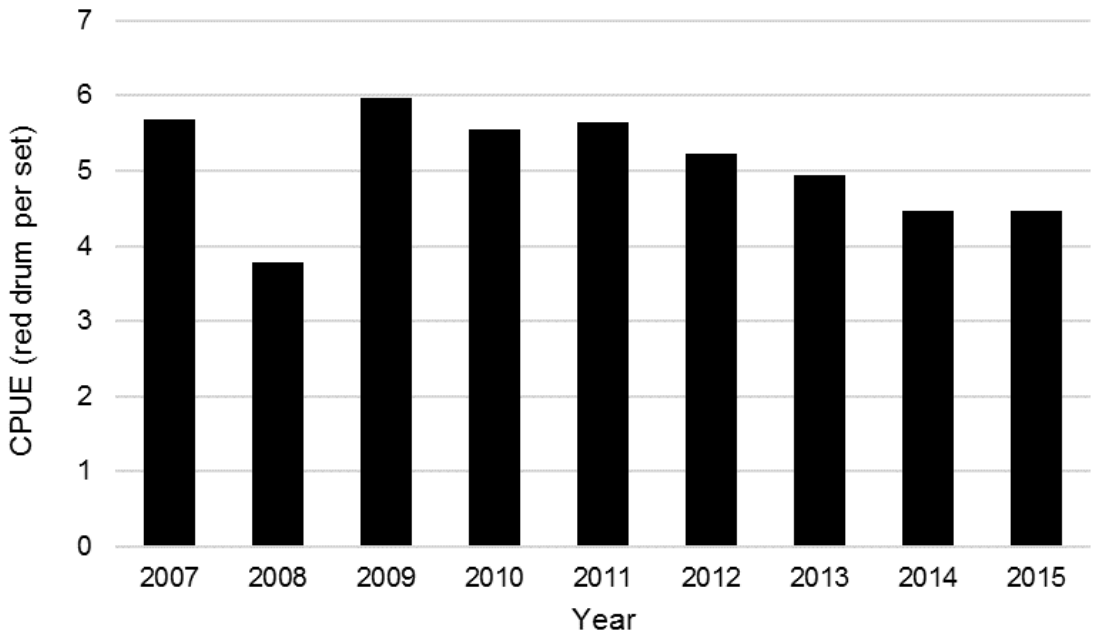

Figure 7. Annual adult red drum CPUE (number captured for ages combined) from the North Carolina Red Drum Longline Survey from 2007-2015.

FISHERY MANAGEMENT PLAN UPDATE
RIVER HERRING
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	February 2000
Amendments:	Amendment 2 – May 2015 Amendment 1 – September 2007
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	May 2025

Amendment 2 to the North Carolina River Herring Fishery Management Plan (FMP) was finalized with three issues: 1) eliminating the discretionary river herring harvest season and permit since it was not serving the intended purposes of providing biological data for stock analysis and local product; 2) moving the Albemarle Sound/Chowan River Herring Management Areas to 15A NCAC 03R .0202, which corrected a reference and corrected the boundary of the Cashie River Anadromous Fish Spawning Area, and 3) removing alewife and blueback herring from exceptions in the Mutilated Finfish Rule 15A NCAC 03M .0101.

Due to the Rules Review Committee receiving at least 10 letters requesting legislative review (pursuant to G.S. 150B), a portion of the third issue to prohibit possession of river herring (alewife and blueback herring) greater than six in aboard a vessel or while engaged in fishing from the shore or a pier underwent legislative review during the 2016 spring short session. Since a bill was not introduced specifically disapproving the rule, the rule will have an effective date of June 13, 2016.

Amendment 1 to the North Carolina River Herring FMP implemented a no-harvest provision for commercial and recreational fisheries of river herring in coastal waters of the state, effective in 2007. This was a result of the North Carolina Division of Marine Fisheries (NCDMF) 2005 stock assessment of river herring (data through 2003) that determined blueback herring and alewife were overfished and overfishing was occurring, there was minimal recruitment with continued declines for both species, and high fishing mortality rates. Additional management strategies included gear restrictions and stock recovery indicators. It also included a 7,500 lb limited research set-aside harvest to be used for data collection and to provide product to local herring festivals. The NCDMF Director allocated a maximum of 4,000 lb to be used for this research season, which occurred in the Chowan River Herring Management Area around Easter week each year.

Additional outcomes of Amendment I included implementing monitoring programs, endorsing additional research on predation, restoration, impediments, bycatch and supporting spawning area habitat protection.

The original North Carolina River Herring FMP focused on issues pertaining to stock conditions (overfished and recruitment overfishing), habitat degradations, and research/monitoring expansion to provide assessment data and socioeconomic data.

Management Unit

Blueback herring and alewife management authority lies with the Atlantic Coastal states and is coordinated through the Atlantic States Marine Fisheries Commission (ASMFC). Responsibility for management action in the Economic Exclusive Zone (EEZ), located from 3-200 miles from shore, lies with the Secretary of Commerce through the Atlantic Coastal Fisheries Cooperative Management Act in the absence of a federal FMP. The NCDMF also has an FMP in place for statewide management of river herring.

Goal and Objectives

The goal of Amendment 2 to the North Carolina River Herring FMP is to restore the long-term viability of the river herring population. To achieve this goal, the plan adopts the following objectives:

1. Identify and describe population attributes necessary to sustain long-term stock viability.

2. Protect, restore, and enhance spawning and nursery area habitats.

3. Initiate, enhance, and/or continue programs to collect and analyze biological, social, economic, fishery, and environmental data needed to effectively monitor and manage the river herring fishery.

4. Promote education and public information to help the public understand the causes and nature of problems in the river herring stocks, its habitats and fisheries, and the rationale for management efforts to solve these problems.

The goal of Amendment 2 to the ASMFC Interstate Fishery Management Plan for Shad and River Herring (River Herring Management) is to protect, enhance, and restore East Coast migratory spawning stocks of alewife and blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. To achieve this goal, the plan adopts the following objectives:

1. Prevent further declines in river herring (alewife and blueback herring) abundance.

2. Improve our understanding of bycatch mortality by collecting and analyzing bycatch data.

3. Increase our understanding of river herring fisheries, stock dynamics and population health through fishery-dependent and independent monitoring, in order to allow for evaluation of management performance.

4. Retain existing or more conservative regulations for American shad and hickory shad.

5. Promote improvements in degraded or historic alosine critical habitat throughout the species' range.

STATUS OF THE STOCK

Stock Status

The ASMFC completed a stock assessment on river herring in 2012 (ASMFC 2012), including data through 2009 (See Section 15, Appendix 15.3). The coast-wide assessment found river herring to be depleted throughout their range. The North Carolina portion of the stock assessment found that, although the stock was not experiencing overfishing, it remained overfished. The spawning stock biomass was less than 5% of the amount necessary for replacement and due to the biology of the species, significant improvements would not be likely within such a short time frame.

Stock Assessment

The North Carolina stock assessment (2005) used a forward-projecting, age-structured statistical catch-at-age model for the Chowan River blueback herring stock. This stock assessment was constructed for river herring and used to estimate the population sex-specific numbers-at-age, exploitation rates, and annual recruitment of age-3 fish during 1972-2009 using four data sources: total in-river catches, age and length compositions, a fisheries-independent young-of-year index, and assumed rates of age and sex-specific natural mortality. Biological samples for sex, age, and length data were collected from fishery landings, and natural mortality values were estimated using average weight at age and the Lorenzen (1996) method. Only ages 3 through 8+ were represented in the model because these are the only ages caught by the fishery and therefore the ages with the best data.

Three stock status indicators were adopted by the River Herring FMP plan development team, each based on a three-year moving average. The plan development team recommended using the first two stock status indicators (juvenile abundance and repeat spawners) as a trigger for doing a stock assessment earlier than ten years. If a three-year moving average of each of the indicators was above the threshold, it would trigger the need for a new stock assessment, which would determine the third stock status indicator.

1. Catch per unit effort (CPUE) of 60 young-of-the-year per haul in the Albemarle Sound juvenile abundance survey
2. Ten percent repeat spawners observed in fishery-dependent pound net samples
3. Spawning stock biomass (SSB) of 30% unfished SSB, estimated in stock assessment model.

STATUS OF THE FISHERY

Current Regulations

In 2007, Amendment 1 to the North Carolina River Herring FMP implemented a no-harvest provision for commercial and recreational fisheries of river herring in coastal waters. The North Carolina River Herring FMP Amendment 2, adopted by the North Carolina Marine Fisheries Commission (NCMFC) in May 2015, eliminated the discretionary river herring harvest season

and permit, removed alewife and blueback herring from exceptions in the Mutilated Finfish Rule, and prohibited the possession of river herring (alewife and blueback herring) greater than six in aboard a vessel or while engaged in fishing from the shore or a pier.

Commercial Landings

Since Amendment 1 implemented a no-harvest provision the landings figure below (Figure 1) contains data only through 2006. Table 1 includes information on landings data from 2007 through 2015 when the discretionary harvest season was prosecuted.

Recreational Landings

There is currently no recreational fishery for river herring per the no harvest provision outlined in Amendment 1. Formerly, most river herring caught recreationally were likely used for personal consumption or for bait. For the years leading up to the 2007 harvest closure, the extent of river herring harvest for personal consumption in coastal North Carolina is unknown.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fishing activity is monitored through fishery dependent sampling conducted by the NCDMF since 1982. The dominant gears for river herring were gill nets and pound nets. In 2007, the no-harvest provision restricted commercial landings. However, the Chowan River Pound Net survey was implemented in 2008 to provide estimates of catch-per-unit effort (CPUE), percent of repeat spawners, and age and sex data for alewife and blueback herring. Tables 2 and 3 describe the mean, minimum and maximum length data for the last ten years.

Due to a position vacancy since October of 2015, blueback and alewife herring ageing is incomplete therefore tables 4 and 5 as well as figure 2 have not been updated to reflect 2015 data.

Table 4 and 5 describe the modal age, minimum and maximum age, and total number aged from this survey. Total pound net effort, total river herring catch, and CPUE for the Chowan River Pound Net Survey (Table 6) shows a downward trend through 2012 followed by an increasing trend through 2014.

According to the stock status indicators in order to restore the long-term viability of the river herring population, the stock status indicator objective is to see 10% repeat spawners (blueback herring only) observed in the Chowan River Pound Net Survey. Figure 2 shows the current ten-year average of repeat spawners to be 3.3%, with the last three years (2012-2014) falling below that average.

Fishery-Independent Monitoring

River herring are monitored regularly in several of the division’s fishery independent monitoring programs, including Program 100 (Juvenile Anadromous Independent Fishery), Program 135 (Striped Bass Independent Gill Net Survey), Program 150 (Adult Anadromous Spawning Area Survey), and Program 160 (Anadromous Egg and Larval Survey).

Due to a position vacancy since October of 2015, blueback and alewife herring ageing is incomplete therefore tables 7 and 8 have not been updated to reflect 2015 data. Tables 7 and 8 show the modal, minimum, and maximum age for alewife and blueback from 2005 to 2014.

Data from Program 100 is used to annually calculate the juvenile abundance index (JAI) for blueback herring. The first of the stock status indices, it involves a CPUE of 60 young-of-the-year blueback herring for three consistent years in the Program 100 survey. The average JAI for the last ten years is 2.6, well below the needed stock status indicator requirements (Figure 3).

MANAGEMENT STRATEGY

River herring are currently monitored using the three stock status indicators based on blueback herring:

1. Catch per unit effort (CPUE) of 60 young-of-the-year in the Albemarle Sound juvenile abundance survey.
2. Ten percent repeat spawners observed in the Chowan River Pound Net Survey.
3. Spawning stock biomass (SSB) of 30% unfished SSB, estimated in stock assessment model.

Collectively, these indices represent *minimal* stock rebuilding goals for the recovery of river herring stocks in the Albemarle Sound and Chowan River. In the 2012 stock assessment ASMFC recommended a ten-year interval between stock assessments (ASMFC 2012). The plan development team recommended using the first two stock status indicators (juvenile abundance and repeat spawners) as a trigger for doing a stock assessment earlier than ten years. If a three-year moving average of each of the indicators was above the threshold, it would trigger the need for a new stock assessment, which would determine the third stock status indicator.

Currently the first two indicators are well below the threshold that would trigger a stock assessment which is needed to evaluate the third indicator. The spawning stock biomass was less than 5% of the amount necessary for replacement. Due to the biology of the species, significant improvements would not be likely within such a short time frame.

MANAGEMENT AND RESEARCH NEEDS

Included is a list of the management and research recommendations identified in the current FMP (Amendment 2) and the priority and status of each.

Life History

- Conduct studies of river herring egg and larval survival and development in North Carolina river systems. **High priority**
- Conduct research on predation of all life stages of river herring in the Albemarle Sound and other systems in North Carolina (including invasive species such as blue catfish and other predators). **Medium priority**
- Conduct studies on energetics of feeding and spawning migrations of river herring in North Carolina. **Medium priority**

Stock Status

- Estimate bycatch and discard mortality of river herring captured incidentally in Atlantic Ocean fisheries coastwide. **High priority**
- Estimate bycatch and discard mortality of river herring captured incidentally in inside fisheries. **Medium priority**

Environmental Factors

Water Quality Recommendations

- Evaluate effects of existing and future water withdrawals on water quality, quantity and fisheries habitat in coastal watersheds. NCDCM and NCWRC review and comment on water withdrawals and their effect on fisheries and habitat. **High priority**
- Determine if contaminants are present and identify those that are potentially detrimental to various life history stages of river herring. Long term water quality monitoring devices have been maintained and deployed to identify shifts or swings in water quality in multiple tributaries in the Albemarle Sound area. **High priority**
- Evaluate the impacts/effects of reverse osmosis (RO) plants on receiving waters and aquatic resources. NCDCM and NCWRC provide comments on permit applications for RO plants; some work by universities to evaluate effects of RO plants in local river systems. **Low priority**

Obstruction Recommendations

- Identify all man-made physical obstructions to river herring migrations (update Collier and Odom project) and prioritize impediments for removal /replacement after identification. The NCDMF has surveyed culverts in the Chowan River area and developed a priority list for replacement or repair. This information will be used by a paid graduate student to investigate fish friendly culverts. **High priority**
- Identify research needs regarding impediments to river herring migration**. High priority**

Impingement and Entrainment Recommendations

- Research is needed to determine the fate of river herring eggs, larvae and juveniles that are impinged, and then released through screen cleaning operations. **Low priority**

Climate change

- The specific effects of climate change, including warming water, increased drought severity, and loss of flood plain spawning habitat should be further investigated. **Low priority**

FISHERY MANAGEMENT PLAN SCHEDULE RECOMMENDATION

Pertaining to the current FMP schedule, the plan development team recommended using the first two stock status indicators (juvenile abundance and repeat spawners) as a trigger for doing a stock assessment earlier than ten years. If a three-year moving average of each of the

indicators was above the threshold, it would trigger the need for a new stock assessment, which would determine the third stock status indicator.

It is recommended the review schedule for river herring remain the same.

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TABLES

Table 1. Harvest landings and value of discretionary river herring harvest season in North Carolina, 2007-2015.

Year	# of Permits Issued	Quota (lb/permit/period)	Harvest (lb)	Value ($)
2007	15	200	1,103	856
2008	13	250	1,292	775
2009	27	125	643	836
2010	30	125	1,765	1,765
2011	23	150	1,611	1,611
2012	18	150	678	678
2013	12	150	743	743
2014	27	150	989	1,319
2015*	--	--	--	--

*Discretionary harvest season eliminated with Amendment 2 to the River Herring FMP.

Table 2. Blueback herring mean, minimum and maximum length data from 2005-2015 from dependent sampling surveys.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2005	226	196	275	305
2006	225	196	257	156
2007	228	195	276	231
2008*	225	191	279	928
2009*	225	198	267	546
2010*	224	192	260	833
2011*	229	190	264	500
2012*	229	180	265	412
2013*	229	196	276	492
2014*	217	191	260	691
2015*	225	198	274	589

*2008 a no-harvest provision went into effect and the Chowan River Pound Net survey began

Table 3. Alewife mean, minimum and maximum length data from 2005-2015 from dependent sampling surveys.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2005	244	200	286	539
2006	242	198	311	553
2007	229	196	278	45
2008*	227	190	287	1872
2009*	236	197	276	1000
2010*	241	203	282	822
2011*	247	201	283	806
2012*	248	190	286	641
2013*	234	196	330	854
2014*	234	202	295	1037
2015*	235	201	282	998

*2008 a no-harvest provision went into effect and the Chowan River Pound Net survey began

Table 4. Alewife ages from the dependent sampling surveys (2005-2014).

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	5	3	7	253
2006	4	3	7	260
2007	3	3	6	30
2008*	5	4	8	588
2009*	5	3	7	342
2010*	6	3	7	277
2011*	6	3	8	211
2012*	4	3	8	259
2013*	3	2	7	308
2014*	3	2	6	328

*samples from the Chowan River pound net survey

Table 5. Blueback ages from the dependent sampling surveys (2005-2014).

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	4	3	6	162
2006	4	3	5	86
2007	5	3	6	143
2008*	4	3	7	474
2009*	4	3	7	251
2010*	4	3	7	247
2011*	4	3	6	172
2012*	4	3	6	191
2013*	3	2	5	216
2014*	2	2	5	198

*samples from the Chowan River pound net survey

Table 6. Total pound net effort, catch and CPUE for the Chowan River Pound Net Survey 2009-2015.

Year	Total Effort (# of Active Sets)	Total RH (lbs)	Total CPUE
2009	217	89,245	411.27
2010	260	71,532	275.12
2011	286	74,485	260.44
2012	315	18,415	58.46
2013	238	27,396	115.11
2014	271	45,619	168.34
2015	253	49,560	195.89
Average	263	53,750	212.09

Table 7. Alewife ages from the independent sampling surveys.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	5	3	7	148
2006	5	3	7	284
2007	4	3	8	473
2008	5	3	7	428
2009	5	2	7	472
2010	6	3	8	490
2011	6	3	8	388
2012	5	3	7	181
2013	4	3	6	319
2014	4	3	7	361

Table 8. Blueback ages from the independent sampling surveys (2005-2014).

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	4	2	7	174
2006	5	3	7	213
2007	5	3	7	379
2008	4	2	7	254
2009	5	3	7	330
2010	4	3	6	127
2011	4	3	6	112
2012	5	3	6	69
2013	3	2	6	211
2014	3	2	5	320

FIGURES

Figure 1. Statewide NC Commercial River Herring Landings, 1950 - 2006.

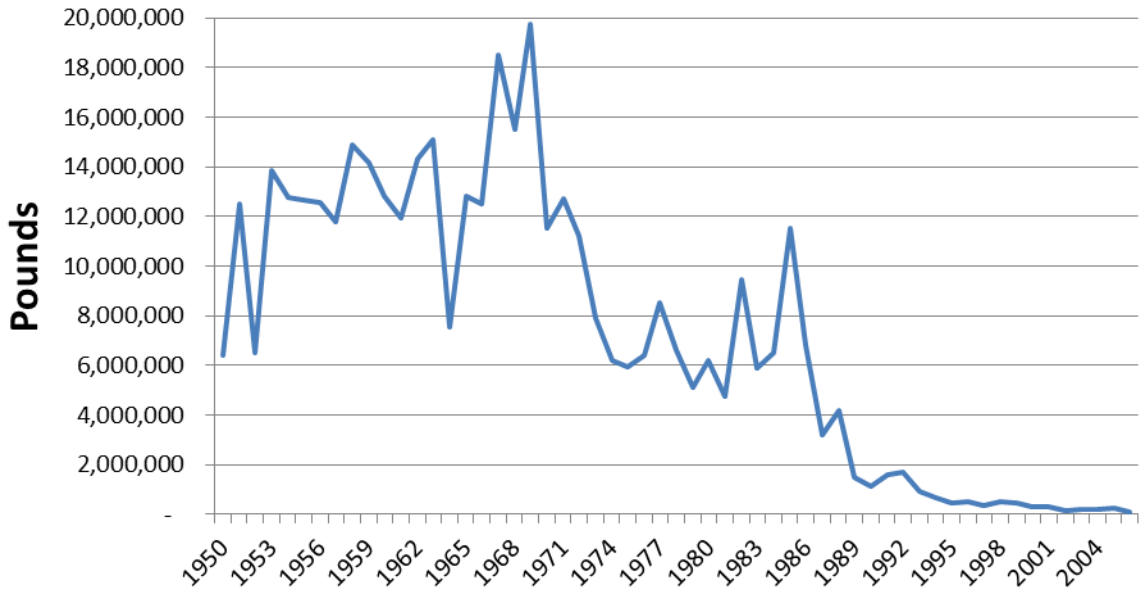


Figure 2. Percent of repeat spawners in the Chowan River Pound Net Survey, 2005-2014.

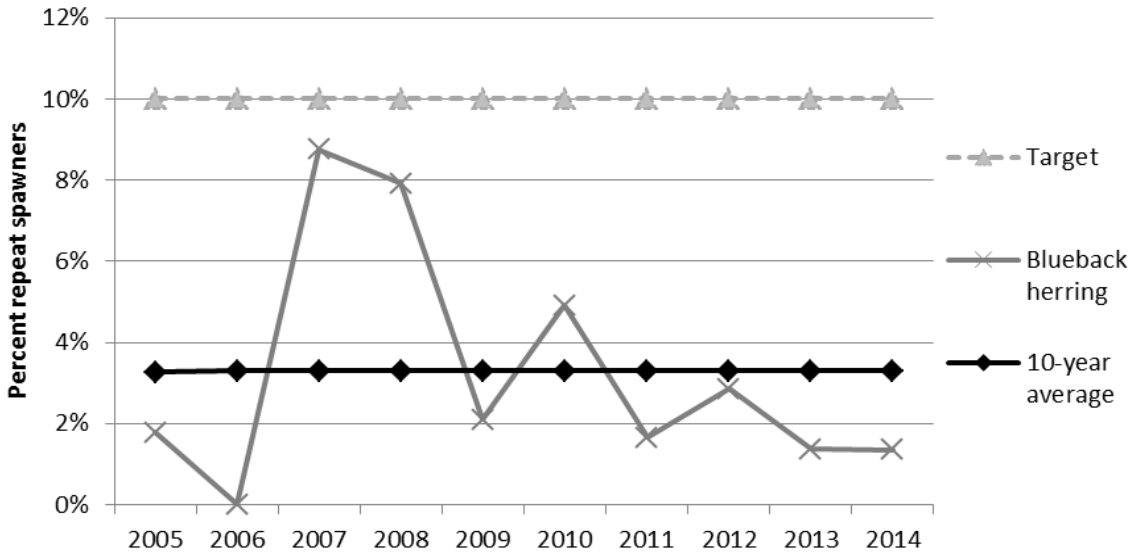
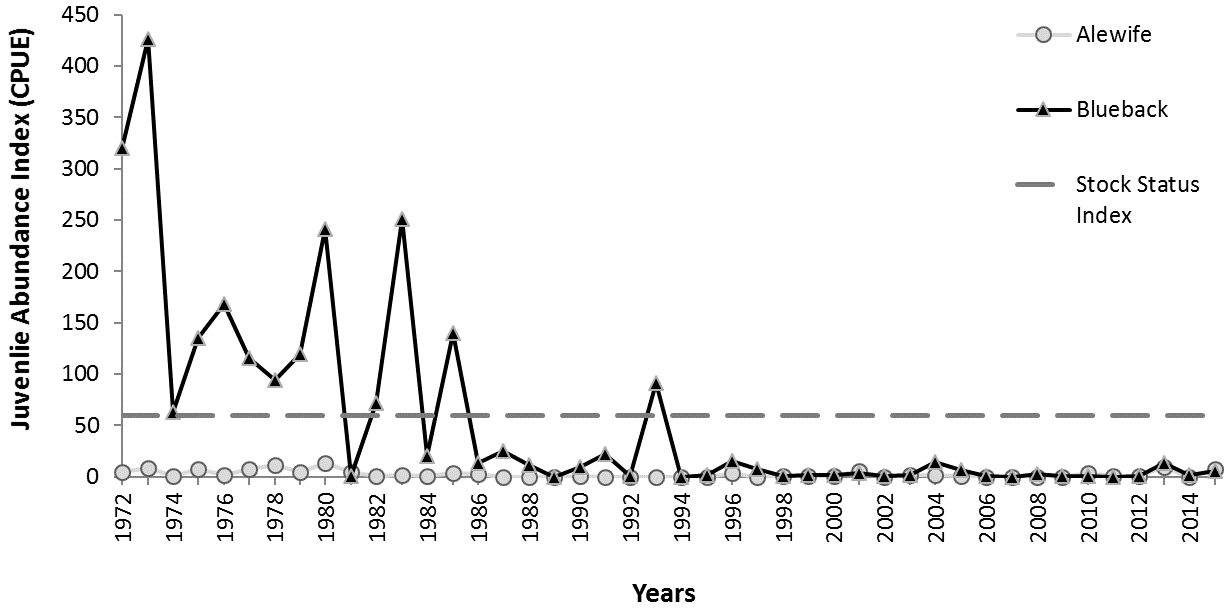


Figure 3. Blueback herring juvenile abundance index 1972-2015, North Carolina.



FISHERY MANAGEMENT PLAN UPDATE
SHRIMP
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	April, 2006
Amendments:	Amendment 1 – February 2015
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	July 2020

The N.C. Shrimp Fishery Management Plan (FMP) was approved in April 2006 by the N.C. Marine Fisheries Commission (NCMFC). The plan included a 90-foot headrope limit in some internal waters, allowed skimmer trawls as a Recreational Commercial Gear License (RCGL) gear and made recommendations on the minimum shrimp size at which some water bodies open to trawling. The plan also closed some areas in the state to protect habitats and juvenile finfish and established a 48-quart recreational limit. A restriction on the use of shrimp trawls above the Highway 172 Bridge over New River took effect in 2010 and this area above the bridge is now limited to skimmer trawls only. This strategy was codified into rule through Amendment 1.

Amendment 1 was adopted in February 2015 and was limited in scope to bycatch issues in the commercial and recreational fisheries. It recommended a wider range of certified bycatch reduction devices to choose from, and the requirement of two bycatch reduction devices in shrimp trawls and skimmer trawls beginning June 1, 2015 (SH-2-2015). It increased the daily harvest limit for cast nets in closed areas. Amendment 1 also established a maximum combined headrope length of 220 feet in all internal coastal waters where there is no existing maximum combined headrope requirements, allowing for a phase-out period until January 1, 2017. Shrimp trawling was also prohibited, effective May 1, 2015 in the Intracoastal Waterway channel from the Sunset Beach Bridge to the South Carolina line, including the Shallotte River, Eastern Channel and lower Calabash River, to protect small shrimp. An industry workgroup, as a management strategy through Amendment 1, is currently working to test gear modifications to reduce bycatch to the extent practicable with a 40 percent target reduction in the shrimp trawl fishery. Also as part of Amendment 1, the division was directed to establish a permitted live bait shrimp fishery and to develop guidelines and permit fees based on other states. The Marine Fisheries Commission further directed the division to allow live bait fishermen with a permit to fish until 12:00 p.m. (noon) on Saturdays; this issue will be prepared for the Marine Fisheries Commission's August 2016 business meeting to request approval of proposed rules to begin the rulemaking process.

Management Unit

The management unit includes the three major shrimp species of shrimp: brown (*Farfantepenaeus aztecus),* pink (*Farfantepenaeus duorarum*), and white (*Litopenaeus setiferus*) and its fisheries in all coastal fishing waters of North Carolina, which includes the Atlantic Ocean offshore to three miles.

Goal and Objectives

The goal of the N.C. Shrimp Fishery Management Plan is to utilize a management strategy that provides adequate resource protection, optimizes the long-term commercial harvest, maximizes social and economic value, provides sufficient opportunity for recreational shrimpers, and considers the needs of all user groups. To achieve this goal, it is recommended that the following objectives be met:

1. Minimize waste and enhance economic value of the shrimp resource by promoting more effective harvesting practices.

2. Minimize harvest of non-target species of finfish and crustaceans and protected, threatened, and endangered species.

3. Promote the protection, restoration, and enhancement of habitats and environmental quality necessary for enhancing the shrimp resource.

4. Maintain a clear distinction between conservation goals and allocation issues.

5. Reduce conflicts among and within user groups, including non-shrimping user groups and activities.

6. Encourage research and education to improve the understanding and management of the shrimp resource.

STATUS OF THE STOCK

Stock Status

Shrimp stocks of all three species in North Carolina are still considered viable. Population size is regulated by environmental conditions, and while fishing reduces the population size over the season, fishing is not believed to have any impact on subsequent year class strength unless the spawning stock has been reduced below a minimum threshold level by environmental conditions. Because of high fecundity and migratory behavior, the three species are all capable of rebounding from a very low population size in one year to a large population size in the next, provided environmental conditions are favorable.

Stock Assessment

Estimates of population size are not available but since the fishery is considered to be an annual crop and fished at near maximum levels, annual landings are probably a good indication of relative abundance. Annual variations in catch are presumed to be due to a combination of

prevailing environmental conditions, fishing effort, and the effects of changes in the economics of the fishery.

STATUS OF THE FISHERY

Current Regulations

General Rules

- Channel net is defined as a net used to take shrimp which is anchored or attached to the bottom at both ends or with one end anchored or attached to the bottom and the other end attached to a boat [15A NCAC 03I .0101 (3)(b)].
- Headrope is defined as a support structure for the mesh or webbing of a trawl that is nearest to the water surface when in use [15A NCAC 03I .0101 (3)(i)].
- Nursery areas are defined as areas in which for reasons such as food, cover, bottom type, salinity, temperature and other factors, young finfish and crustaceans spend the major portion of their initial growing season [15A NCAC 03I .0101 (4)(f)].
- Military danger zones and restricted areas are designated in 15A NCAC 3R .0102 and are enforced by the appropriate federal agency [15A NCAC 03I .0110 (a)].
- Maps or charts showing the boundaries of areas identified by rule or in proclamations are available for inspection [15A NCAC 03I .0121 (a)].
- The NCDMF shall mark boundaries with signs insofar as may be practical. No removal or relocation of signs shall have the effect of changing the classification or affect the applicability of any rule pertaining to that body of water [15A NCAC 03I .0121 (b)].

Rules Specific to Commercial Nets, Pots, Dredges, and Other Fishing Devices

- It is unlawful to use or set a fixed or stationary net in the Intracoastal Waterway where it may be a hazard to navigation, block more than two-thirds of any natural or manmade waterway, in the middle third of any marked navigation channel [15A NCAC 03J .0101 (1)(2)(3)].
- It is unlawful to possess aboard a vessel while using a trawl in internal waters more than 500 pounds of finfish from December 1 through February 28 and 1,000 pounds of finfish from March 1 through November 30 [15A NCAC 03J .0104 (a)].
- It is unlawful to use trawls nets in internal coastal waters from 9:00 p.m. on Friday through 5:00 p.m. on Sunday, except for the areas described in the next bullet [15A NCAC 03J .0104 (b) (1)].
- It is unlawful to use trawl nets from December 1 through February 28 from one hour after sunset to one hour before sunrise in portions of the Pungo, Pamlico, Bay, Neuse, and New rivers [15A NCAC 03J .0104 (b) (5)(A)(B)(C)(D)(E)].
- It is unlawful to use trawl nets in Albemarle Sound and its tributaries [15A NCAC 03J .0104 (b) (3)].
- The Director may by proclamation, require bycatch reduction devices or codend modifications in trawl nets to reduce the catch of finfish that do not meet size limits or are unmarketable as individual foodfish by reason of size [15A NCAC 03J .0104 (d)].
- It is unlawful to use trawl nets in designated pot areas opened to the use of pots by 15A NCAC 03J .0301(a)(2) within an area bound by the shoreline to the depth of six feet [15A NCAC 03J .0104 (6)].
- It is unlawful to use shrimp trawls for the taking of blue crabs in internal waters, except that

it shall be permissible to take or possess blue crabs incidental to commercial shrimp trawling provided that the weight of the crabs shall not exceed 50 percent of the total weight of the combined crab and shrimp catch; or 300 pounds, whichever is greater [15A NCAC 03J .0104 (f)(2)].

- It is unlawful to use shrimp trawls for recreational purposes unless the trawl is marked with a pink buoy on the tailbag [15A NCAC 03J .0104 (e)].
- The Fisheries Director may, by proclamation, close any area to trawling for specific time periods in order to secure compliance with this rule [15A NCAC 03J .0104 (g)].
- It is unlawful to use a channel net until the Director specifies by proclamation when and where channel nets and other fixed nets for shrimping can be used [15A NCAC 03J .0106 (a)(1)].
- It is unlawful to set a channel net without yellow light reflective tape on the staffs, stakes and buoys [15A NCAC 03J .0106 (a)(2)].
- Channel nets cannot be set with any portion of the set within 50 feet of the center line of the Intracoastal Waterway (ICW) channel or in the middle third of any navigation channel marked by the Corps of Engineers or the Coast Guard. Fishermen must attend channel nets by being no more than 50 yards from the set at all times [15A NCAC 03J .0106 (a)(3)(4)(5)].
- The maximum corkline length of a channel net that can be used or possessed is 40 yards. No channel net, net buoys or stakes can be left in coastal waters from December 1 through March 1. From March 2 through November 30, cables and any attached buoy must be connected together with non-metal line when not attached to the net. Metallic floats or buoys to mark sets are unlawful [15A NCAC 03J .0106 (b)(c)(d)(e)].
- Channel nets must be properly marked with yellow light reflective tape and the owner's identification on each buoy. Identification includes one of the following: owner's NC motorboat registration number or the U.S. vessel documentation number or owner's last name and initials. Channel nets, anchor lines or buoys are not to be used in any way that constitutes a hazard to navigation [15A NCAC 03J .0106 (f) and (g)].
- It is unlawful to use channel nets to take blue crabs in internal waters, except that it shall be permissible to take or possess blue crabs incidental to channel net operations provided that the weight of the crabs does not exceed 50% of the total weight of crab and shrimp or 300 lb whichever is greater [15A NCAC 03J .0106 (h)(1)(A)(B)].
- The Director may, by proclamation, close any area to channel net use for specific time periods in order to secure compliance with the above bullet [15A NCAC 03J .0106 (h)(2)].
- It is unlawful to use nets from June 15 through August 15 in the waters of Masonboro Inlet or in the ocean within 300 yards of the beach between Masonboro Inlet and a line running 138° through the water tank on the northern end of Wrightsville Beach, a distance parallel with the beach of 4,400 yards. It is unlawful to use trawls within one-half mile of the beach between the Virginia line and Oregon Inlet [15A NCAC 03J. 0202 (1)(2)].
- It is unlawful to use a trawl with a mesh length less than four inches in the body and three inches in the extension and on and three-fourths inches in the cod end or tail bag from the west side of Beaufort Inlet Channel to the shore off Salter Path within a half mile of shore [15A NCAC 03J .0202 (3)].
- From December 1 through March 31 it is unlawful to possess finfish caught incidental to shrimp and crab trawling in the Atlantic Ocean unless the weight of the combined catch of shrimp and crabs exceeds the weight of finfish; except that crab trawlers working south of Bogue Inlet may keep up to 300 pounds of kingfish, regardless of their shrimp or crab catch weight [15A NCAC 03J .0202 (5)].
- It is unlawful to use shrimp trawls in all waters west of a line beginning at the southeastern tip of Baldhead Island at a point 33^0 50.4833'N – 77^0 57.4667 W; running southerly in the

Atlantic Ocean to a point 33^0 46.2667'N – 77^0 56.4000 W from 9:00 PM through 5:00 AM [15A NCAC 03J .0202 (8)].

- It is unlawful to use trawl nets upstream of the Highway 172 Bridge in New River from 9:00 p.m. through 5:00 a.m. when opened by proclamation from August 15 through November 30 (15A NCAC 03J .0208).
- It is unlawful to use any commercial fishing gear in the Southport Boat Harbor, Brunswick County and to use any commercial fishing gear in the Progress Energy Intake Canal between the fish diversion screen and the Brunswick nuclear power plant (15A NCAC 3J .0206, 15A NCAC 03J .0207).
- It is unlawful to use shrimp pots with mesh lengths smaller than one and one-fourth inches stretch or five-eighths inch bar [15A NCAC 03J .0301(e)].
- It is unlawful to use pots with leads or leaders to take shrimp. Leads are defined as any fixed or stationary net or device used to direct fish into any gear [15A NCAC 03J .0301(l)].
- In Dare County commercial fishing gear may not be used within 750 feet of licensed fishing piers when opened to the public. Commercial fishing gear may not be used in the Atlantic Ocean off of portions of Onslow, Pender, and New Hanover counties during specified time frames [15A NCAC 03J .0402(a)(1)(A)(ii)(2)(A)(B)(i)(ii)(3)(A)(B)(i)(iii)(4)].
- Shrimp pound net set is defined as a pound net set constructed of stretch mesh equal to or greater than one and one-fourth inches and less than or equal to two inches [15A NCAC 03J .0501(a)(6)].
- A permit is required to deploy a pound net set and must be operational for a minimum of 30 consecutive days during the permit period. Each pound required the permittee's identification on a sign attached to a stake at the permitted ends of each set at all times. They must have yellow light reflective tape or yellow light reflective devices on each pound and have a marked navigational opening at least 25 feet wide at the end of every third pound and marked with yellow light reflective tape or yellow light reflective devices [15A NCAC 03J .0501 (b)(c)].
- It is unlawful to use a RCGL shrimp pound net unless it is marked by attaching to the offshore lead, one hot pink floating buoy. The owner shall be identified on the buoy by engraving the gear owner's current boat registration number or the owners US vessel documentation name. Each shrimp pound must be set a minimum of 100 yards from a RCGL pound net set or 300 yards from an operational permitted shrimp pound net set [15A NCAC 03J .0501(d)(1)(2)].
- It is unlawful within 30 days of abandonment of a permitted pound net set to fail to remove all stakes and associated gear from coastal fishing waters [15A NCAC 03J .0501(g)].
- Pound net permit applications, renewals and transfers are to comply with the permitting procedures and requirements for obtaining all NCDMF-issued permits. Application process, criteria for the granting of the permit, operational requirements and other elements of the shrimp pound net set permits are found in 15A NCAC 03J .0502, 15A NCAC 03J .0503, 15A NCAC 03J .0504 and 15A NCAC 03J .0505.

Rules Specific to Shrimp

- It is unlawful to take shrimp with nets until the Director opens the season in various waters by proclamation (15A NCAC 03L .0101).

Proclamations may specify any hours of day or night or both and any other conditions appropriate to manage the fishery. Some areas never open to shrimping, some areas are open year round, and some areas open and close throughout the year dependent upon shrimp movement and their size. Open areas to trawling are considered the shrimp open areas for all

other gears including cast nets. All proclamations beginning with SH identify the open and closed areas and are found here throughout the year: http://portal.ncdenr.org/web/mf/2014-proclamation-archives.

- It is unlawful to take shrimp by any method from 9:00 PM on Friday through 5:00 p.m. on Sunday except in the Atlantic Ocean or with the use of fixed and channel nets, hand seines, shrimp pots and cast nets [15A NCAC 03L .0102 (1)(2)].
- It is unlawful to take shrimp with mesh lengths less than one and one-half inches in trawls, one and one-fourth inches in fixed nets, channel nets, float nets, butterfly nets and hand seines [15A NCAC 03L .0103)(a)(1)(2].
- It is unlawful to take shrimp with a net constructed in a manner as to contain an inner our outer liner of any mesh size. Net material used as chafing gear shall be no less than four inches mesh length [15A NCAC 03L .0103) (b)].
- It is unlawful to take shrimp with trawls which have a combined headrope of greater than 90 feet in internal coastal waters except in Pamlico Sound, Pamlico River downstream of Pamlico Point/ Willow Point and Neuse River downstream of Winthrop Point/Windmill Point [15A NCAC 03L .0103)(c)(1)(2)(3)].
- It is unlawful to use a shrimp trawl in the Pungo River, upstream of Wades Point/Abel Bay, Pamlico River upstream of the entrance to Goose Creek/Wades Point and Neuse River upstream of Cherry Point/Wilkerson Point 15A [NCAC 03L .0103)(d)].
- It is unlawful to possess more than 48 quarts, heads-on or 30 quarts heads-off of shrimp per person per day or per vessel per day for recreational purposes [15A NCAC 03L .0105)(1)].
- It is unlawful to take or possess shrimp taken from any area closed to the taking of shrimp except for 2 quarts per person per day may be taken with a cast net in a closed area [15A NCAC 03L .0105(2)].
- It is unlawful to use trawls in the crab spawning sanctuaries from March 1 through August 31 [15A NCAC 03L .0205(a)].
- It is unlawful to use a trawl net in any primary or permanent secondary nursery area [15A NCAC 3N .0104, 3N .0105 (a)].
- Special secondary nursery areas may be opened to shrimp and crab trawling from August 16 through May 14 [15A NCAC 3N .0105(b)].

Special secondary nursery areas open by proclamation and vary in their open time periods within the August 16th through May 14th window. They are opened once the finfish amount has declined to reduce bycatch.

Recreational Licenses and Limits

- RCGL gear includes one shrimp trawl with a headrope not exceeding 26 feet in length per vessel, five shrimp pots, skimmer trawls, not exceeding 26 feet in total combined width and one shrimp pound net with each lead 10 feet or less in length and with a minimum lead net mesh of 1 ½ inches and enclosures constructed of net mesh of 1 ¼ inches or greater and with all dimensions being 36 inches or less. Attendance is required at all times for shrimp pounds [15A NCAC 03O .0302(a)(2)(3)(7)(8)].
- It is unlawful for a RCGL holder to use pots, including shrimp pots unless each pot is marked by attaching one hot pink floating buoy; the buoy should be engraved with the gear owners boat registration number or U.S. vessel documentation name [15A NCAC 03J .0302(a)(1)(2)].
- It is unlawful to possess more than 48 quarts, heads-on, or 30 quarts, heads-off, of shrimp

per person per day or per vessel per day [15A NCAC 03L .0105].

- It is unlawful to possess more than 48 quarts, heads-on, or 030 quarts, heads-off, of shrimp when only one person aboard a vessel possesses a valid RCGL and recreational commercial fishing equipment [15A NCAC 03O .0303(e)].
- It is unlawful to possess more than 96 quarts, heads on or 60 quarts, heads off of shrimp if more than one person aboard a vessel possesses a valid RCGL and recreational commercial fishing equipment [15A NCAC 03O .0303(f)].

Turtle Excluder Device Requirements

- It is unlawful to use a shrimp trawl that does not conform with the federal requirements for TEDs [15A NCAC 03L .0103)(g)].
- It is unlawful to trawl for shrimp in the Atlantic Ocean without TEDs within one nautical mile of shore from Browns Inlet to Rich's Inlet without a valid permit to waive the requirement to use TEDs in the Atlantic Ocean when allowed by proclamation from April 1 through November 30. It is unlawful to tow more than 55 minutes from April 1 through October 31 and 75 minutes from November 1 through November 30. It is unlawful to not fully empty the contents of each net after each tow. It is unlawful to refuse to take observers. It is unlawful to fail to report any sea turtle captured [15A NCAC 03O .0503 (d) (1)(2)(3)(4)(5)].

Federal Regulations

33 CFR 334.410 through 334.450
These rules designate prohibited and restricted military areas, including locations within North Carolina coastal fishing waters, and specify activities allowed in these areas.

50 CFR 223.206 - Exceptions to prohibitions relating to sea turtles.
The incidental taking of sea turtles in the shrimp trawl fishery is exempted from section 9 of the Endangered Species Act (ESA) if conservation regulations are followed and include the installation of NOAA Fisheries approved TEDs and alternative tow times for skimmer trawls, pusher-head trawls and butterfly trawls.

50 CFR 223.207 – Approved TEDs
This lists NOAA Fisheries approved TEDs such as the single-grid hard TEDs, hooped hard TEDs, special hard TEDs and soft TEDs, along with materials and gear specifications. Testing protocols for TEDs are also included in this rule.

50 CFR 229.7 – Monitoring of incidental mortalities
This requires that fishermen who participate in a Category I or II fishery are required to accommodate an observer onboard your vessel(s) up on request

50 CFR 622, Appendix D – Approved BRDs
This lists NOAA Fisheries approved BRDs and provides technical specifications for the construction and subsequent legal enforcement of these BRDs.

Rules implemented in Amendment 1 to the N.C. Shrimp Fishery Management Plan on May 1, 2015

- Modify the definition of mesh length to apply to diamond-mesh and square-mesh nets in support of a management strategy to require an additional bycatch reduction device in skimmer and otter trawls, which can include a square-mesh T-90 panel.
- Codify an existing management strategy prohibiting the use of trawl nets, except skimmer trawls, upstream of the N.C. 172 Bridge over the New River in Onslow County to continue reducing bycatch.
- Clarify the Division of Marine Fisheries director's proclamation authority for shrimp harvest restrictions;
- Establish a maximum combined headrope length of 220 feet in all internal coastal waters where there is no existing maximum combined headrope requirements, allowing for a phase-out period until Jan. 1, 2017.
- Allow cast-netting of shrimp in all areas otherwise closed to shrimping and increasing the harvest limit in these areas to 4 quarts, heads-on, or 2 ½ quarts, heads-off.
- Prohibit shrimp trawling in the Intracoastal Waterway channel from the Sunset Beach Bridge to the South Carolina line, including the Shallotte River, Eastern Channel and lower Calabash River, to protect small shrimp.

Commercial Landings

Landings in the North Carolina shrimp fishery vary from year to year and are dependent primarily on environmental conditions. Environmental factors, principally temperature especially severity of winter temperatures, and salinity can have a major influence on the yearly harvest. North Carolina's shrimp fishery is unusual in the southeast because all three species are taken here and the majority of the effort occurs in internal waters. While South Carolina, Georgia and Florida allow limited inside waters shrimping, the majority of their fisheries are conducted in the Atlantic Ocean and white shrimp comprise most of their harvest (NCDMF 2015).

The shrimp fishery in the northern portion of the state is conducted in Pamlico, Croatan, and Roanoke sounds and Pamlico, Pungo, Bay and Neuse rivers. The otter trawl is the predominant gear used in this portion of the state. Commercial activity occurs in all waters. The shrimp fishery in the central coastal area of the state occurs in Neuse River, Core Sound, North River, Newport River, Bogue Sound, and White Oak River. A variety of methods are used to catch shrimp including trawls, skimmer trawls, channel nets, shrimp pounds, and cast nets. Trawls are used on all three species in both the estuary and the ocean with two seam trawls used for brown and pink shrimp and four seam and tongue trawls for white shrimp, which tend to swim higher in the water column and have the ability to jump to the surface when disturbed. Most trawling in the central portion of the state is conducted at night. Channel nets are popular around Harkers Island in the Straits and North River while skimmer trawling is very popular in Newport River and New River.

In the southern portion of the state, the fishery is characterized by a large number of small boats fishing internal waters (primarily the Intracoastal Waterway, New and Cape Fear rivers) and larger vessels fishing the Atlantic Ocean primarily off New River, Carolina Beach, and Brunswick County. Many of the small boats are fished by individuals who shrimp part-time or for personal consumption. Use of gears other than trawls has increased primarily in the area from New River to Rich's Inlet. Channel, float, and butterfly nets make use of tidal currents to push shrimp into the nets and offer the advantages of less fuel consumption and less bycatch than traditional shrimp trawls. Channel nets are fished extensively in the areas around New

River and Topsail inlets. To shrimp with a “float net”, fishermen attach large floats to the doors and top lines of trawls to make the net fish up in the water column and are pulled slowly forward to harvest shrimp that are migrating to the inlets at night. Butterfly nets use this same harvest strategy but are attached to a metal frame and are held stationary in the water column to capture shrimp as the current carries them into the net. Skimmer trawls have become more popular around New River and Topsail Sound. These alternative gears are employed very little in areas south of Rich's Inlet, however tidal conditions seem favorable for their use. Cast nets and seines are also used to harvest shrimp to provide live shrimp for the commercial bait fishery.

Landings provided by the trip ticket program are combined for all three shrimp species (Figure 1). Total landings from 1994 to 2015 have averaged 6,672,869 pounds per year (Figure 1). Total landings increased 94% from 2014 to 2015. Annual shrimping effort has fluctuated with shrimp abundance, but it appears to have gradually declined since 1994 (NCDMF 2015). This is due to a number of things including cheaper imported shrimp prices, increasing fuel prices, increased regulations, and fishermen retiring out of the industry. Landings in 2005 were lowest on record likely from several reasons; many large trawlers remained scalloping instead of shrimping because prices were high and the days at sea were extended (NCDMF 2015). Hurricanes Katrina (8/29/05) and Rita (9/4/05) hit the Gulf coast, negatively affecting the fishing industry. Shrimp breading operations in the Gulf shut down with only one operational in September and some North Carolina shrimpers could not sell their product (NCDMF 2015).

Recreational Landings

Shrimp are harvested recreationally throughout the state by otter trawls, skimmer trawls, seines, cast nets, shrimp pots and shrimp pounds with specific gear limitations. Since July 1, 1999, anyone wishing to harvest shrimp recreationally with commercial gear is required to purchase a Recreational Commercial Gear License (RCGL). The RCGL is an annual license that allows recreational fishermen to use limited amounts of commercial gear to harvest seafood for their personal consumption. Seafood harvested under this license cannot be sold. Fishermen using this license are held to recreational size and possession limits, gear marking and gear limit and configuration requirements. Many of the species taken by recreational users of commercial gear are included in fisheries management plans. Until 2002, the influence that RCGL holders may have on these species was unknown. Two survey strategies were used to collect information from RCGL holders; a socioeconomic survey, conducted in 2001, 2004, and 2007, and catch and effort surveys conducted monthly from 2002 through 2008. Both of these surveys were terminated in 2008 due to budget constraints. RCGL holders harvested an average of 52,352 pound of shrimp a year from 2002 to 2008 (Table 1 from NCDMF 2015). The highest landings occurred in 2002 (101,766 lb), followed by 2008 (54,359 lb) and 2003 (50,961 lb) (NCDMF 2015).

Recreational landings of shrimp are unknown since this survey was discontinued in 2008.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Currently, the only data available for the stock in all areas are the commercial landings and associated effort from the Trip Ticket Program. No fishery dependent monitoring program exists for shrimp.

Fishery-Independent Monitoring

The Estuarine Trawl Survey (Program 120) is a fishery-independent multispecies monitoring program that has been ongoing since 1971 in the months of May and June. One of the key objectives of this program is to provide a long-term data base of annual juvenile recruitment for economically important species. This survey samples fixed stations, a set of 104 core stations with additional stations as needed. The core stations are sampled from western Albemarle Sound south through the South Carolina border each year without deviation two times in the months of May and June. This survey targets juvenile finfish, blue crabs, and Penaeid shrimp. A two-seam 10.5 foot headrope trawl with a ¼ inch mesh in the body and 1/8-inch mesh in the tailbag is used. A one-minute tow is conducted covering a distance of 75 yards. All species taken are sorted, identified, and a total number is recorded for each species. For target species, a subset of at least 30 to 60 individuals is measured. Environmental data is collected, including salinity, dissolved oxygen, temperature, wind speed and direction.

Trends in the annual brown shrimp catch per unit effort (CPUE) as the number of brown shrimp per station in Program 120 sampling shows fluctuations from year to year (Figure 2). The annual brown shrimp CPUE increased 198% from 2014 to 2015; 2015 was the highest CPUE of the 28-year time series. The proportional standard error was below 20 in all but 3 years from 1988 to 2015 (Table 2). A PSE of “20” and less was established by the Atlantic Coast Cooperative Statistics Program (ACCSP) as a standard when considering the precision of a given metric. The margin of error for the annual brown shrimp CPUE is low, therefore providing greater confidence in the samples as an expression to the population (Table 2).

As indicated in the stock status section, annual landings are probably a good indication of relative abundance. When comparing the Program 120 brown shrimp CPUE to the landings from the months of June and July, that are predominantly brown shrimp in the harvest, you can see very similar trends (Figure 3).

MANAGEMENT STRATEGY

The management strategy for the shrimp fisheries in North Carolina is to continue to: 1) optimize resource use over the long-term, and 2) minimize waste. The first strategy is accomplished by protection of critical habitats, and gear and area restrictions to protect the stock. Minimization of waste is accomplished by gear modifications, bycatch reduction devices, area closures, and harvest restrictions.

There are no management triggers or methods to track stock abundance, fishing mortality, or recruitment between benchmark reviews from the current FMP. Landings and effort have decreased over time (NCDMF 2015). There are no data to track the recreational fishery.

Amendment 1 was adopted in February 2015 and was limited in scope to bycatch issues in the commercial and recreational fisheries. The management strategy for this amendment recommended a wider range of certified bycatch reduction devices to choose from, the requirement of two bycatch reduction devices in shrimp trawls and skimmer trawls (beginning June 1, 2015), and increased the daily harvest limit for cast nets in closed areas. Amendment 1 also established a maximum combined headrope length of 220 feet in all internal coastal waters where there is no existing maximum combined headrope requirements, allowing for a phase-out period until January 1, 2017. Shrimp trawling was also prohibited, effective May 1, 2015 in the Intracoastal Waterway channel from the Sunset

Beach Bridge to the South Carolina line, including the Shallotte River, Eastern Channel and lower Calabash River, to protect small shrimp. An industry workgroup, is also currently working to test gear modifications to reduce bycatch to the extent practicable with a 40 percent target reduction in the shrimp trawl fishery. With the adoption of the Amendment 1, the Marine Fisheries Commission further directed the division to develop a live bait permit to allow permitted fishermen to fish until 12:00 p.m. (noon) on Saturdays. See Table 3 for the specific current management strategies.

MANAGEMENT AND RESEARCH NEEDS

The N.C. Marine Fisheries Commission selected management strategies and implementation status are provided in Table 3. Proposed research needs and status of need is provided in parenthesis from Amendment 1 include:

Management

High Priority

- Continue to conduct bycatch characterization work across all strata (for example: dominant species, season, areas, vessel type, number of nets/rigs, headrope length)(ongoing through NCDMF)
- Initiate/increase state monitoring and reporting on the extent of unutilized bycatch and fishing mortality on fish less than age-1 in the shrimp trawl fishery (needed)
- Continue to develop and test methods to reduce bycatch in the commercial and recreational shrimp trawl fisheries (ongoing in commercial shrimp trawl fishery through NCDMF)
- Obtain mortality (immediate and post-harvest) estimates of culled (active and passive) bycatch from gears used in the recreational and commercial shrimp fisheries (needed)
- Continue to develop standard protocol for bycatch estimations (ongoing at NCDMF with collaborative efforts with other agencies and researchers)

Medium Priority

- Conduct research to quantify the number of protected species interactions with the shrimp fishery (ongoing through current NCDMF grants)
- Continue to develop and test methods to reduce interactions with protected species in the commercial and recreational shrimp trawl fisheries (ongoing work being conducted by NOAA)
- Initiate sampling to investigate if additional areas currently open to shrimping need changes to their habitat designations (needed)
- Evaluate the effectiveness and efficiency of the current sampling protocol used to manage shrimp (needed)

Low Priority

- Continue to support research to determine the status of protected species along the N.C. coast to better anticipate and prevent interactions (for example: migration patterns and habitat utilization) (ongoing support continued to provide information as interactions with protected species occurs)

Biological

High Priority
- Continue to define and quantify the intensity, duration and spatial scale of trawling effort in N.C. estuaries (ongoing through NCDMF)
- Determine species interactions and predator/prey relationships for prominent shrimp trawl bycatch (needed)
- Determine how the resuspension of sediment, siltation, and non-point source pollution from adjacent land use practices impacts trends in shrimp abundance and habitat degradation (needed)
- Determine the spatial and biological characteristics of submerged aquatic vegetation that maximize their ecological value to shrimp for restoration and conservation purposes (ongoing through the CHPP)

Medium Priority
- Continue to map and quantify the habitat structure and sediment types in North Carolina estuaries (ongoing through NCDMF)
- Continue to measure the effects of trawling on sediment size distribution and organic carbon content (needed)

Low Priority
- Continue to investigate the impact of tiger shrimp in NC waters (research conducted through NOAA)
- Initiate research to determine the impacts of endocrine disrupting chemicals (EDCs) on the various life stages of shrimp (needed)

Social and Economic

Medium Priority
- Expand current social and economic surveys to specifically collect information on shrimp fishermen (needed)
- Continue to determine the extent of recreational shrimp harvest that is occurring. This group primarily use cast nets to take shrimp either for bait or personal consumption (needed)

Data Needs

High Priority
- Effort data needs to be collected to provide estimates based on actual time fished (or number of tows), rather than number of trips (needed)
- Improve accuracy of self-reported license gear survey data, or investigate other means of accurately obtaining shrimp fleet characteristic (needed)

Education

High Priority
- Encourage research and education to improve the understanding of new innovative BRDs and TEDs (ongoing through NCDMF; update proclamation in May 2015, outreach being conducted by staff and Marine Patrol to help the public understand the various BRDs available and proper placement within the trawls)

- Encourage research and education to improve the understanding and management of the shrimp resource as well as the fishery (needed)

FISHERY MANAGEMENT PLAN RECOMMENDATION

Recommend maintain the current timing of the Benchmark Review. Amendment 1 of the N.C. Shrimp FMP was just adopted in February 2015 with rule changes in effect May 1, 2015. Continue ongoing work with a stakeholder group to test gear modifications to reduce bycatch to the extent practicable with a 40 percent target reduction in the shrimp trawl fishery. Establish a permitted live bait shrimp fishery and allow live bait fishermen with a permit to fish until 12 p.m. (noon) on Saturday.

LITERATURE CITED

North Carolina Division of Marine Fisheries. 2015. North Carolina Shrimp Fishery Management Plan. Amendment 1. North Carolina department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. Morehead City, NC. 519 pp.

TABLES

Table 1. Harvest (pounds) and pounds per trip of shrimp (three species combined) by RCGL gear from 2002 through 2008 (NCDMF 2015).

Year	Pounds	Pounds/trip
2002	101,766	19.1
2003	50,961	18.5
2004	43,698	9.3
2005	32,542	13.4
2006	49,362	20.3
2007	33,778	15.2
2008	54,359	22.3
Mean	52,352	16.8

Table 2. Program 120 annual sampling for brown shrimp from core stations in May and June combined. Number of samples (stations), brown shrimp arithmetic catch per unit effort (CPUE) as the number of shrimp per station, standard error, standard deviation, coefficient of variation (CV), minimum number caught at a station, maximum number caught at a stations, total number caught, proportional standard error (PSE), 1988-2015.

Year	Number of stations	CPUE (No. shrimp/tow)	Standard error	Standard deviation	CV	Minimum number per station	Maximum number per station	Total number of shrimp	PSE
1988	209	21.24	3.20	46.31	218.01	0	348	4,440	15
1989	207	29.23	5.40	77.68	265.78	0	775	6,050	18
1990	206	44.17	6.83	98.03	221.97	0	1,094	9,098	15
1991	207	48.57	5.36	77.18	158.88	0	520	10,055	11
1992	210	25.85	5.03	72.93	282.16	0	664	5,428	19
1993	205	23.79	4.35	62.31	261.95	0	348	4,876	18
1994	205	29.92	4.29	61.41	205.23	0	459	6,134	14
1995	208	38.62	5.72	82.53	213.72	0	615	8,032	15
1996	207	34.78	6.39	91.87	264.16	0	696	7,199	18
1997	207	25.62	6.24	89.80	350.45	0	856	5,304	24
1998	208	13.04	2.77	39.99	306.74	0	369	2,712	21
1999	206	49.67	7.55	108.34	218.09	0	675	10,233	15
2000	209	56.77	7.06	102.08	179.82	0	759	11,865	12
2001	209	42.81	6.30	91.03	212.64	0	717	8,947	15
2002	208	59.68	6.89	99.38	166.52	0	793	12,414	12
2003	208	31.17	4.32	62.32	199.91	0	563	6,484	14
2004	208	24.93	3.99	57.61	231.12	0	334	5,185	16
2005	208	23.17	4.35	62.75	270.81	0	551	4,820	19
2006	208	25.88	3.44	49.67	191.93	0	308	5,383	13
2007	208	18.49	1.89	27.20	147.16	0	170	3,845	10
2008	208	95.71	13.45	193.92	202.61	0	1,718	19,908	14
2009	208	60.29	8.16	117.73	195.27	0	1,001	12,540	14
2010	208	15.25	13.17	189.97	252.47	0	1,622	15,651	18
2011	208	52.17	7.41	106.82	204.74	0	930	10,852	14
2012	208	40.13	4.26	61.47	153.17	0	343	8,347	11
2013	208	27.53	4.39	63.25	229.77	0	459	5,726	16
2014	208	34.98	4.47	64.46	184.28	0	409	7,276	13
2015	207	104.12	26.00	374.12	359.31	0	5,503	21,553	25

Table 3. The N.C. Marine Fisheries Commission selected management strategies, and implementation status to reduce bycatch.

Management Strategy	Implementation Status
Status quo (continue to prohibit otter trawls in the New River special secondary nursery area above the Highway 172 Bridge).	Rule change required in 15A NCAC 03J .0208; Rule change in effect on May 1, 2015.
Allow hand cast netting of shrimp in all closed areas and increase the limit to four quarts, with heads on per person.	Rule change required in 15A NCAC 03L .0105; Rule change in effect on May 1, 2015.
Status quo on a license requirement to fish a cast net for shrimp.	No action required
Upon federal adoption of TEDs in skimmer trawls, the division will support the federal requirement.	No action required
Establish a permitted live shrimp bait fishery and for DMF to craft the guidelines and permit fees after reviewing permitted operations in other states, and to allow live bait fishermen with a permit to fish until 12 p.m. (noon) on Saturday.	Based on review of other state operations, future rule changes will be required and include 15A NCAC 03J .0104, 03L .0102, 03O .0105, 03O .0503; Rule change in effect on May 1, or June 1, 2017.
Allow any federally certified BRD in all internal and offshore waters of NC.	Existing proclamation authority; Proclamation issued with complete list of BRDs, SH-2-2015
Update the scientific testing protocol for the state's BRD certification program.	Plans to update the testing protocols to use the federal standards.
Convene a stakeholder group to initiate industry testing of minimum tail bag mesh size, T-90 panels, skylight panels, and reduced bar spacing in TEDs to reduce bycatch to the extent practicable with a 40 percent target reduction. • Upon securing funding, testing in the ocean and internal waters will consist of three years of data using test nets compared to a control net with a Florida fish eye, a federally approved TED and a 1.5-inch mesh tail bag. • Results should minimize shrimp loss and maximize reduction of bycatch of finfish. Promising configurations will be brought back to the commission for consideration for mandatory use. • The stakeholder group may be partnered with the division and Sea Grant. • Members should consist of fishermen, net/gear manufacturers and scientific/gear specialists.	Stakeholder group convened and industry testing underway in 2015.
Require either a T-90/square mesh tailbag or other applications of square mesh panels (e.g., skylight panel), reduced bar spacing in a TED, or another federal or state certified BRD in addition to existing TED and BRD requirements in all skimmer and otter trawls.	Existing proclamation authority Rule change required in 15A NCAC 03I .0101; Rule change in effect on May 1, 2015. Proclamation issued for second BRD requirement to begin on June 1, 2015, SH-2-2015, http://portal.ncdenr.org/web/mf/proclamation-sh-02-2015
Status quo on effort management (no change in season, weekend, or night time fishing).	No action required

Management Strategy	Implementation Status
In order to put a cap on fleet capacity as a management tool, establish a maximum combined headrope length of 220 feet in all internal coastal waters where there is no existing maximum combined headrope requirements with a two-year phase out period.	Rule change required in 15A NCAC 03L .0103; Rule change in effect on May 1, 2015.
Prohibit shrimp trawling in the IWW channel from Sunset Beach to the SC state line, including Eastern Channel, lower Calabash River and Shallotte River.	Rule change required in 15A NCAC 03R .0114; Rule change in effect May 1, 2015.
Recommend the MFC Habitat and Water Quality Advisory Committee to consider changing designation of special secondary nursery areas that have not been opened to trawling since 1991 to permanent secondary nursery areas.	Rule changes required in 15A NCAC 03R .0104 and 03R .0105; Rule change in effect May 1, 2015.

FIGURES

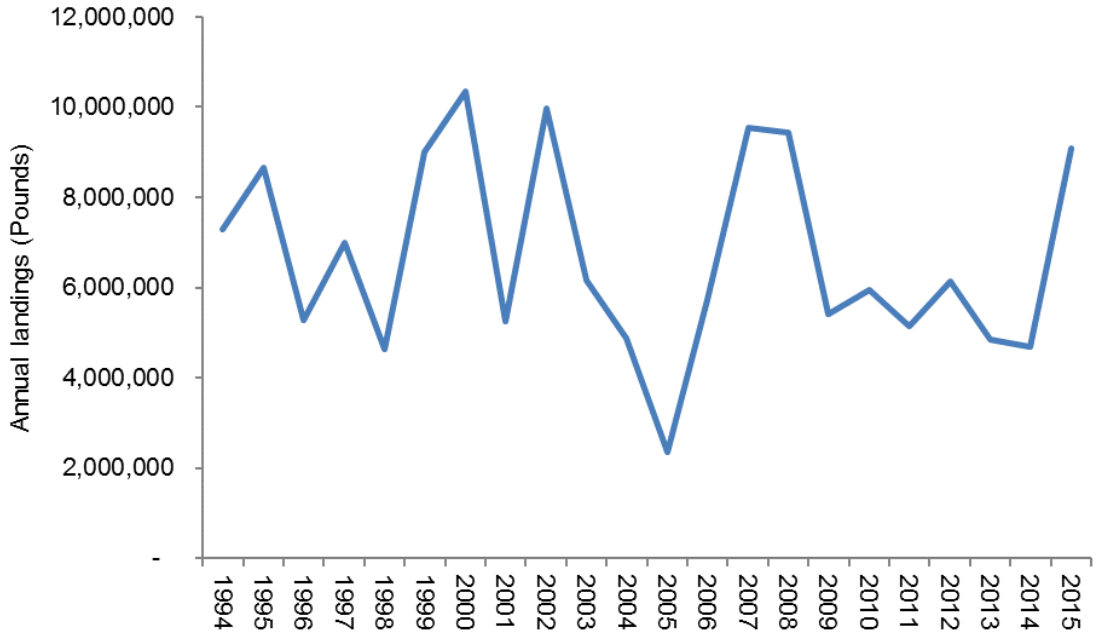


Figure 1. Annual shrimp landings (pounds) from all three species combined in North Carolina, 1994-2015. Data from the NCDMF Trip Ticket Program.

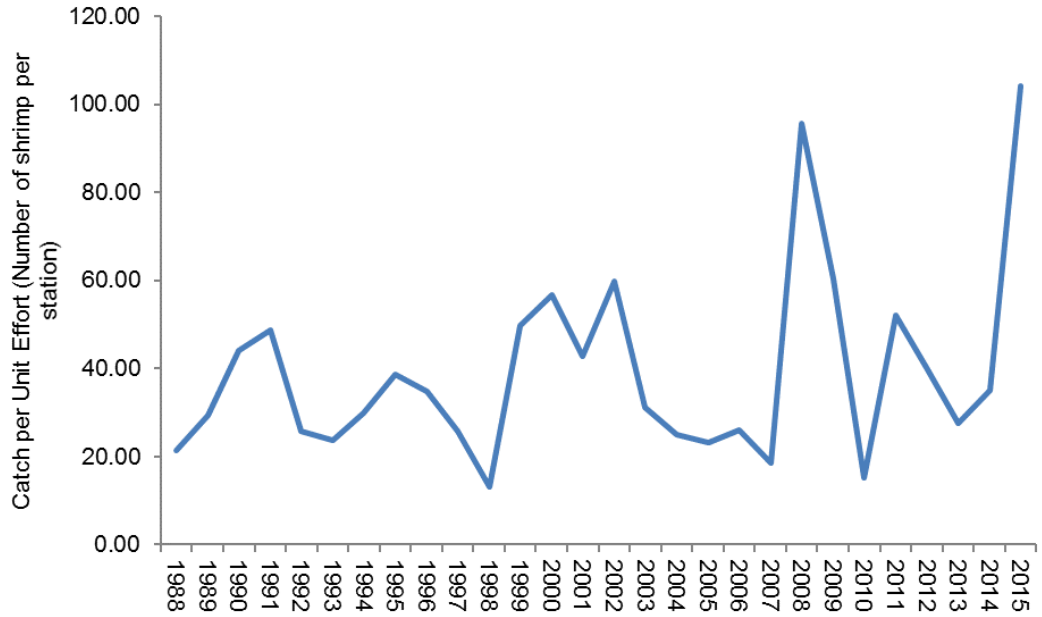


Figure 2. Annual catch per unit effort (number of shrimp per station) of brown shrimp from Program 120 estuarine trawl survey, 1988-2015.

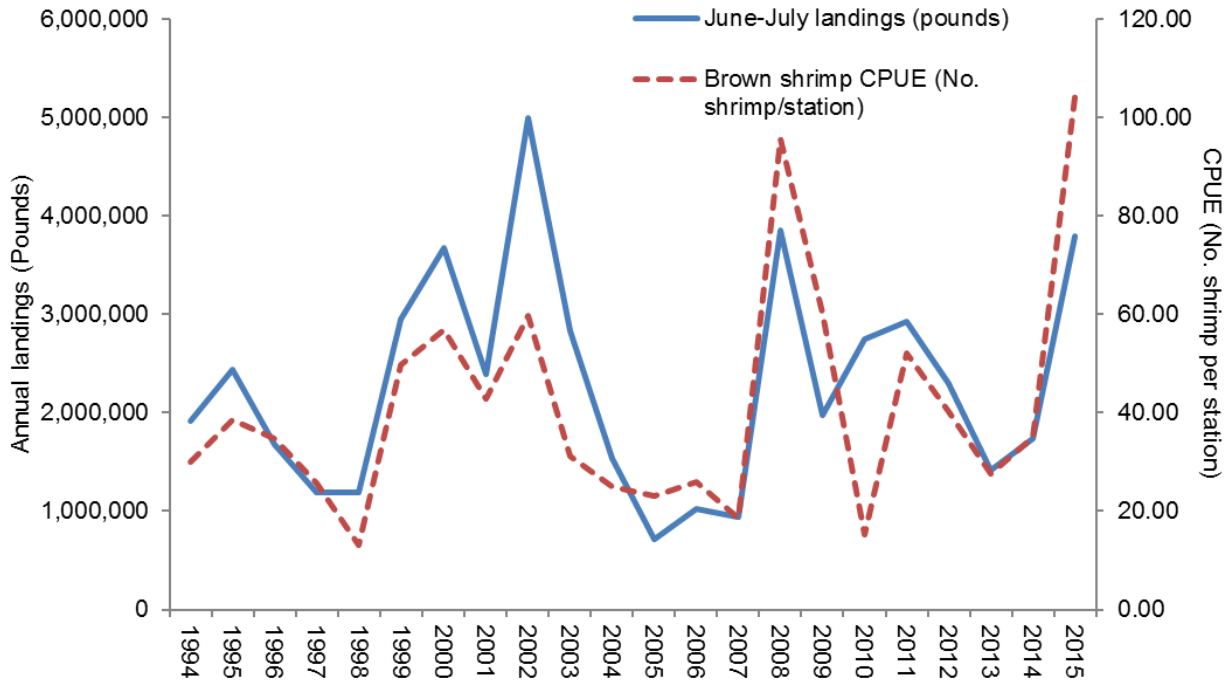


Figure 3. Comparison of shrimp commercial landings in the months of June and July to the brown shrimp Program 120 index of abundance or catch per unit effort (Number of shrimp per station), 1994-2015.

FISHERY MANAGEMENT PLAN UPDATE
SOUTHERN FLOUNDER
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	February 2005
Amendments:	Amendment 1 – February 2013
Revisions:	None
Supplements:	Supplement A to the 2005 FMP - February 2011 Supplement A to Amendment 1 - November 2015
Information Updates:	None
Schedule Changes:	None

Next Benchmark Review: Next 5-year review of the N.C. Southern Flounder Fishery Management Plan (FMP) is scheduled to begin July 2018. At its May 21, 2015 business meeting, the commission also directed the division to request the department secretary to approve a change to the FMP schedule for an amendment to the southern flounder plan to begin immediately, concurrent with the supplement process. Given the proximity of this request to the commission's annual approval of its FMP review schedule which occurs each August, the secretary deferred judgement to the commission on modifying the schedule. At its Aug. 23, 2015 business meeting, the commission approved the 2015 FMP Review Schedule as presented, which included a review of the Southern Flounder FMP to begin in 2018.

Actions to achieve sustainable harvest in Amendment 1 include: 1) accept management measures to reduce protected species interactions as the management strategy for achieving sustainable harvest in the commercial southern flounder fishery; 2) increase the recreational minimum size limit to 15 inches and decrease the creel limit to 6 fish. Amendment 1 also set new sustainability benchmarks at 25% SPR (threshold) and 35% SPR (target).

Supplement A to Amendment 1 was approved at the November 2015 MFC meeting. Management actions approved include: increasing the minimum commercial size limit to 15 inches, increasing the minimum mesh size for gill nets to 6 ISM, closing the commercial gill net and recreational fisheries on October 15th, closing the commercial gig fishery once the pound net fishery closes, a 38 percent reduction to the pound net fishery based on 2011-2015 average landings, and to increase the escape panels in flounder pound nets to 5¾ inches. All management actions were effective Jan. 1, 2016.

Management Unit

North Carolina coastal and joint waters.

Goal and Objectives

The goal of Amendment 1 to the North Carolina Southern Flounder Fishery Management Plan (FMP) is to end overfishing and rebuild the spawning stock for long-term sustainable harvest and maintain the integrity of the stock. To achieve this goal, the following objectives must be met:

1. Ensure that the spawning stock biomass of southern flounder is adequate to produce recruitment levels necessary to increase spawning stock biomass and expand age distribution.

2. Implement management measures that will achieve sustainable harvest.

3. Promote harvesting practices that minimize bycatch.

4. Continue to develop an information program to educate the public and elevate their awareness of the causes and nature of problems in the southern flounder stock, its habitat and fisheries, and explain the rationale for management efforts to sustain the stock.

5. Address social and economic concerns of all user groups, including issues such as user conflicts.

6. Promote the protection, restoration, and enhancement of habitats and environmental quality for the conservation of the southern flounder population.

7. Initiate, enhance, and/or continue studies to improve the understanding of southern flounder population ecology and dynamics.

8. Initiate, enhance, and/or continue studies to collect and analyze the socio-economic data needed to properly monitor and manage the southern flounder fishery.

STATUS OF THE STOCK

Stock Status

The current status of the southern flounder stock is ‘concern.’ There are concerns about the sustainability of current harvest levels due to coastwide trends in juvenile and adult abundance and the high percentage of immature fish in the harvest. A regional stock assessment is being conducted to help determine stock status.

Stock Assessment

The 2009 stock assessment used a statistical catch-at-age model run using the Age Structured Assessment Program. Results showed the stock to be overfished with overfishing occurring throughout the time series. These were the most recent assessment results included in Amendment 1. The 2014 Southern Flounder Stock Assessment used a statistical catch-at-age model run using Stock Synthesis. Upon review of the assessment, external peer reviewers and the NCDMF determined the model could not fully account for stock mixing during spawning and quantify migration of southern flounder to and from North Carolina waters. Consequently, the assessment was not accepted for determining stock status so it is currently unknown whether

the stock is overfished or if overfishing is occurring. A multistate southern flounder assessment is under development and includes data and expertise of state agency staff from Florida, Georgia, South Carolina, and North Carolina, as well as researchers from the University of North Carolina at Wilmington and Louisiana State University. The multistate assessment is an attempt to further address the geographical distribution of the unit stock and is scheduled to be peer reviewed during 2017.

STATUS OF THE FISHERY

Current Regulations

Commercial: 15–inches total length (TL) minimum size limit in internal and ocean waters, closed season in internal waters from December 1–31; no trip limits in internal waters and a 100-pound trip limit in ocean waters unless the individual has a License to Land Flounder from the Atlantic Ocean.

Recreational: 15–inches TL minimum size limit, 6-fish creel limit for all joint and coastal waters, and year-round season.

At the MFC's November business meeting they adopted a supplement to the FMP which instituted several new rule changes effective Jan. 1, 2016. Please check the division website for a summary of the actions http://portal.ncdenr.org/web/mf/nr-50-2015-mfc-flounder.

Commercial Landings

All landings reported as caught in inshore waters are considered to be southern flounder by the NCDMF Trip Ticket Program. Most southern flounder landings are from gill nets and pound nets, although gigs and other inshore gears (e.g. trawls) catch flounder in smaller numbers. Historically, pound nets were the dominant gear but landings from gill nets were higher in 1994-2013 (Figure 1). Peak commercial landings occurred in 1994. Since 1994, pound net landings decreased greatly while gill net landings remained relatively high until 2010. Decreases in gill net landings from 2010 to 2012 were mainly due to lower landings in the Albemarle Sound. The Sea Turtle Settlement Agreement (2010) added regulations to gill nets in some areas of the state, resulting in lower effort in many areas, however the Albemarle Sound was mostly unaffected by these regulations. The Albemarle Sound is typically where the majority of southern flounder gill net harvest occurs. In 2013 gill net harvest increased greatly in the Albemarle Sound but decreased in Pamlico Sound and Core Sound; pound net landings also increased greatly in 2013. In 2014 and 2015 gill net harvest decreased in all areas of the state but especially in the Albemarle Sound, due to widespread gill net closures to avoid catches of red drum and closures due to protected species interactions. Pound net harvest surpassed gill net harvest in 2014 and 2015. Gig harvest of southern flounder has generally increased, especially since 2010, but remains near 10% of total commercial harvest. Harvest by other commercial gears has generally decreased and currently makes up a small portion of commercial harvest. Commercial harvest is highest in fall months.

Trends in commercial trips have generally followed landings trends (Figure 2). Trips include the number of trip ticket records with landings reported. Some trips may represent more than one day of fishing. The majority of trips that harvest flounder are from gill nets. Gill net trips decreased since 2010. Pound net trips decreased until 2002 and were consistent after that year. Gigging trips have increased since 2010.

Recreational Landings

Recreational harvest of southern flounder is mainly by hook and line and gigs, with a small amount of harvest by spearfishing or RCGL gears. NCDMF does not have information on long-term trends of the gig fishery. This is because the Marine Recreational Information Program (MRIP) rarely encounters gig fishermen. A mail-based survey of gigging that began in 2010 indicates the gig harvest in 2010-2013 made up less than 25% of the recreational harvest (with hook and line harvest making up the remainder). Hook and line harvest can be split into ocean and inshore harvest, with most southern flounder harvested inshore (Figure 3). Hook and line harvest peaked in 2010. Harvest is highest during summer months.

Trends in recreational trips are somewhat difficult to interpret because they represent all paralichthid flounder species commonly caught in North Carolina (southern, summer and Gulf). This is because anglers simply report targeting 'flounder' rather than a particular species of flounder. Trips can be defined in several ways but in this document all trips that harvested or released any paralichthid flounder species were included. Trends in trips and harvest are roughly similar throughout most of the time-series but in 2012 to 2014 harvest declined while trips remained relatively high (Figure 4).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fishing activity is monitored through fishery-dependent sampling conducted by the division since 1982. Data collected in this program allow the size and age distribution of southern flounder to be characterized by gear/fishery. Several NCDMF sampling programs collect biological data on commercial and recreational fisheries that catch southern flounder. The primary programs that collect length and age data for harvested southern flounder include: 461 (gill net and seine), 476 (gig and spear), 432 (pound net) and 437 (long haul seine). Programs 466 and 570 collect length data on harvested and discarded flounder. Other commercial sampling programs focusing on fisheries that do not target southern flounder collect biological data rarely. NCDMF sampling of the recreational fishery through the MRIP collects length data on southern flounder. The NCDMF mail-based gigging survey collects harvest data for the recreational gig fishery but does not collect length or age data. Age data from the recreational fishery are collected mainly via voluntary angler donations.

There were no clear trends in commercial length and age data in 2005-2015 (Table 1). Annual mean lengths were fairly consistent and 2015 was similar to previous years. However, the number of fish measured in 2015 was the lowest of any year 2005-2015. The modal and maximum ages were also fairly consistent throughout the time-series. The annual number of age samples collected and aged was low from the commercial fisheries.

There were no clear trends in recreational length and age data in 2005-2015 (Table 2). Annual mean lengths were fairly consistent and 2015 was similar to previous years. The modal and maximum ages were also fairly consistent throughout the time-series.

Fishery-Independent Monitoring

Several NCDMF independent sampling programs collect biological data on southern flounder. The primary surveys that collect length data for southern flounder and were included as indices of abundance in recent stock assessments were: 120 (Estuarine Trawl Survey), 195 (Pamlico Sound Survey), 135 (Striped Bass Independent Gill Net Survey) and 915 (Pamlico Sound Independent Gill Net Survey). Age data primarily come from program 915 although the other three surveys do collect age data. Methodology for analyzing trends in CPUE for each survey changed with the 2014 stock assessment when generalized linear models (GLMs) were used to calculate relative yearly abundance index values. The indices were not updated for this report as a new stock assessment is under way and criteria for survey data have not been finalized. As a result, nominal CPUE values have been include in this report.

There were no clear trends in fishery-independent length and age data in 2005-2015 (Table 3). Annual mean lengths were fairly consistent and 2015 was similar to previous years. However, the number of fish measured in 2015 was the lowest of any year 2005-2015. The modal age decreased slightly after 2006 but the maximum age increased slightly. The annual number of age samples collected and aged generally increased since 2005.

Data collected by Program 915 were used for an index of general (juvenile and adult) abundance in recent stock assessments. The survey is designed to characterize the size and age distribution for key estuarine species in Pamlico Sound and its major river tributaries. Sampling began in Pamlico Sound in 2001 and was expanded to the current sampling area (including tributaries) in 2003. Each array of nets consists of floating gill nets in 30-yard segments of 3-, 3.5-, 4-, 4.5-, 5-, 5.5-, 6-, and 6.5-inch stretched mesh, for a total of 240 yards of nets. Catches from an array of gill nets comprise a single sample; two samples (one shallow, one deep) totaling 480 yards of gill net are completed each trip. Gill nets are typically deployed within an hour of sunset and fished the following morning. Efforts are made to keep all soak times within 12 hours. All gill nets are constructed with a hanging ratio of 2:1. Gill net sets are made using a random stratified survey design, based on area and water depth. Each region is overlaid with a one-minute by one-minute grid system (equivalent to one square nautical mile) and delineated into shallow (<6 feet) and deep (>6 feet) strata. Deep strata were not included in data analysis for this report. Sampling in Pamlico Sound is divided into two regions: Region 1, which includes areas of eastern Pamlico Sound adjacent to the Outer Banks from southern Roanoke Island to the northern end of Portsmouth Island; and Region 2, which includes Hyde County bays from Stumpy Point Bay to Abel's Bay and adjacent areas of western Pamlico Sound. Each of the two regions is further segregated into four similar sized areas, denoted by either Hyde or Dare and numbers 1 through 4. The rivers are divided into four areas in the Neuse River, three areas in the Pamlico River, and one area for the Pungo River. Although the survey is conducted in all months except January, only July-September data were used to analyze CPUE trends because these months had the peak catches of southern flounder. The survey was expanded to include areas in the southern portion of the state in 2008, but these data were not analyzed for the index due to the short time-series. The abundance index for Program 915 peaked in 2010 and the low point was in 2015 for the time-series analyzed (2003-2015) but has no clear trend overall (Table 4; Figure 5).

Data collected by Program 135 were used for an index of general (juvenile and adult) abundance in recent stock assessments. Beginning in 1990, Program 135 has conducted gill net sets in waters of Albemarle Sound and Roanoke River. The survey was designed to monitor the striped bass population. The survey follows a random stratified design, stratified by geographic area. This survey divides the Albemarle region into six sample zones that are further

subdivided into one-mile square quadrants with an average of 22 quadrants per zone. Four arrays of twelve meshes (2.5-, 3-, 3.5-, 4-, 4.5-, 5-, 5.5-, 6-, 6.5-, 7-, 8-, 10-inch stretch) of gill nets are set in each quadrant by the fishing crew, two arrays are sinking gill nets and two are floating. One unit of effort is defined as each 40-yard net fished for 24 hours. Only samples from November and December were included in analysis of CPUE trends (when the most extensive sampling coverage occurs). The abundance index for Program 135 peaked in 1992 and the low point was in 2011 for the time-series analyzed (1991-2015) (Table 4; Figure 5).

Data collected by Program 120 were used for a juvenile abundance index (JAI) in recent stock assessments. The Estuarine Trawl Survey (Program 120) is a fishery-independent multispecies monitoring program that has been ongoing since 1971 in the months of May and June. One of the key objectives of this program is to provide a long-term data base of annual juvenile recruitment for economically important species. This survey samples fixed stations, a set of 104 core stations with additional stations as needed. The core stations are sampled from western Albemarle Sound south through the South Carolina border each year without deviation two times in the months of May and June. This survey targets juvenile finfish, blue crabs, and Penaeid shrimp. A two-seam 10.5 foot headrope trawl with a ¼ inch mesh in the body and 1/8 inch mesh in the tailbag is used. A one-minute tow is conducted covering a distance of 75 yards. All species taken are sorted, identified, and a total number is recorded for each species. For target species, a subset of at least 30 to 60 individuals is measured. Environmental data is collected, including salinity, dissolved oxygen, temperature, wind speed and direction. Data from this survey were used to produce juvenile abundance indices for southern flounder from 1991 to 2014. The abundance index for Program 120 peaked in 1996 and the low point was in 1998 for the time-series analyzed (1991-2015) but shows no clear trend (Table 4; Figure 6).

Data collected by Program 195 were used for a juvenile abundance index (JAI) in recent stock assessments. Program 195 conducts trawls using a random stratified survey design in waters of Pamlico Sound and major river tributaries in June and September. Only data from September were used for the JAI in the 2014 stock assessment. Stations are randomly selected from strata based upon depth and geographic location. Randomly selected stations are optimally allocated among the strata based upon all previous sampling in order to provide the most accurate abundance estimates (PSE <20). Tow duration is 20 minutes; using double rigged demersal mongoose trawls (9.1m headrope, 1.0m X 0.6m doors, 2.2-cm bar mesh body, 1.9-cm bar mesh cod end and a 100-mesh tailbag extension. Data from this survey were used to produce juvenile abundance indices for southern flounder from 1991 to 2014. The abundance index for Program 195 peaked in 1996 and the low point was in 1998 for the time-series analyzed (1991-2015) (Table 4; Figure 6).

MANAGEMENT STRATEGY

Southern flounder are managed under Amendment 1 to the Southern Flounder FMP, adopted in February 2013. Amendment 1 established the threshold spawning potential ratio (SPR) of 25% and the target SPR of 35% and implemented management measures for the commercial and recreational fisheries (Table 5). Actions to achieve sustainable harvest in Amendment 1 include: 1) accept management measures to reduce protected species interactions as the management strategy for achieving sustainable harvest in the commercial southern flounder fishery; 2) increase the recreational minimum size limit to 15 inches and decrease the creel limit to 6 fish. Since the adoption of Amendment 1, the 2014 Southern Flounder Stock Assessment was completed. Upon review of the assessment, external peer reviewers and the NCDMF determined the model could not fully account for stock mixing during spawning and quantify

migration of southern flounder to and from North Carolina waters. Consequently, the assessment was not accepted for determining stock status so it is currently unknown whether the stock is overfished or if overfishing is occurring. Due to concerns for the health of the stock based on abundance trends and the percentage of immature fish in the harvest, in February 2015 the NCMFC requested a supplement be developed for reducing harvest in the southern flounder fishery.

Supplement A to Amendment 1 was approved at the November 2015 MFC meeting. Management actions approved include: increasing the minimum commercial size limit to 15 inches, increasing the minimum mesh size for gill nets to 6 ISM, closing the commercial gill net and recreational fisheries on October 15th, closing the commercial gig fishery once the pound net fishery closes, a 38 percent reduction to the pound net fishery based on 2011-2015 average landings and an increase to 5 ¾ inch escape panels. All management actions were effective January 1 2016.

MANAGEMENT AND RESEARCH NEEDS

The management strategies and implementation status from Amendment 1 of the N.C. Southern Flounder FMP can be found in Table 5. The following research recommendations were included in Amendment 1; status of need is provided in parentheses:

- Investigate the feasibility of a quota as a management tool for the commercial southern flounder fishery (underway).
- Annual survey of the recreational gig fishery (mail-based survey underway, dockside survey still needed).
- Further research on southern flounder that remain in the ocean after the spawning season (tagging studies underway but other studies may be needed).
- Determine the exact locations of spawning aggregations of southern flounder in the ocean (tagging studies underway but other studies may be needed).
- Continued otolith microchemistry research to gain a better understanding of ocean residency of southern flounder (more research needed).
- Tagging study of southern flounder in the ocean to gain a better understanding of migration patterns into the estuaries (underway).
- Update the southern flounder maturity schedule (completed).
- Fishery dependent sampling of the commercial spear fishery for flounder in the ocean (some sampling done under NCDMF sampling but more may be needed).
- Harvest estimates and fishery dependent sampling of the recreational spear fishery for flounder in the ocean (not done except what MRIP encounters).
- Increased fish house sampling of the Currituck Sound flounder gill net and pound net fisheries (sampling has increased, more may be needed).
- Increased at-sea observer trips with gill netters and pound netters in Currituck Sound (underway for gill nets, pound net observing needed).
- Reestablish a RCGL survey to obtain harvest, discard, and effort information (not underway).
- Establish an at-sea observer program of the RCGL fishery (not underway).
- Formulate a bycatch estimate of southern flounder from crab pots (more research needed).
- Further research on degradable materials to determine which material works best in a given water body and how other parameters, such as microbial activities and the effects of

light penetration impact degradation rates and performance of the crab pot (progress unknown).

- Further research on flatfish escapement devices that minimize undersized flounder bycatch and maximize the retention of marketable blue crabs (more research needed).
- Further research on factors that impact release mortality of southern flounder in the recreational hook and line fishery (more research needed).
- Research on deep hooking events of different hook types and sizes on southern flounder (more research needed)
- Population dynamics research for all Atlantic protected species (underway?).
- Continued gear research in the design of gill nets and pound nets to minimize protected species interactions (some research completed, more may be needed).
- Development of alternative gears to catch southern flounder (some research completed, more may be needed).
- Further research on the size distribution of southern flounder retained in pound nets with 5.75-inch and 6-inch escape panels (some research completed, more is needed).
- Research on the species composition and size distribution of fish and crustaceans that escape pound nets through 5.75-inch and 6-inch escape panels (some research completed, more is needed).
- Coast wide at-sea observations of the flounder pound net fishery (still needed).
- Discard mortality estimates of southern flounder from pound nets (still needed).
- Continue at-sea observations of the large mesh gill net fishery, especially outside of the PSGNRA, including acquiring biological data on harvest and discards (underway).
- Increase the number of large mesh gill catches sampled in areas such as Albemarle Sound and the Newport River (sampling has increased, more may be needed).

Research recommendations from 2014 stock assessment, included in Draft Supplement A to Amendment 1:

- Retain mail survey of recreational gig survey harvest and discards. Develop methodology to validate mail survey results, possibly using dockside survey (research needed).
- Collect discard data (ages, species ratio, lengths, fates) from gears targeting southern flounder (pound net, gigs, hook and line, trawls) (research on shrimp trawl bycatch underway, research for other gears needed).
- Develop and implement consistent strategies for collecting age and sex samples from commercial/recreational fisheries and independent surveys to achieve desired precision for stock assessment (underway).
- Collect age data from estuarine trawl survey and Pamlico Sound survey to more accurately estimate YOY abundance (instead of using length cutoffs based on length frequency plot interpretations) (underway).
- Tagging study to estimate emigration (unit stock) and mortality rates (underway).
- Expand, improve, or add inshore surveys of southern flounder to develop indices that we can be confident in for future stock assessments (still needed).
- Expand, improve or add fishery-independent surveys of the ocean component of the stock (still needed).
- Conduct studies to better understand ocean residency of southern flounder (still needed).
- Determine locations of spawning aggregations of southern flounder (tagging studies underway but more studies may be needed).
- Conduct sampling of the commercial/recreational ocean spear fishery harvest/discards (underway for commercial, still needed for recreational).

- Re-establish a RCGL survey to obtain harvest, discard, and effort information (still needed).
- Develop spatial model to account for inshore and ocean components of the stock (still needed).

FISHERY MANAGEMENT PLAN RECOMMENDATION

At the August 2015 MFC meeting the MFC approved the FMP schedule that maintained the timeline for a scheduled review of the southern flounder FMP to begin in 2018.

LITERATURE CITED

Takade-Heumacher, H., and C. Batsavage. 2009. Stock status of North Carolina southern flounder (*Paralichthys lethostigma*). North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries, Morehead City, North Carolina.

NCDMF. 2015. Stock Assessment of Southern Flounder, *Paralichthys lethostigma*, in North Carolina Waters. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. SAP-SAR-2015-01. 297 pp.

TABLES

Table 1. Summary of total length (mm) and age data for NCDMF commercial fishery sampling programs (includes harvest and some discard information)

Year	Mean length	Minimum length	Maximum length	Total measured	Modal age	Minimum age	Maximum age	Total aged
2005	402	46	793	28,972	2	0	7	83
2006	414	131	796	39,572	3	0	6	80
2007	413	90	745	23,768	2	0	5	94
2008	404	38	710	39,302	2	0	7	212
2009	405	92	719	33,403	2	1	6	34
2010	415	130	724	27,176	2	1	5	33
2011	409	123	770	32,000	3	1	6	90
2012	408	100	756	29,865	2	0	6	38
2013	399	16	804	33,776	1	1	5	245
2014	403	21	721	26,354	2	0	4	408
2015	403	51	754	19,717	1	0	5	330

Table 2. Summary of total length (mm) and age data for NCDMF recreational fishery sampling

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2005	433	334	672	202	3	1	6	112
2006	427	246	789	343	3	1	6	188
2007	437	355	610	220	2	1	8	137
2008	441	338	698	311	3	1	6	79
2009	431	304	661	306	2	1	4	45
2010	429	270	710	754	2	1	7	127
2011	447	347	651	478	2	1	6	91
2012	449	361	758	400	2	1	6	57
2013	440	338	695	390	3	1	5	47
2014	432	347	654	198	2	1	7	42
2015	432	365	615	175	3	1	6	36

Table 3. Summary of total length (mm) and age data for NCDMF fishery-independent sampling programs

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2005	198	7	644	3,769	2	0	4	516
2006	219	12	583	3,560	3	0	4	539
2007	190	12	570	3,812	1	0	5	513
2008	242	7	680	4,270	1	0	5	816
2009	251	24	689	3,230	1	0	5	414
2010	227	13	583	4,168	1	0	5	1,072
2011	294	26	712	2,604	1	0	6	720
2012	258	30	655	4,878	1	0	3	1,112
2013	229	20	684	3,534	1	0	6	678
2014	236	22	634	2,339	1	0	3	802
2015	230	21	622	2,133	1	0	3	463

Table 4. Annual nominal abundance index values for southern flounder as catch per unit effort and standard error (SE) in NCDMF fishery-independent surveys (programs 120, 195, 135 and 915). Indices for programs 120 and 195 are considered juvenile (young of the year) abundance indices.

Year	P915 Index	P915 SE	P135 Index	P135 SE	P195 Index	P195 SE	P120 Index	P120 SE
1991			0.17	0.01	0.61	0.20	1.08	0.16
1992			0.18	0.02	4.79	1.30	2.32	0.29
1993			0.12	0.01	3.64	1.10	2.83	0.38
1994			0.08	0.01	3.18	1.20	1.60	0.23
1995			0.11	0.01	2.51	0.70	1.54	0.23
1996			0.03	0.00	9.55	2.10	7.51	0.93
1997			0.10	0.01	3.07	0.80	2.49	0.28
1998			0.08	0.01	0.37	0.10	0.74	0.14
1999			0.04	0.00	1.14	0.30	2.33	0.29
2000			0.05	0.01	0.76	0.30	3.44	0.42
2001			0.10	0.01	0.79	0.30	4.05	0.45
2002			0.14	0.01	3.02	1.50	4.07	0.55
2003	2.04	0.26	0.03	0.00	2.83	0.80	6.08	1.01
2004	1.83	0.16	0.09	0.01	1.12	0.20	3.62	0.44
2005	2.18	0.20	0.08	0.01	3.23	1.00	2.87	0.36
2006	1.35	0.11	0.13	0.01	0.99	0.30	2.42	0.32
2007	1.21	0.11	0.16	0.01	0.80	0.20	3.42	0.38
2008	1.73	0.13	0.17	0.01	0.88	0.50	2.27	0.32
2009	1.62	0.18	0.12	0.01	0.74	0.20	1.77	0.25
2010	2.40	0.14	0.05	0.01	0.92	0.30	4.70	0.63
2011	1.32	0.10	0.02	0.00	0.50	0.20	0.88	0.15
2012	1.29	0.15	0.08	0.01	4.50	1.90	2.61	0.33
2013	1.17	0.11	0.10	0.01	0.81	0.30	2.48	0.32
2014	1.20	0.12	0.05	0.00	0.43	0.20	1.72	0.29
2015	1.02	0.14	0.04	0.00	1.88	0.40	1.43	0.26

Table 5. Management action taken as a result of Amendment 1 to the Southern Flounder FMP.

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	IMPLEMENTATION STATUS
Achieving Sustainable Harvest	Commercial: Accept management measures to reduce protected species interactions as the management strategy for achieving sustainable harvest in the commercial southern flounder fishery. Specific minimum measures for the flounder gill net fishery are provided in Issue Paper 10.1.1 (page 129). Recreational: Increase the minimum size limit to 15 inches and decrease the creel limit to 6 fish--20.2% harvest reduction	1, 2, 4	Commercial: No Action Required Recreational: Proclamation FF-29-2011 (refer to Supplement A to the 2005 FMP)
Ocean Harvest of Southern Flounder	Status quo and address research recommendations	1, 2,4,7	No Action Required
Large Mesh Gill Net Related Conflicts	Status quo (implement mediation and proclamation authority to address user conflicts with large mesh gill nets)	5,8	No Action Required
Minimum Distance Between Pound Nets and Gill Nets in Currituck Sound	Status quo (200-yard minimum distance between pound nets and gill nets)	5,8	No Action Required
Exploring the Elimination of the Recreational Commercial Gear License (RCGL)	Status quo and address research recommendations	5,8	No Action Required
Update on Southern Flounder Bycatch in the Commercial Crab Pot Fishery	Status quo and expand research on flatfish escape devices and degradable panels under commercial conditions to other parts of the state	3	No Action Required
Southern Flounder Discards in the Recreational Hook and Line Fishery	Status quo and expand research on factors impacting the release mortality of southern flounder and on deep hooking events of different hook types and sizes	3	No Action Required
Incidental Capture of Protected Species in Southern Flounder Large Mesh Gill Net	• Request funding for state observer program	3	No Action Required

ISSUE	MANAGEMENT STRATEGY	OBJECTIVES	IMPLEMENTATION STATUS
and Pound Net Fisheries	• Apply for Incidental Take Permit for large mesh gill net fishery • Continue gear development research to minimize protected species interactions		
Gear Requirements in the Flounder Pound Net Fishery	Status quo minimum mesh size for escape panels (5.5-inch stretched mesh) and recommend further research on 5.75-inch stretched mesh escape panels	3	No Action Required
Gear Requirements in the Flounder Gill Net Fishery	Status quo minimum mesh size (5.5 inches stretched mesh)	3	No Action Required

FIGURES

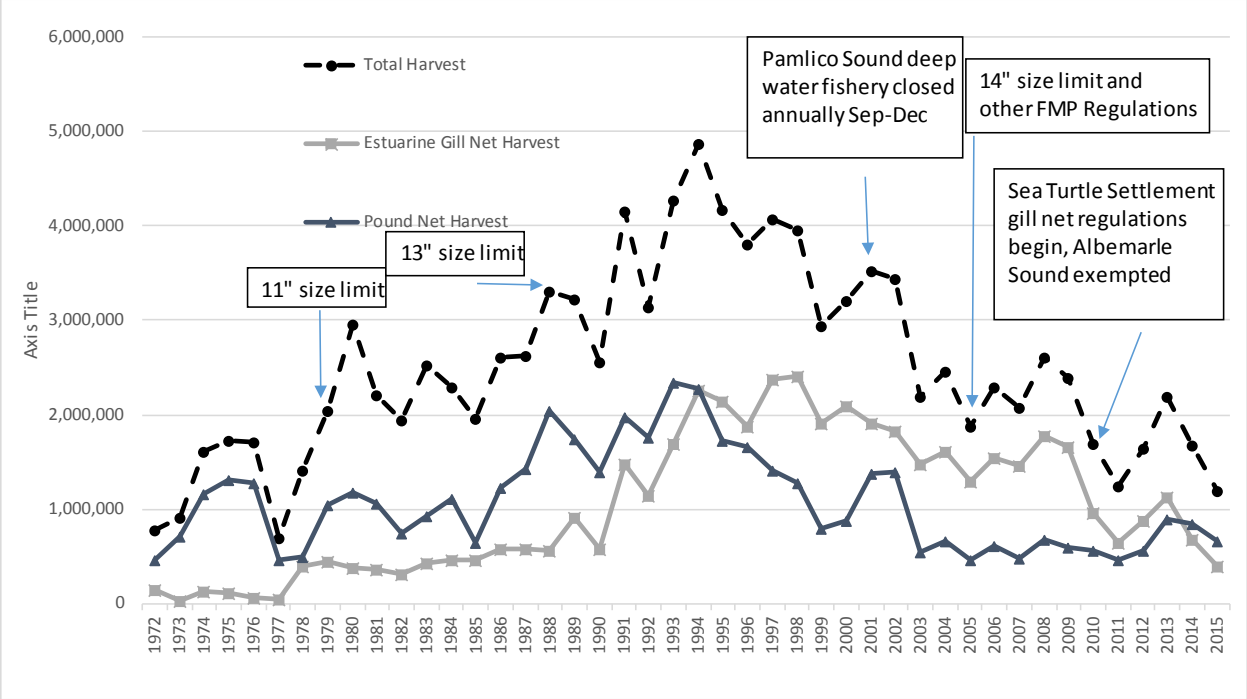


Figure 1. Landings (pounds) for total commercial fishery and top two gears (gill nets and pound nets) from N.C. Trip Ticket Program 1972-2015 with major fishery regulation changes.

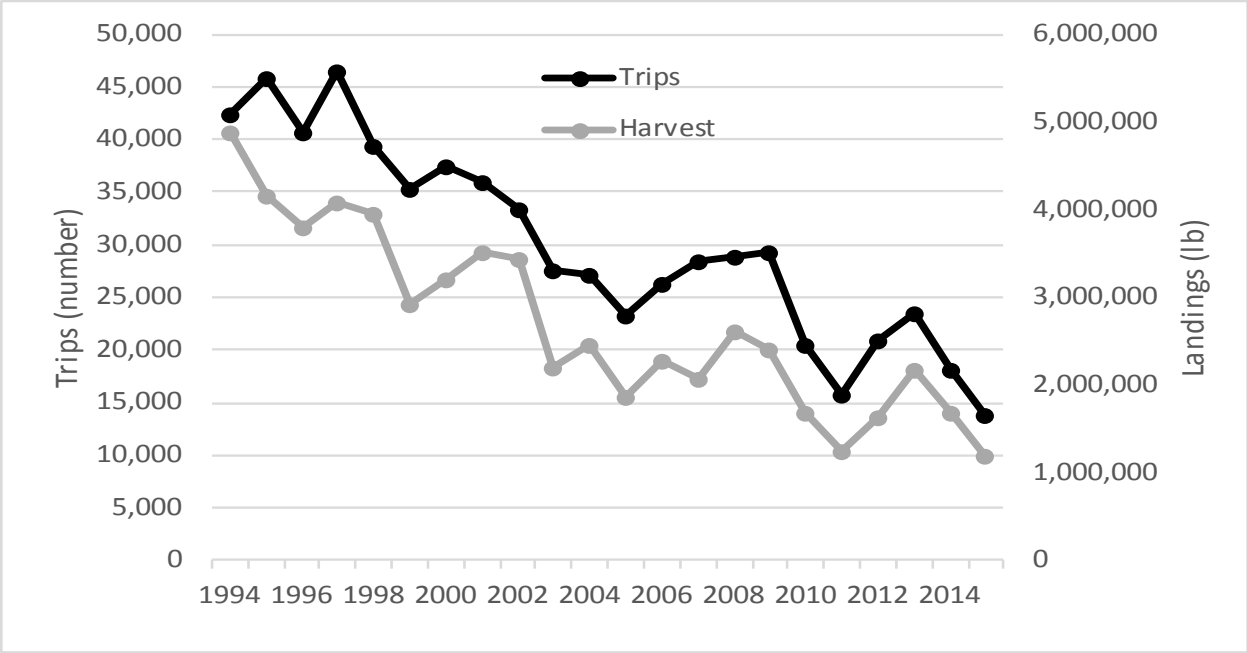


Figure 2. Commercial trips and harvest (pounds) from N.C. Trip Ticket Program, 1994-2015.

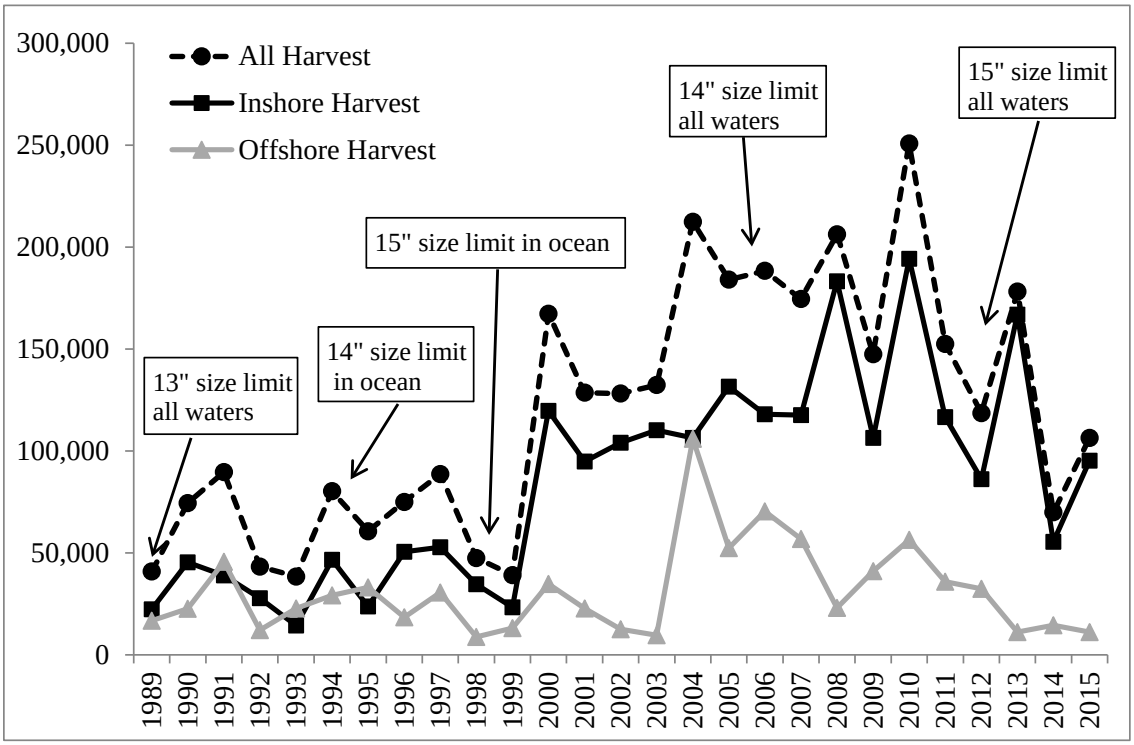


Figure 3. Recreational hook and line harvest in numbers of fish from MRIP data 1989-2015 and major fishery regulation changes.

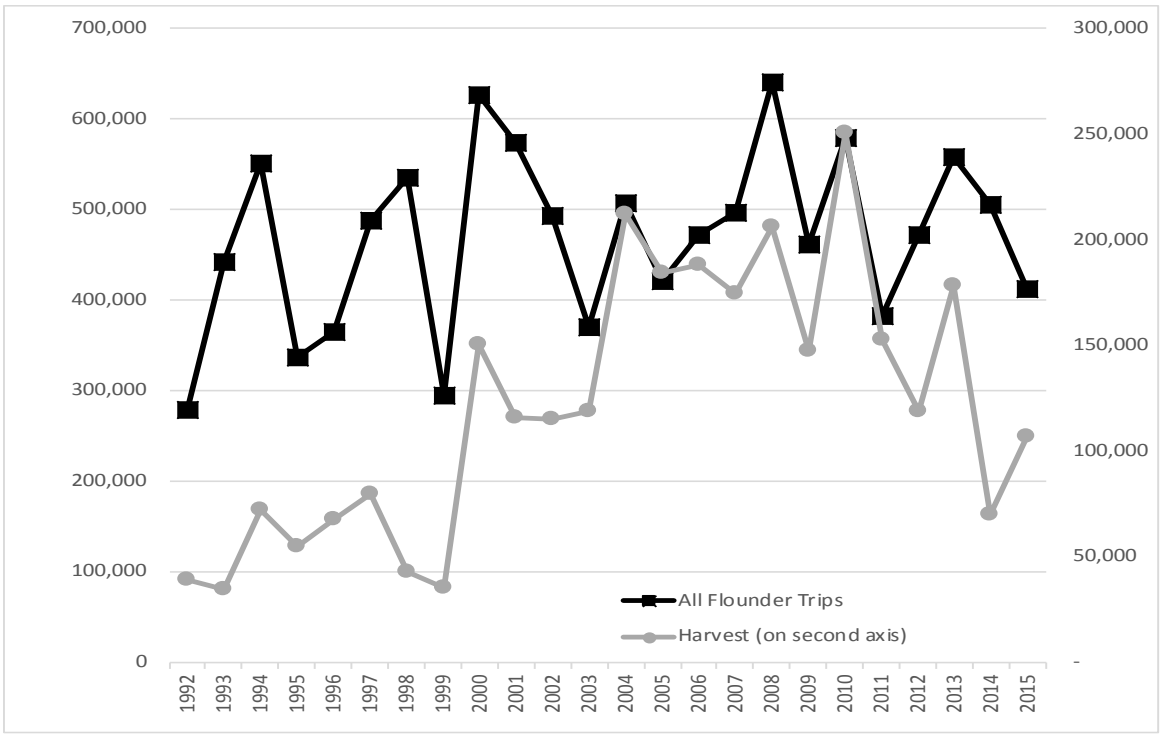


Figure 4. Recreational hook and line harvest (in numbers of fish) and all trips that harvested or released paralichthid flounder species, from MRIP data 1992-2015. Data from prior to 2004 were calibrated to align with MRIP estimates post-2004.

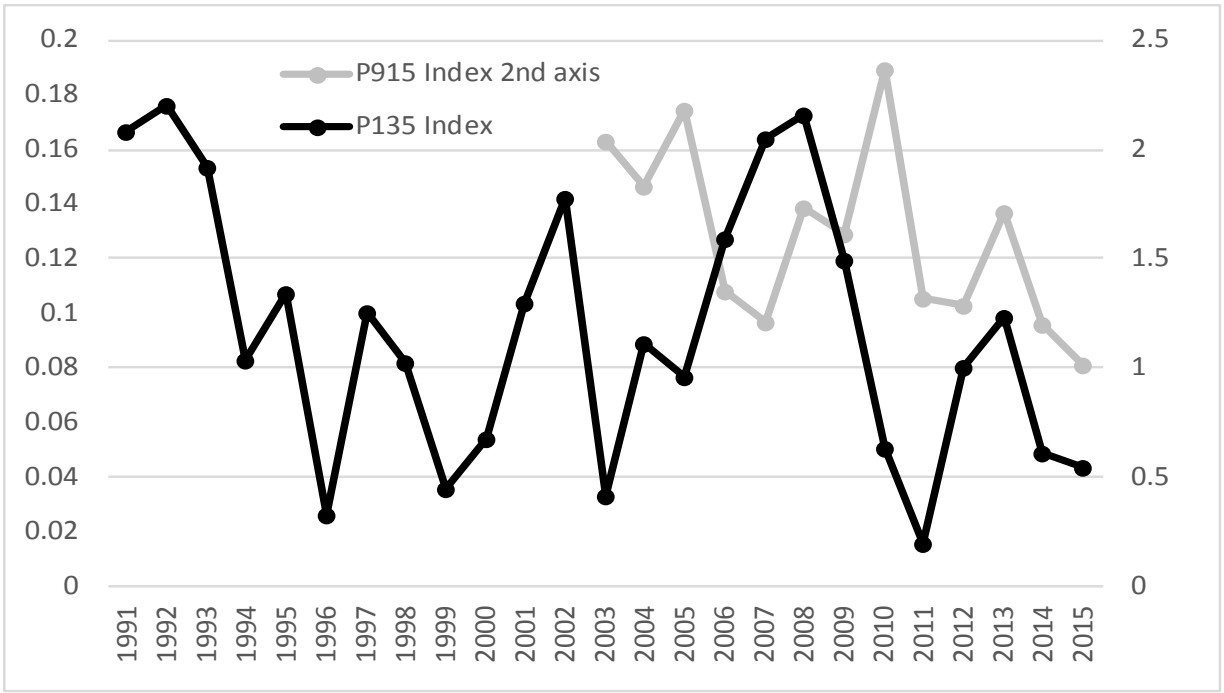


Figure 5. Annual nominal abundance index values for southern flounder (juveniles and adults) caught in the Pamlico Sound Independent Gill Net Survey (P915) and Striped Bass Independent Gill Net Survey (P135).

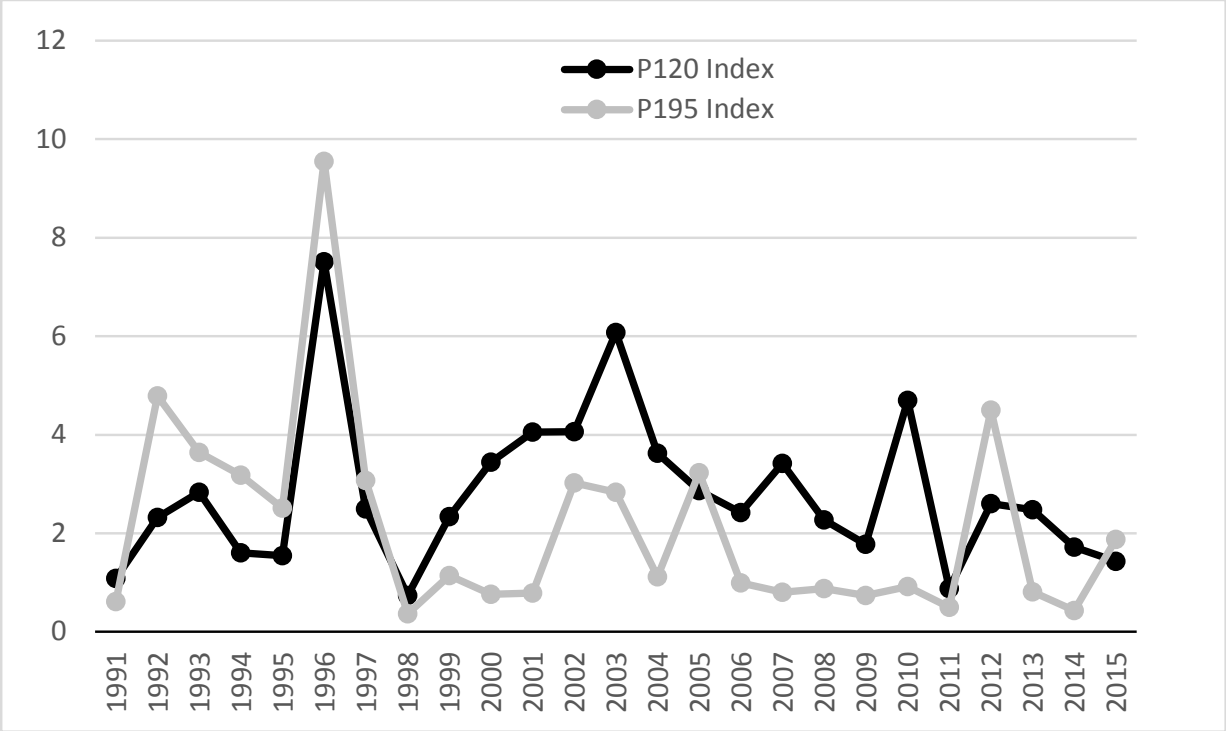


Figure 6. Annual nominal abundance index values for southern flounder (juveniles and adults) caught in the Pamlico Sound Survey (P195) and the Estuarine Trawl Survey (P120).

FISHERY MANAGEMENT PLAN UPDATE
SPOTTED SEATROUT
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	February 2012
Amendments:	None
Revisions:	None
Supplements:	Supplement A to the 2012 FMP - February, 2014
Information Updates:	None
Schedule Changes:	N/A
Next Benchmark Review:	July 2017

Spotted seatrout *(Cynoscion nebulosus)* are managed under the authority of three state and inter-state fishery management plans (FMP). The North Carolina Marine Fisheries Commission (NCMFC) currently manages spotted seatrout under the North Carolina Spotted Seatrout FMP (NCDMF 2012) and Supplement A to the 2012 FMP (NCDMF 2014). Supplement A maintains short–term measures in the spotted seatrout fishery (40% reduction at 14-inch total length minimum size) to address several sources of uncertainty in the 2009 stock assessment through acquisition and assessment of additional data. This supplement examined sources of uncertainty in the assessment, the rationale for not implementing on schedule the North Carolina Spotted Seatrout FMP February 2014 management measures, and presented possible interim management measures. At the February 2014 NCMFC meeting the commission voted to maintain short-term management measures in the spotted seatrout fishery (Proclamation FF-38-2014: 14-inch minimum size, 75-fish commercial trip limit with weekend closures in joint waters except in Albemarle and Currituck sounds; Proclamation FF-39-2014: 14-inch minimum size, four-fish recreational bag limit). These measures will remain effective until an amendment is completed.

As required in the approved 2012 FMP, a stock assessment was completed on schedule (2014/2015), peer reviewed, approved for management, and was presented to the NCMFC at its May 2015 business meeting. The North Carolina Division of Marine Fisheries (NCDMF) is on schedule to review the current state FMP for spotted seatrout by 2017 and determine if changes to management are needed through the FMP amendment process.

The Atlantic States Marine Fisheries Commission (ASMFC) manages spotted seatrout in all Atlantic States who have a declared interest in the species. In addition to the state FMP, the ASMFC manages spotted seatrout under the Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout (ASMFC 2011). The goals for the Omnibus Amendment are to bring the FMPs for the three species under the authority of the ASMFC Interstate Fishery Management Program Charter, and bringing

compliance requirements to each state. Because the intent of the Omnibus amendment was to bring the ASMFC spotted seatrout FMP into compliance with the new ASMFC charter, management measures were not adjusted and the identified objectives and compliance requirements to the states of the Omnibus Amendment are the same as Amendment I to the ASMFC spotted seatrout FMP (ASMFC 1990) and are as follows:

1. Manage the spotted seatrout fishery restricting catch to mature individuals (12-inch minimum size).
2. Manage the spotted seatrout stock to maintain sufficiently-high spawning stock biomass (20% SPR).
3. Develop research priorities that will further refine the spotted seatrout management program to maximize the biological, social, and economic benefits derived from the spotted seatrout population.

To ensure compliance with the stated ASMFC plan requirements, the state also manages spotted seatrout under the Interjurisdictional Fisheries Management Plan (IJ FMP). The goal of the IJ FMP is to adopt FMPs, consistent with N.C. law, approved by the Councils or the ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal Councils FMPs) and the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA), are similar to the goals of the Fisheries Reform Act of 1997 to "ensure long-term viability" of these fisheries. The management measures included in the IJ FMP for spotted seatrout are mirrored from the ASMFC plan and are intended to provide a mechanism for compliance of the federal plan (NCDMF 2015).

Management Unit

The management unit for the North Carolina Spotted Seatrout FMP (NCDMF 2012) includes all spotted seatrout within the coastal and joint waters of North Carolina. The unit stock, or population unit, for North Carolina's assessment of spotted seatrout included all spotted seatrout caught in North Carolina and Virginia. Virginia landings were included in the stock assessment of spotted seatrout because of the high rate of mixing observed between North Carolina and Virginia.

Goal and Objectives

The goal of the North Carolina Spotted Seatrout FMP (NCDMF 2012) is to determine the status of the stock and ensure long-term sustainability for the spotted seatrout stock in North Carolina. To achieve this goal, it is recommended that the following objectives be met:

1. Develop an objective management program that provides conservation of the resource and sustainable harvest in the fishery.
2. Ensure the spawning stock is of sufficient capacity to prevent recruitment-overfishing.
3. Address socio-economic concerns of all user groups.
4. Restore, improve, and protect important habitats that affect growth, survival, and reproduction of the North Carolina spotted seatrout stock.
5. Evaluate, enhance, and initiate studies to increase understanding of spotted seatrout biology and population dynamics in North Carolina.
6. Promote public awareness regarding the status and management of the North Carolina spotted seatrout stock.

STATUS OF THE STOCK

Stock Status

The 2014 North Carolina spotted seatrout stock assessment indicated that the spotted seatrout stock in North Carolina and Virginia is not overfished and overfishing in not occurring. Reference points (SSB and F) for determining stock status were calculated from the assessment using the SPR thresholds (20% SPR) and targets (30%SPR) defined in the spotted seatrout FMP (NCDMF 2012). The model estimated $SSB_{20\%}$ at 394 mt and $SSB_{30\%}$ at 623 mt with a model terminal year (2012) SSB estimate of 2,513,270 pounds. Based on these results, the stock is not currently overfished ($SSB_{2012} < SSB_{20\%}$) and has not been overfished during the 1991 to 2012 time period (Figure 1). Fishing mortality reference points estimated from the model were $F_{20\%}$ at 0.656 and $F_{30\%}$ at 0.422 with a terminal year estimate of F at 0.401, close to the F target but still below suggesting that overfishing is not occurring ($F_{2012} < F_{20\%}$; Figure 2). Based on the results of the current assessment, the NCDMF has updated the status of spotted seatrout to viable. The stock assessment will be updated prior to the scheduled plan review for 2017 with data current up to 2015.

Stock Assessment

The 2014 assessment of the spotted seatrout in North Carolina and Virginia was conducted using a Stock Synthesis model that incorporated data collected from commercial and recreational fisheries, two fishery-independent surveys, and a tagging study. This approach differs from the previous NCDMF assessment of spotted seatrout, which was applied to data available from 1991 through 2008. The previous assessment utilized the ASAP2 statistical catch-at-age model and used data more limited in both area and time. The previous model relied primarily upon fishery-dependent data, one fishery-independent index, and also included age data from the North Carolina portion of the stock only.

The Stock Synthesis model has been thoroughly vetted through the stock assessment community and peer reviewed literature. The time period used for the assessment was 1991 through 2012 and relied on expanded fishery-independent data sources, including age data from the Virginia portion of the stock, a juvenile abundance index, and tag-return data from research conducted by Tim Ellis with North Carolina State University. The fishing year was changed from a calendar year to a biological year (defined as March 1 through February 28 or 29) to allow the model to incorporate cold stun mortalities within a single fishing year instead of across two calendar years. The maximum age was decreased from 12 years (previous assessment) to nine as the 12 year maximum was based on scale ages not otoliths. Only ages derived from otoliths were used in the current assessment.

Tagging data from Ellis' study were included in the model but did not have a significant influence on results. Multiple model configurations were attempted to account for varying natural mortality ranging from direct tagging estimates to estimates based on water temperature correlations: however, no model configuration incorporating varying natural mortality would produce results (converge). Ellis' data did provide further evidence of the highs and lows associated with spotted seatrout natural mortalities and the need for a custom model that can incorporate these highly variable mortality rates. The NCDMF recognized the need to develop a model that will accept variable natural mortality estimates. Developing a custom model that can incorporate variable natural mortality was added as a research recommendation and the NCDMF will continue to investigate this during the next assessment.

The results of this assessment suggest the age structure of the spotted seatrout stock has been expanding during the last decade. However, an abrupt decline is evident in the model's estimate of recruitment after 2010, although this is not mirrored in the empirical survey data. Spawning stock biomass (SSB) increased to its maximum in 2007 but has since declined to close to the time series average. In 2012, estimated SSB was 2,513,270 pounds, which is greater than the currently defined threshold for assessing whether the stock is overfished (SSB30%=868,621 pounds; Figure 1). Fishing mortality has varied without apparent trend, but periods of high fishing mortality seem to coincide with the decline in spawning stock biomass and may be attributed to cold stun events. The 2012 estimate of fishing mortality was 0.40, which is less than the fishing mortality threshold (F20%=0.66), indicating that the stock is not experiencing overfishing; however, the 2012 estimate of fishing mortality (0.40) is very near the target fishing mortality of F30%=0.42 (Figure 2).

The current stock assessment will be updated with data through 2015 before the scheduled plan review starting in 2017.

STATUS OF THE FISHERY

Current Regulations

The NCDMF currently allows the recreational harvest of spotted seatrout seven days per week with a minimum size limit of 14-inches total length (TL) and a daily bag limit of four fish. The commercial harvest is limited to a daily limit of 75 fish with a minimum size limit of 14-inches T). It is unlawful for a commercial fishing operation to possess or sell spotted seatrout for commercial purposes taken from Joint Fishing Waters of the state from midnight on Friday to midnight on Sunday each week; the Albemarle and Currituck sounds are exempt from this weekend closure.

Commercial Landings

Commercial landings from 2015 were the second lowest over the last 10 years and third lowest since 1989 (Table 1; Figure 3). Annual landings over the last 10-year period have averaged 259,125 lb but have varied by almost 300,000 lb (2007 and 2011) with 2015 landings being about half the average. During the early to mid-1990s, landings in the ocean and estuarine areas were more similar than in the remainder of the time series (1989-2015) in which estuarine landings have dominated. The primary gear of harvest are gill nets (set, drift, and run around) accounting for 93% of the 2015 landings.

Recreational Landings

Recreational data are collected through an angler based survey program, the Marine Recreational Information Program (MRIP), and are reported in various harvest types with associated sampling error. Estimated recreational harvest (Type A + B1) of spotted seatrout in 2015 was 148,926 lb (PSE = 23.1%) and 87,396 fish (PSE = 22.2%), lowest over the last 10-year period (Table 1; Figure 3). However, estimated recreational releases in 2015 were the second highest (1,813,052 fish; PSE = 22.9%) over the last 10-year period (Table 1). Citations awarded through the North Carolina Saltwater Fishing Tournament for spotted seatrout have varied by year since 2006 but have averaged 218 citations since requirements were changed in 2008 (Table 2).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fish houses are sampled on a monthly basis to provide length, weight, and age data to describe the commercial fisheries. This information is used to characterize the commercial fishery for stock assessments and to monitor trends in the size and age of fish being removed from the stock. The number of fish sampled by division staff at commercial fish houses has varied over time due to annual variability in landings of the fishery, however; mean, minimum, and maximum lengths of spotted seatrout have not varied much between years for either the commercial or recreational (Table 3) fisheries. The bulk of spotted seatrout landings by the commercial fishery (93%) come from the ocean and estuarine gill net fishery with gigs (5.5%) and all other gears (1.5%) accounting for the rest.

Fishery-Independent Monitoring

The NCDMF utilizes numerous independent monitoring programs to provide indexes of juvenile (Program 120) and adult (Program 915) abundances to include in stock assessments. Program 120, the North Carolina Estuarine Trawl Survey, is a fishery-independent multispecies monitoring program that has been ongoing since 1971 in the months of May and June. One of the key objectives of this program is to provide a long-term data base of annual juvenile recruitment for economically important species. This survey samples fixed stations, a set of 104 core stations with additional stations as needed. The core stations are sampled from western Albemarle Sound south to the South Carolina border each year without deviation two times in the months of May and June. Data from this program are used to generate an index of relative abundance of age-0 spotted seatrout for all in-state waters. The resulting Catch Per Unit Effort (CPUE) index, which is the average number of fish per tow, for the current 10-year time series remained somewhat constant with no significant trends in CPUE but with peaks in 2008, 2012, and 2013, suggesting relatively higher recruitment in those years (Figure 4).

The NCDMF started a fishery independent gill net survey (Program 915) in 2001 as a way to generate a long-term database of age composition and develop indices of abundance for numerous commercial and recreationally important finfish species, including spotted seatrout. The survey utilizes a stratified random sampling scheme designed to characterize the size and age distribution for key estuarine species in Pamlico Sound and help managers assess the spotted seatrout stocks without relying solely on commercial and recreational fishery dependent data. For the most recent stock assessment, four indices were generated from data collected from the survey; spring, summer, fall, and abundance from the southern portion of the survey. All four Program 915 indices varied without trend over the respective time series Figures 5-8). A peak was observed in 2009 in the spring (Figure 5), summer (Figure 6), and southern (Figure 8) indices. This corresponds with the peak observed in 2008 in the Program 120 age-0 index (Figure 4). The fall index exhibited a peak in 2006 (Figure 8). All the Program 915 indices suggest an increase in adults in the terminal year of the assessment, 2012, to varying degrees.

MANAGEMENT STRATEGY

Reduce F to maintain a 20% SPR which will increase the likelihood of sustainability through an expanded age structure and an increase in the spawning stock biomass. This strategy should provide a greater cushion for the population that would likely lead to faster recovery of the population after cold stun events. Consider revising reference points after the stock is reassessed in the next plan review based on the response of the population to the management measures selected in the initial FMP. The Director will maintain authority to intervene in the event of a catastrophic cold stun event and do what is necessary in terms of temporary closures by water body (Table 5 and 6).

MANAGEMENT AND RESEARCH NEEDS

The following research needs were compiled from those listed in the 2012 North Carolina Spotted Seatrout FMP. Improved management of spotted seatrout is dependent upon research needs being met. Research needs are not listed in order of priority**.**

- Develop a juvenile abundance index to gain a better understanding of a stock recruitment relationship – ongoing, using program 120 since 2004
- Research the feasibility of including measures of temperature or salinity into the stock-recruitment relationship could be researched - not completed
- Determine batch fecundity estimates for North Carolina – not completed
- Size specific fecundity estimates for North Carolina spotted seatrout – not completed
- Area specific spawning surveys could help in the delineation of area specific closures to protect females in spawning condition – not completed
- Investigation of the relationship of temperature with both adult and juvenile mortality – started in 2015, monitoring temperatures in over wintering habitat of spotted seatrout
- Incorporate cold stun event information into the modeling of the population – attempted using stock synthesis model, unsuccessful.
- Estimate or develop a model to predict the impact of cold stun events on local and statewide spotted seatrout abundance – attempted using stock synthesis model, unsuccessful.
- Obtain samples (length, age, weight, quantification) of the cold stun events as they occur – obtained samples in 2001, 2014, and 2015 (length, weight, sex, age)(did not quantify extent of kills)
- Define overwintering habitat requirements of spotted seatrout – not conducted
- Determine factors that are most likely to influence the severity of cold stun events in North Carolina, and separate into low and high salinity areas – Tim Ellis and the spotted seatrout Plan Development Team worked on this but were unable to incorporate into models.
- Investigate the distribution of spotted seatrout in nursery and non-nursery areas – not completed
- Further research on the possible influences of salinity on release mortality of spotted seatrout – not completed
- Survey of fishing effort in creeks with conflict complaints – not completed
- Determine targeted species in nursery areas and creeks with conflict complaints – not completed
- Microchemistry, genetic, or tagging studies are needed to verify migration patterns, mixing rates, or origins of spotted seatrout between North Carolina and Virginia – Tim Ellis data (2008-2013), NCDMF CRFL study 2014 - present
- Tagging studies to verify estimates of natural and fishing mortality – Ellis data and NCDMF ongoing

- Tagging studies to determine if there are localized populations within the state of North Carolina (e.g., a southern and northern stock) – Ellis data and NCDMF ongoing
- A longer time series and additional sources of fishery-independent information – longer series available as well as 915 survey for rivers and southern portion of state
- Increased observer coverage in a variety of commercial fisheries over a wider area - ongoing
- Expand nursery sampling to include SAV bed sampling in high and low salinity areas during the months of July through September – not completed
- Evaluate the role of shell hash and shell bottom in spotted seatrout recruitment and survival, particularly where SAV is absent – not completed
- Evaluate the role of SAV in the spawning success of spotted seatrout – not completed

FISHERY MANAGEMENT PLAN RECOMMENDATIONS

Recommend maintain the current timing of the Benchmark Review, which to the NCMFC recommended in May 2015 to delay review of the 2012 spotted seatrout FMP until 2017, but keeping the review within the 5-year mandatory review cycle.

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TABLES

Table 1. Recreational harvest (number of fish released and weight in pounds) and releases (number of fish) and commercial harvest (weight in pounds) of spotted seatrout from North Carolina for the time period 2006-2015.

	Recreational			Commercial	
	Number of fish		Weight (lb)		
Year	Released	Harvested	Harvested	Harvested (lb)	Total Weight Harvested (lb)
2006	594,955	565,042	821,982	312,620	1,134,602
2007	848,682	531,614	879,306	374,722	1,254,028
2008	880,560	654,435	1,005,548	304,430	1,309,978
2009	1,213,526	608,790	954,845	320,247	1,275,092
2010	1,684,872	195,065	407,534	200,822	608,356
2011	1,916,249	215,922	403,517	75,239	478,756
2012	1,646,512	500,522	817,551	265,016	1,082,567
2013	1,427,410	369,265	649,158	367,401	1,016,559
2014	960,570	234,045	433,978	241,995	675,973
2015	1,813,052	87,396	148,926	128,762	297,295

Table 2. Total number of awarded citations for spotted seatrout (>24-inches total length for release or > 5 lb landed) from the North Carolina Saltwater Fishing Tournament for the time period 2006-2015.

Year	Total Citations*	Release Citations[+]	% Release[+]
2006	686	-	-
2007	1000	-	-
2008	428	5	1.2
2009	434	14	3.2
2010	168	16	9.5
2011	37	3	8.1
2012	143	5	3.5
2013	162	21	13.0
2014	197	18	9.1
2015	176	16	9.1

*Minimum qualifying weight increased from 4 lb to 5 lb in 2008
[+]Release citations were not offered prior to 2008

Table 3. Mean, minimum, and maximum lengths (total length, mm) of spotted seatrout collected from the commercial and recreational fisheries and the total number of awarded citations for spotted seatrout (>24-inches total length for release or > 5 lb landed) from the North Carolina Saltwater Fishing Tournament in North Carolina for the time period 2006-2015.

	Commercial				Recreational			
Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	418	225	745	4,905	398	257	659	706
2007	442	57	788	6,577	407	275	704	521
2008	436	43	770	4,741	397	293	674	790
2009	425	71	706	5,238	407	230	661	779
2010	448	300	784	3,208	448	315	630	336
2011	422	229	706	970	431	313	615	638
2012	422	222	685	3,805	415	330	612	939
2013	425	46	723	4,193	428	256	598	863
2014	440	139	719	3,244	436	332	660	379
2015	465	225	786	2,672	425	325	634	152

Table 4. Modal age, minimum age, maximum age, and number aged for spotted seatrout collected through NCDMF sampling programs from 1988 through 2015.

Year	Modal Age	Min Age	Max Age	Number Aged
1991	1	0	7	707
1992	1	0	6	594
1993	1	0	6	698
1994	1	0	9	701
1995	1	0	5	653
1996	1	0	6	1,010
1997	1	0	6	730
1998	1	0	9	781
1999	1	0	6	877
2000	1	0	7	566
2001	1	0	5	426
2002	1	0	7	715
2003	1	1	7	433
2004	1	0	6	600
2005	1	0	5	731
2006	1	0	8	974
2007	2	0	8	706
2008	1	0	7	619
2009	2	0	6	663
2010	1	0	6	646
2011	1	0	6	429
2012	1	0	5	598
2013	2	0	5	641
2014	1	0	7	555
2015	2	0	5	401

Table 5. Summary of the NCMFC management strategies and their implementation status for the 2012 N.C. Spotted Seatrout FMP.

NCMFC Selected Management Strategy	Implementation Status
½ reduction needed, 6 fish bag, 14-inch minimum size, and weekend closure for commercial gears year-round (no possession on weekends).	Accomplished; multiple proclamations
A maximum of 2 fish over 24 inches for recreational fishermen	Change in management strategy
The small mesh gill net attendance requirement is extended to include weekends, December through February	Accomplished
Development of a mutual aid agreement between NCDMF Marine Patrol and WRC Wildlife Enforcement Officers for Inland fishing waters	Accomplished
Move forward with the mediation policy process to resolve conflict between spotted seatrout fishermen	Conflict resolution process established under Rule NCAC 03I .0122.
Remain status quo with the assumption that the Director will intervene in the event of a catastrophic event and do what is necessary in terms of temporary closures by water body	Repeal Rule 15A NCAC 03M.0504 and utilize proclamation authority in 15A NCAC 03M.0512
More extensive research on cold stun events by NCDMF, Universities, etc.	Ongoing

Table 6. Summary of the NCMFC management strategies and their implementation status for Supplement A to the 2012 N.C. Spotted Seatrout FMP.

NCMFC Selected Management Strategy	Implementation Status
Immediately: 14-inch minimum size limit, 4 recreational bag limit, 75 fish commercial trip limit, no gillnets in joint waters on weekends, unlawful for a commercial operation to possess or sell spotted seatrout taken from joint waters on weekends.	Proclamation FF-38-2014 and FF-39-2014
2014: 14-inch minimum size limit, 3 fish recreational bag limit with a December 15- January 31 closure, 25 fish commercial trip limit (no closure)	Change in management strategy
If Cold Stun Occurs: close spotted seatrout harvest through June 1and retain 4 fish recreational bag limit and 75 fish commercial trip limit	Utilize proclamation authority in 15A NCAC 03M.0512
Revisit the Spotted Seatrout FMP in 3 years to determine if sustainable harvest measures are working	On schedule

FIGURES

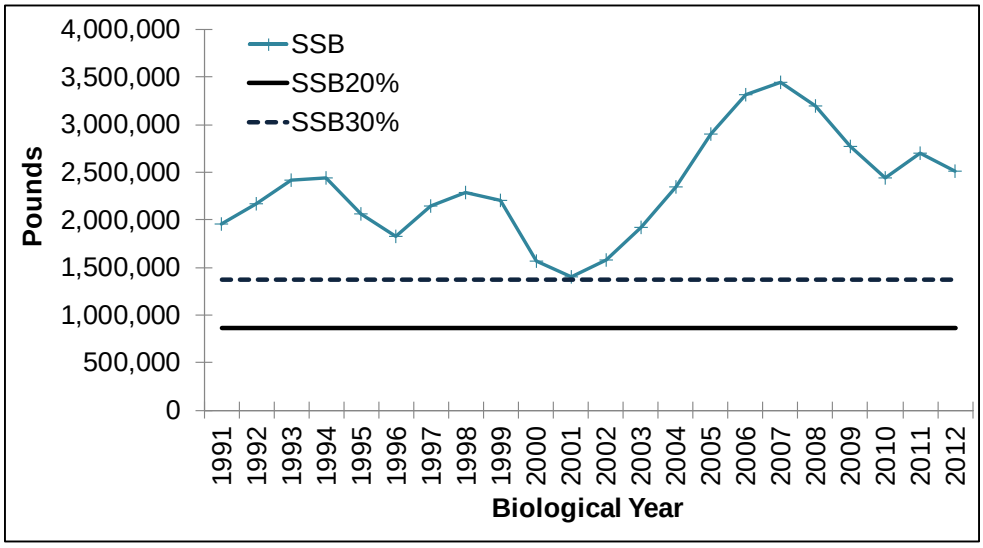

Figure 1. Annual predicted spawning stock biomass compared to estimated $SSB_{Threshold}$ ($SSB_{20\%}$) and SSB_{Target} ($SSB_{30\%}$), 1991-2012.

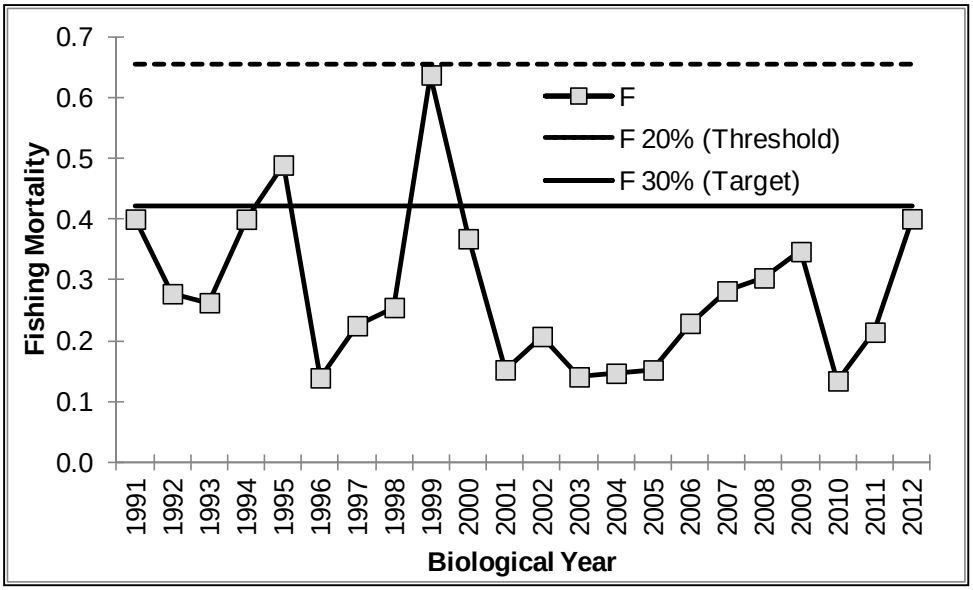

Figure 2. Annual predicted fishing mortality rates (numbers-weighted, ages 1–4) compared to estimated $F_{Threshold}$ ($F_{20\%}$) and F_{Target} ($F_{30\%}$), 1991-2012.

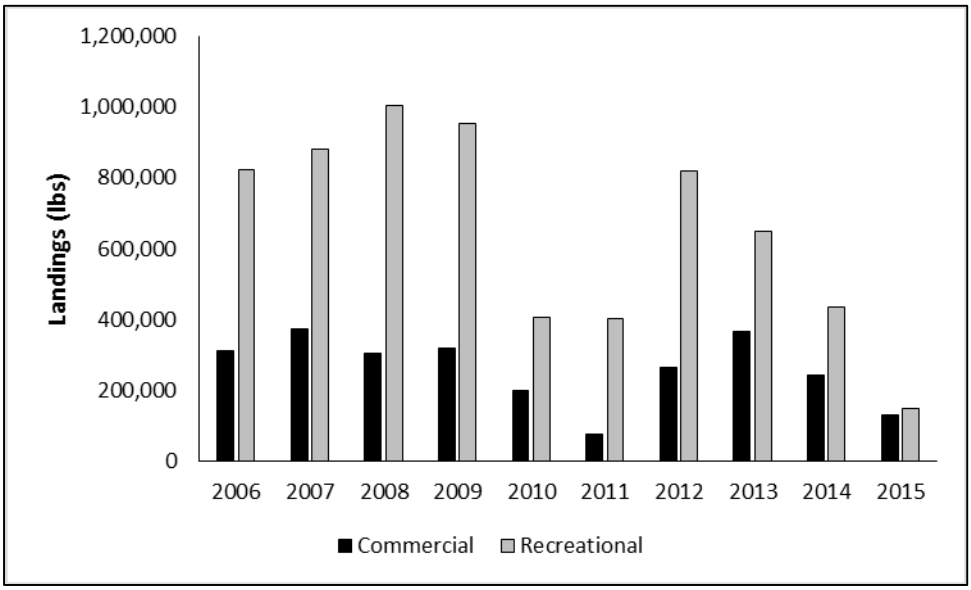

Figure 3. Commercial landings reported through the North Carolina Trip Ticket Program and recreational landings estimated from the MRIP survey (Type A + B1) for North Carolina from 2006 – 2015.

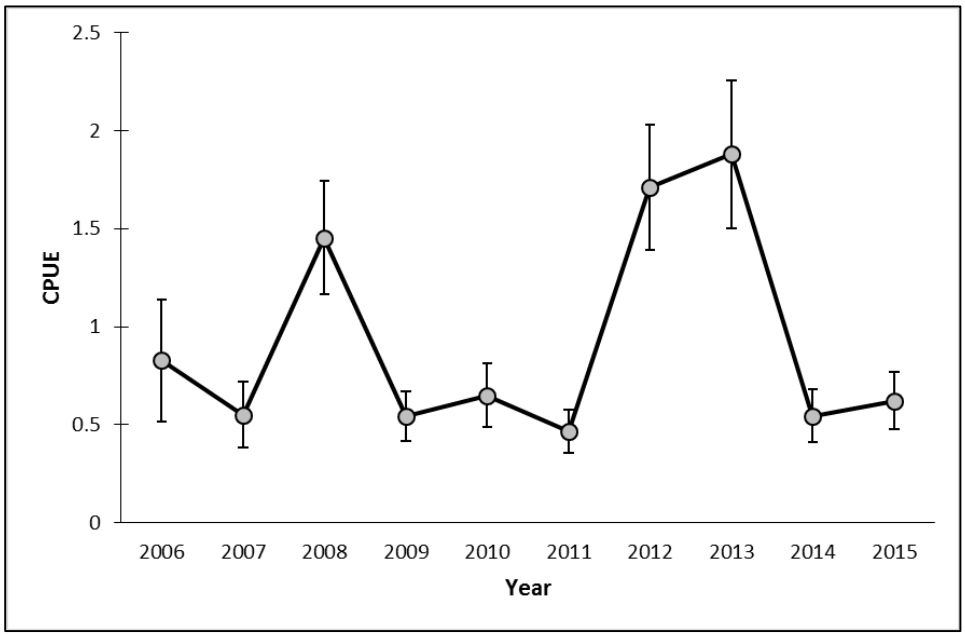

Figure 4.Catch per unit effort (CPUE; fish per-tow) from the North Carolina Estuarine Trawl Survey (Program 120) during June and July, 2006–2015. Error bars represent ± 1 standard error.

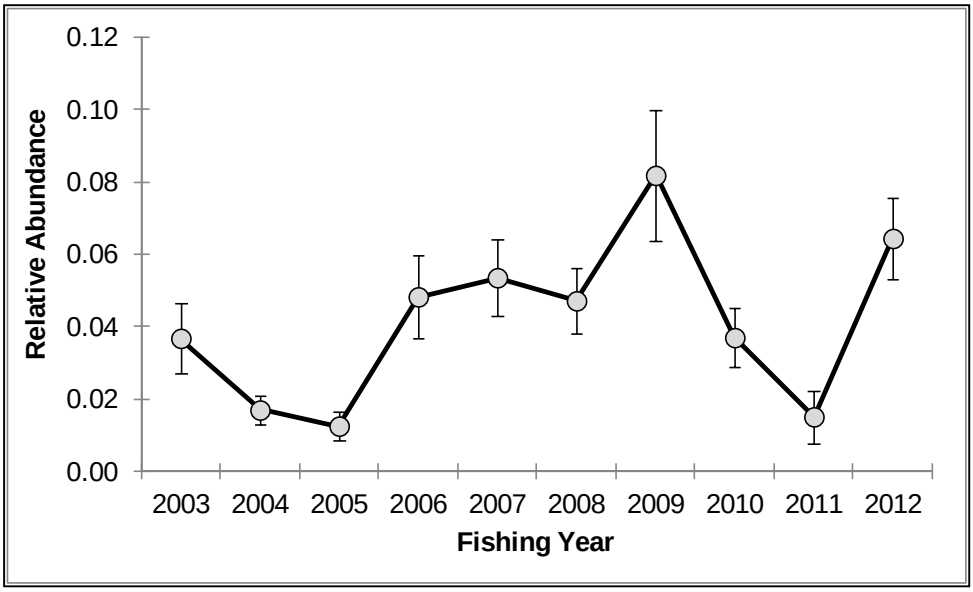

Figure 5. Generalized Linear Model (GLM)-standardized index of relative abundance for spotted seatrout collected from Program 915 during spring (May–June), 2003–2012. Error bars represent ± 1 standard error.

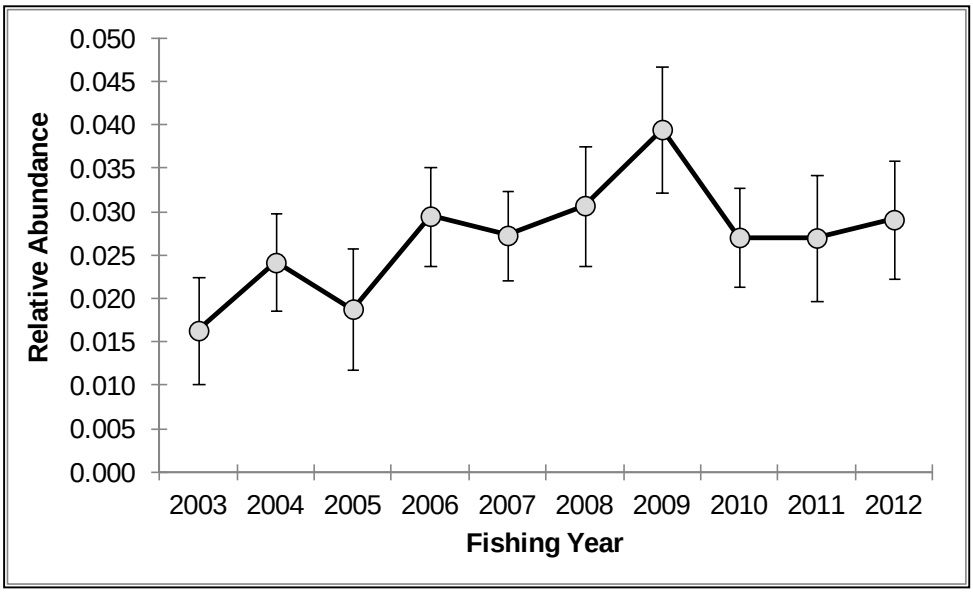

Figure 6. Generalized Linear Model (GLM)-standardized index of relative abundance for spotted seatrout collected from Program 915 during summer (July–August), 2003–2012. Error bars represent ± 1 standard error.

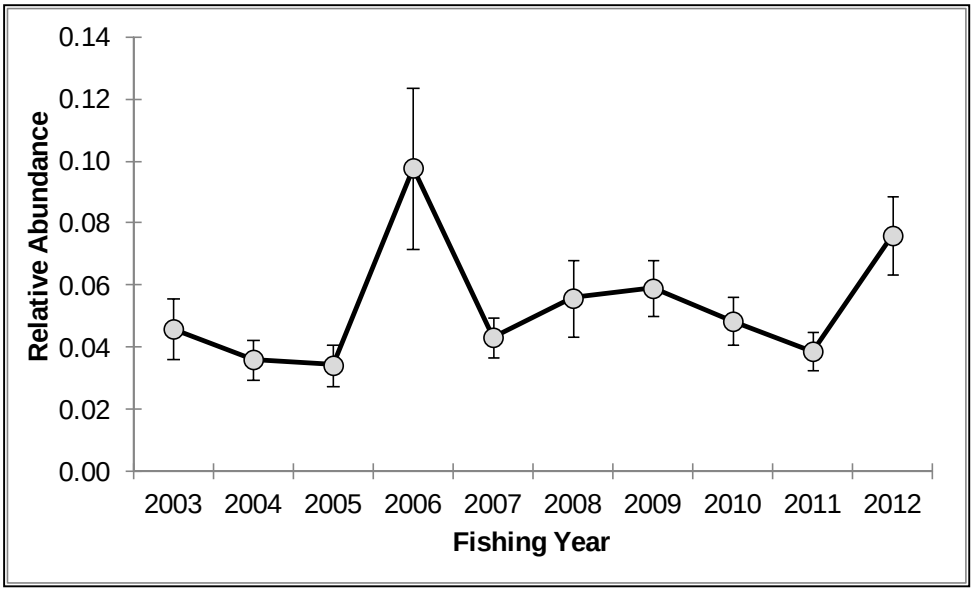

Figure 7. Generalized Linear Model(GLM)-standardized index of relative abundance for spotted seatrout collected from Program 915 during fall (September–November), 2003–2012. Error bars represent ± 1 standard error.

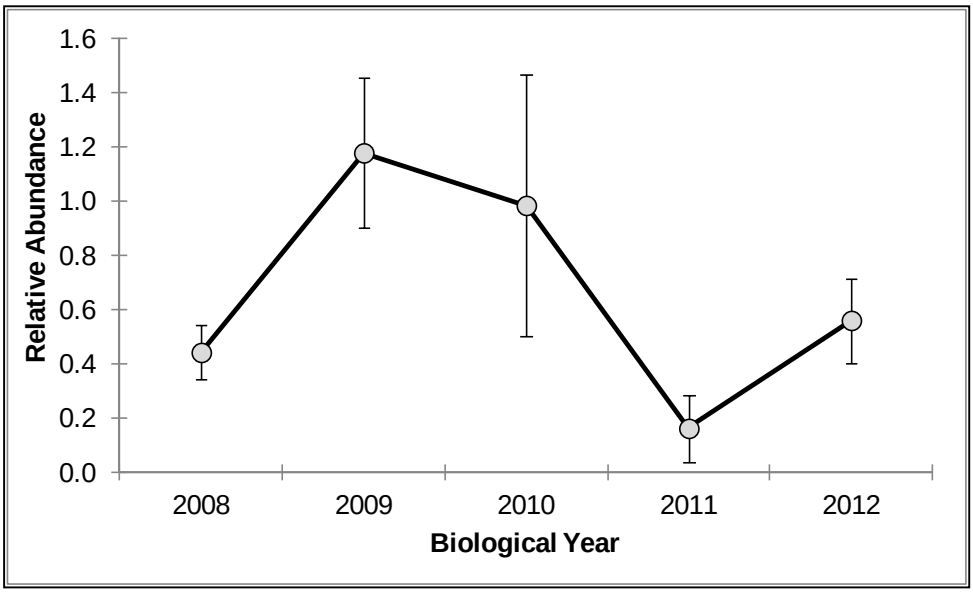

Figure 8. Generalized Linear Model (GLM)-standardized index of relative abundance for spotted seatrout collected from Program 915 during spring (May–June) in the southern sampling stations, 2008–2012. Error bars represent ± 1 standard error.

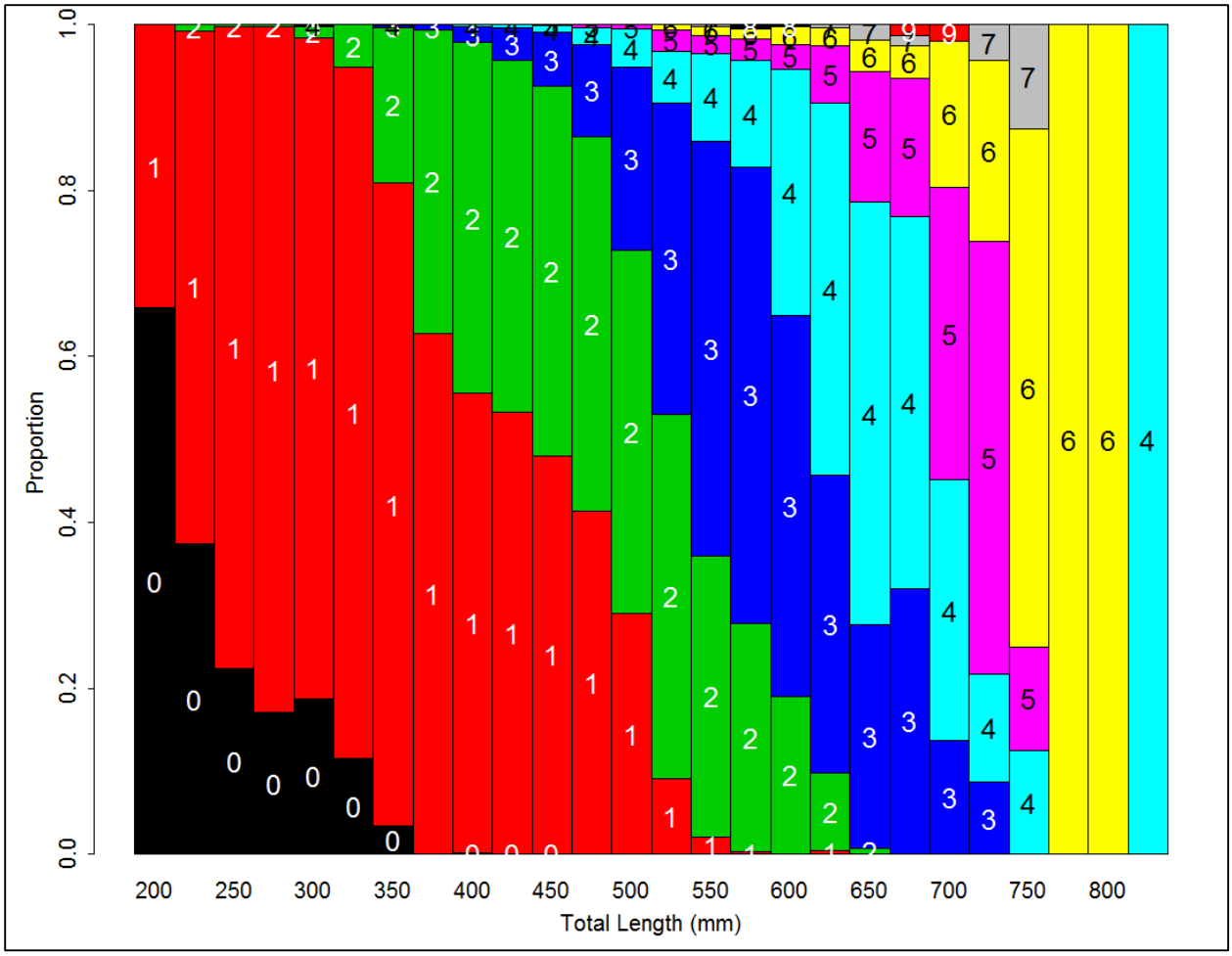

Figure 9. Proportion of ages by size class (25mm size bins) of all spotted seatrout aged by NCDMF, 1991-2015.

FISHERY MANAGEMENT PLAN UPDATE – No schedule change recommended
STRIPED MULLET
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	April 2006
Amendments:	November 2015
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	2019

The North Carolina Fishery Management Plan (FMP) for striped mullet was adopted in April 2006 and reclassified the stock as viable. The management plan established minimum and maximum landings thresholds of 1.3 million pounds and 3.1 million pounds, respectively. If landings fall below the minimum threshold, the North Carolina Division of Marine Fisheries (NCDMF) would initiate further analysis of the data to determine if the decrease in landings is attributed to stock decline or decreased fishing effort. If landings exceed the 3.1 million pounds, the NCDMF would initiate analysis to determine if harvest is sustainable and assess what factors are driving the increase in harvest. The striped mullet FMP established a possession limit of 200 mullets (white and striped in aggregate) per person in the recreational fishery.

Amendment 1 to the N.C. Striped Mullet FMP was adopted in November 2015 and rules were implemented in April 2016. Amendment 1 maintained the stock classification as viable. Issues addressed in Amendment 1 included: 1) resolution of Newport River gill net attendance, 2) addressing user group conflicts, and 3) updating the management framework for the N.C. striped mullet stock. Amendment 1 updated the minimum and maximum commercial landings triggers to 1.13 and 2.76 million pounds, respectively, that would warrant a closer examination of data.

Management Unit

Coastal and joint waters of North Carolina.

Goal and Objectives

The goal of Amendment I to the North Carolina Striped Mullet FMP is to manage the striped mullet fishery to preserve the long-term viability of the resource that maintains sustainable harvest, maximizes the social and economic value, and considers the needs of all user groups. The following objectives will be used to achieve this goal:

Objectives:

1. Use a management strategy that provides for conservation of the striped mullet resource and promotes sustainable harvest while considering the needs of all user groups.

2. Promote the protection, enhancement, and restoration of habitats and water quality necessary for the striped mullet population.

3. Minimize conflict among user groups, including non-fishing user groups and activities.

4. Promote research to improve the understanding of striped mullet population dynamics and ecology to improve management of the striped mullet resource.

5. Initiate, enhance, and/or continue studies to collect and analyze the socio-economic data needed to properly monitor and manage the striped mullet fishery.

6. Promote public awareness regarding the status and management of the North Carolina striped mullet stock.

STATUS OF THE STOCK

Stock Status

Stock assessment information is based on data through 2011. A population assessment of the North Carolina striped mullet stock was conducted using the Stock Synthesis model, which incorporated data from commercial fisheries and three fishery-independent surveys from 1994 to 2011. Spawning stock biomass increased from 2003 through 2007, but has since declined. Recruitment has also declined in recent years, though a slight increase was observed in 2011. Fishing mortality (F) has increased in recent years, but F in the terminal year (F_{2011} = 0.437) was below both the fishing mortality target ($F_{35\%}$ = 0.566) and threshold ($F_{25\%}$ = 0.932). Based on these results, the stock is not undergoing overfishing. A poor stock-recruit relationship resulting in unreliable biomass-based reference points prevents determining if the stock is currently overfished (NCDMF 2013).

Stock Assessment

The striped mullet stock was modeled using Stock Synthesis text version 3.24f (Methot 2000, 2011; NFT 2011; Methot and Wetzel 2013), which was also used to calculate reference points. The Stock Synthesis model can incorporate information from multiple fisheries, multiple surveys, and both length and age composition data. The structure of the model allows for a wide range of model complexity depending upon available data. The strength of the model is it explicitly models both the dynamics of the population and the processes by which one observes the population and its fisheries. That is, the comparison between the model and the data is kept close to the natural basis of the observations, instead of manipulating the observations into the format of a simpler model. Another important advantage is the model allows for (and estimates) selectivity patterns for each fishing fleet and survey (NCDMF 2013).

STATUS OF THE FISHERY

Current Regulations

There are no size restrictions, but as of July 1, 2006 there is a 200 mullet (white and striped aggregate) daily possession limit per person in the recreational fishery and the mutilated finfish rule was modified to exempt mullet used as bait.

Commercial Landings

Since 1994 striped mullet landings have ranged from a low of 1,247,044 lb in 2015 to a high of 2,829,086 lb in 2000 (Figure 1). From 2003 to 2009 landings were stable between 1,598,617 and 1,728,607 lb before increasing to 2,082,832 lb in 2010. Since 2010 landings fluctuated between approximately 1.5 and 2 million lb before dropping significantly in 2015. The single time landings have fell outside of thresholds established by Amendment I was in 2000 when they exceeded the upper threshold.

Recreational Landings

The Marine Recreational Information Program is primarily designed to sample anglers who use rod and reel as the mode of capture. Since the majority of striped mullet are caught with cast nets for bait, recreational harvest data are imprecise. Misidentification between striped mullet and white mullet is also common. Bait mullet are usually released by anglers before observation by creel clerks and therefore cannot be identified to the species level.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The total number of striped mullet measured in fishery dependent programs has ranged from 5,923 to 13,183 from 2006-2015 (Table 1). Mean length varied little, generally falling between 343 and 360 mm. Minimum and maximum lengths generally fell within a small range, though in 2011 the minimum was 166 mm which is much lower than the minimum in other years (Table 1).

Fishery-Independent Monitoring

Modal age was two in all years except 2005, 2013, and 2014 when the modal age was one (Table 2). Minimum age was zero in every year except 2010 when the minimum age was one. Maximum age ranged from six in 2012 and 2013 to 14 in 2011. From 2005 through 2008 the maximum age was 10 and in 2009 the maximum age was 13. The number of fish aged varied little from 2005 through 2011 (mean=648 aged per year), though in 2009 only 349 fish were aged. The number of age samples increased from 2012 through 2014 ranging from 933 to 998 over that time period. Age data from 2015 is not currently available.

To provide the most relevant index from the NCDMF Striped Mullet Electroshock Survey, data were limited to those collected during January through April, when striped mullet were most abundant in the Neuse River. Since the survey primarily catches adult striped mullet, juveniles were excluded from analysis. A sample represents all the fish collected over a 500 m transect. Striped mullet catch-per-unit-effort (CPUE) was stable at approximately 100 fish per sample from 2005 through 2009 before spiking in 2010 and 2011 to approximately 160 fish per sample

(Figure 2). Striped mullet CPUE dropped dramatically in 2012, potentially due to hurricanes, before increasing to near the time series average in 2013, and 2014. Striped mullet CPUE dropped again in 2015 to approximately 45 fish per sample.

To provide the most relevant index from the Independent Gill Net Survey, data were limited to samples from shallow river areas during October-November, when and where the majority of striped mullet occurred. The survey primarily catches adult striped mullet, so juveniles were excluded from analysis. From 2004-2012 striped mullet CPUE fluctuated between 3 and 8 striped mullets per sample before jumping to 13.5 in 2013 and 19.8 in 2014 (Figure 3). Striped mullet CPUE dropped significantly in 2015 to 3.3 striped mullets per sample.

MANAGEMENT STRATEGY

The proposed management strategy for the striped mullet fisheries in North Carolina is to: 1) optimize resource utilization over the long-term; 2) reduce user group conflicts; and 3) promote public education. The first strategy will be accomplished by protecting critical habitats, and monitoring stock status. To address user group conflicts, a rule change was made to limit how much of a waterway may be blocked by a runaround, drift, or other non-stationary gill nets. Specific user group conflict issues will continue to be dealt with on a case-by-case basis and management actions will be implemented to address specific fishery related problems. The North Carolina Division of Marine Fisheries (NCDMF) will work to enhance public information and education. Issues addressed in formulating Amendment I of the management plan for North Carolina's striped mullet fishery included: 1) resolution of the Newport River gill net attendance and 2) user group conflicts, and 3) updating the management framework for the N.C. striped mullet stock. See Table 3 for a summary of management strategies and outcomes.

Minimum and maximum landings thresholds of 1.13 million and 2.76 million pounds have been established to monitor the striped mullet fishery. If landings fall below the minimum landings trigger or exceed the maximum landings trigger the NCDMF will initiate further analysis of the data to determine if a new stock assessment and/or interim management action is needed.

MANAGEMENT AND RESEARCH NEEDS

See Table 4 for a summary of management and research recommendations pertaining to striped mullet from the FMP.

Biological

1. Improve data on maturity, age-growth, identification of spawning locations, and larval/juvenile movement (age-growth, maturity ongoing through the division; spawning locations, and larval/juvenile movement needed).
2. To fully quantify finfish bycatch in North Carolina commercial fisheries, the establishment of a long-term, fishery-dependent observer program is needed (ongoing through division observer program, recent expanded coverage).
3. Establish a long-term database of adult striped mullet from fishery-independent surveys for the development of an annual abundance index (ongoing through division independent gill net survey and striped mullet electroshock survey).
4. Improve and validate juvenile abundance estimates (needed).
5. Continue annual age determination and creation of age-length keys (ongoing through division).

6. Annual review of commercial and recreational fisheries (commercial ongoing; recreational needed).
7. Continue improving estimates of recreational hook and line and bait harvest (needed but some MRIP and CRFL mail survey data).
8. Continue sampling the commercial bait mullet cast net fishery to improve the estimates of striped mullet and white mullet harvest (ongoing through the division).
9. Continue independent cast net sampling to improve estimates of the proportion of striped mullet and white mullet in this fishery (discontinued; needed).

Social and Economic

1. Continue ongoing annual socioeconomic surveys with commercial fishermen, including those who participate in the striped mullet fishery, in order to monitor its social and economic components (ongoing through the division).
2. Continue ongoing RCGL surveys in order to monitor landings, as well as the social and economic elements of the striped mullet fishery (RCGL survey discontinued 2008, needed).

Education

1. Implement public outreach on waste reduction of mullets in the recreational fishery (needed).

FISHERY MANAGEMENT PLAN RECOMMENDATION

Commercial striped mullet landings have not met management thresholds established in Amendment 1. However, 2015 landings are the lowest since 1994. Declining commercial landings coinciding with declines in independent indices, while concerning, are still within thresholds established by Amendment I. Therefore, it is recommended to maintain the timing of the Benchmark Review "as is" on the current FMP schedule, but continue to monitor trends in landings and independent indices.

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TABLES

Table 1. Mean, minimum, and maximum length in mm of striped mullet measured in North Carolina dependent sampling programs from 2006-2015.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	347.5	197	563	12,108
2007	343.6	180	698	12,141
2008	358.1	213	612	13,183
2009	359.2	202	568	8,241
2010	352.6	206	577	10,991
2011	353.4	166	561	7,750
2012	356.6	200	565	12,833
2013	360.5	212	617	8,535
2014	349.7	195	610	6,517
2015	360.5	205	632	5,923

Table 2. Modal, minimum, and maximum age of striped mullet aged in North Carolina from 2005-2014. No ages are currently available for 2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	1	0	10	654
2006	2	0	10	685
2007	2	0	10	699
2008	2	0	10	771
2009	2	0	13	349
2010	2	1	8	748
2011	2	0	14	633
*2012	2	0	6	933
*2013	1	0	6	991
*2014	1	0	7	998

*Ages based on preliminary data.

Table 3. Summary of management strategies and outcomes.

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
MFC Rules (adopted by the MFC on April 27, 2006)		
Implement a recreational harvest limit of 200 mullet per person, per day – currently there are no bag restrictions for mullet.	1, 2, 3, and 6	Completed, MFC Rule April 2006 adoption 15ANCAC 03M.0502 (a), (b)
Modify mutilated finfish rule to exempt mullet when used as bait.	1, 2, 3, and 6	15ANCAC 03M.0101

Table 4. Summary of management and research recommendations from the 2006 striped mullet FMP.

MANAGEMENT STRATEGY	OBJECTIVES	OUTCOME
Environmental Degradation		
1. Advocate stronger regulatory programs of other agencies as well as work with them to enhance protection of habitat that is critical to striped mullet.	1 and 4	CHPP approved in 2005.
2. Continue to make recommendations on all state, federal, and local permits to minimize impacts to critical habitat areas, especially those pertaining to dredging, beach nourishment, and shoreline stabilization (jetties, groins). The MFC should fully utilize its permit commenting authority as outlined in G.S. 143B-289.52.	1 and 4	Ongoing, DMF comments submitted and MFC reviews thru Habitat & Water Quality AC.
3. Identify, research, and designate additional areas as primary nursery areas that may be important to striped mullet as well as other fisheries.	1 and 4	Ongoing (Program 120 and Program 146).
4. Develop and maintain accurate maps and documentation of wetlands, soft bottom, SAVs, and water column.	1 and 4	Ongoing CHPPs, SHA work group.
5. Enhance existing efforts to restore the function and value of degraded wetlands, soft bottom, SAVs, and water column.	1 and 4	Part of CHPPs implementation plan.
6. Continue to investigate the impacts of bottom disturbing gear on habitat.	1 and 4	CHPP revision scheduled for 2009 and will complete a comprehensive review of all gears and habitat impacts.

7. Work with the CRC to modify shoreline stabilization regulations and guidelines to minimize impacts to marine and estuarine resources.	1 and 4	Ongoing with CHPPs, shore stabilization workgroup.
8. Advocate stronger regulatory programs of other agencies as well as work with them to enhance protection of water quality critical to striped mullet.	1 and 4	Ongoing with CHPPs.
9. Support research on the causes of hypoxia and anoxia and impacts on striped mullet populations in North Carolina's estuarine waters.	1 and 4	No Action
10. Request that EMC adopts measures needed to fully achieve the identified nutrient reduction goals. Initiate nutrient load reduction planning for all watersheds.	1 and 4	No Action
11. Support additional research to document and quantify the influences of significant weather events on water quality and assess impacts on the striped mullet population.	1, 4, and 5	No Action
12. Recommend and support development and implementation of additional measures to reduce sediment delivery and associated turbidity throughout coastal waters.	1 and 4	Ongoing CHPPs, New storm-water rules.
13. Recommend and support restoration of non-coastal wetlands and floodplains to offset for losses, in order to improve water quality by restoring natural water filtering and storage processes.	1 and 4	Ongoing through permit process.
Fishing Issues		
14. To fully quantify finfish bycatch in North Carolina commercial fisheries, the establishment of a long-term, fishery-dependent observer program is needed.	1	Ongoing; Began an observer program for PSGNRA in 2000, and expanded into other areas of state. Funding is time-limited. Recently began using observers on alternative platforms which may reduce the type of finfish bycatch data collected.
15. Establish a 200 daily possession limit per person in the recreational fishery.	1, 2, and 5	Adopted by the MFC on April 27, 2006.

16. Implement public outreach to reduce waste of mullets in the recreational fishery.	1 and 6	A pamphlet for the WRC fish ID website was updated, but no program was established for public outreach to minimize the waste of mullet in the recreational fishery.
Research recommendation		
17. Implement no new management measures at this time but establish minimum and maximum landings thresholds of 1.3 million pounds and 3.1 million pounds, respectively.	1, 2, and 5	Ongoing, annual review for stock status report.
18. Continue annual age determination and creation of age-length keys.	1, 2, and 5	Age structures are being collected, ongoing.
19. Validate juvenile abundance indices.	1, 2, and 5	Sampling began in 2003, electroshock juvenile sampling conducted September-April each year; ongoing. NOAA Bridge Net Survey sample back-log funded for processing through CRFL grant beginning July 2013. Seeking SEAMAP funding for long-term continuation of program.
20. Annual review of commercial and recreational fisheries.	1, 2, and 5	Ongoing, annual review for stock status report.
User Conflicts		
21. Adopt the current Bogue Bank gill net proclamation as rule.	3	As of April 2006, due to the sale of two of the three subject ocean fishing piers, proclamation authority was maintained for flexibility. Did not go into rule.
22. Mediate the conflict between gill netters and stop netters.	3	Mediation completed, proclamation M-14-2006 issued for Bogue Banks area.
23. Inshore gill net conflicts should continue to be handled on a case-by-case basis and to implement management actions to address specific fishery related problems.	3	Mediation process for conflicts has been established within the Division and outreach materials developed. Adopted as preferred action in southern flounder and spotted seatrout FMP. Also, recent rule changes to large mesh (4”-6.5”) gill net fishery restricts fishing by area and during certain times as needed to protect sea turtles. Conflict in Deer and Schoolhouse creeks, mediation unsuccessful, Proclamation M-9-2013 issued to address recurring conflict between residents and fishermen using seines and gill nets.

FIGURES

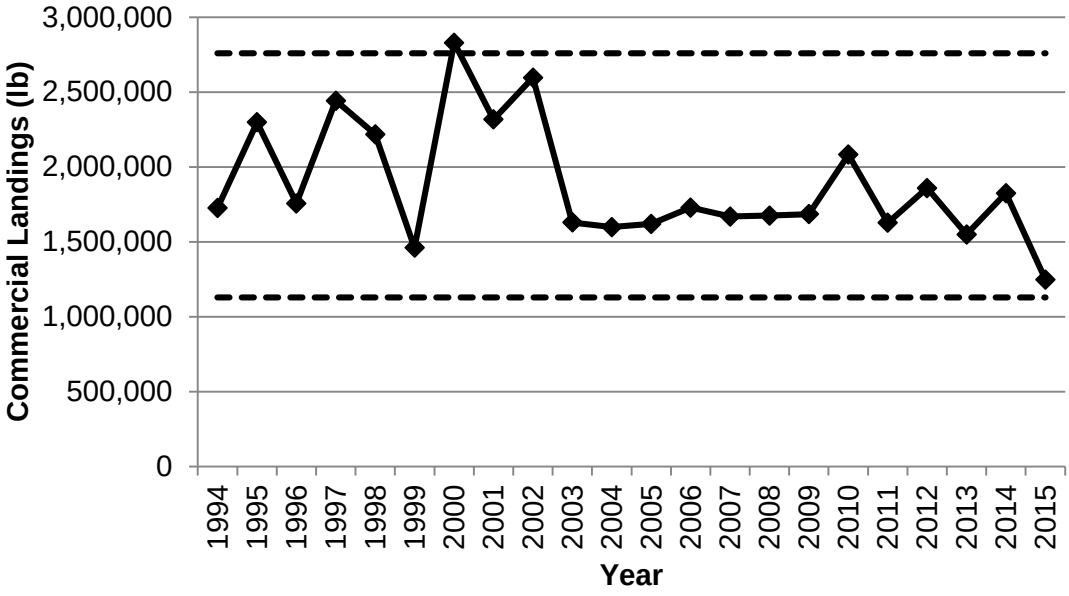

Figure 1. Commercial landings of striped mullet from 1994-2015. Dashed lines represent upper (2.76 million lb) and lower (1.13 million lb) landings limits that would trigger a closer examination of data. Landings limits were changed from upper and lower limits of 3.1 million and 1.3 million lb by Amendment 1 (2014).

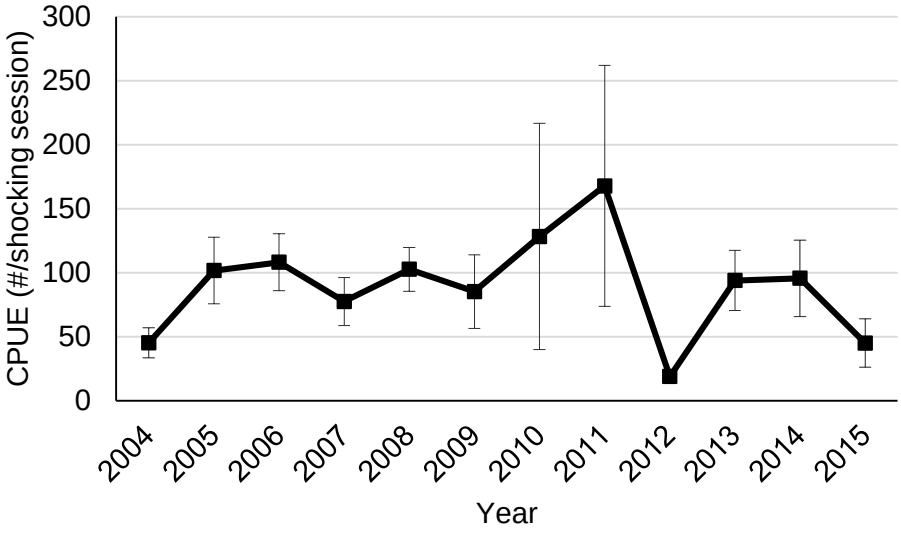

Figure 2. CPUE (number/500 m shocking session) of striped mullet from the striped mullet electroshock survey (P146) from 2004-2015. To provide the most relevant index, data were limited to those collected during January through April. Error bars represent standard error.

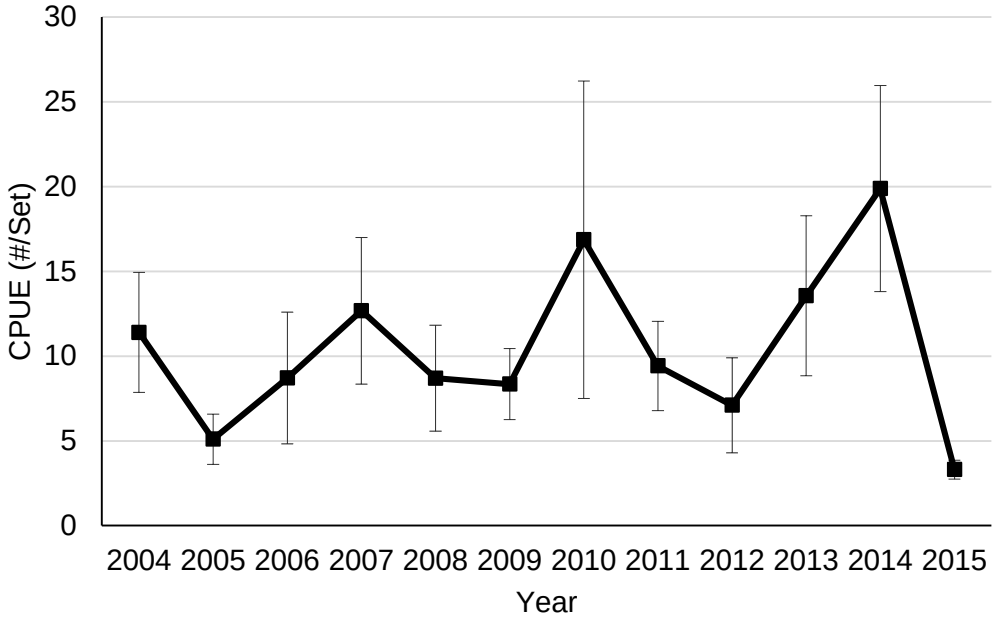

Figure 3. CPUE (number/set) of striped mullet from the Independent Gill Net survey (P915). In order to provide the most relevant index, only shallow river area samples collected during October-November 2004-2015 were included. Error bars represent standard error.

FISHERY MANAGEMENT PLAN UPDATE
AMERICAN SHAD
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1985
Amendments:	Amendment 1 (April 1999) Amendment 3 (February 2010)
Revisions:	Technical Addendum 1 (February 2000) Addendum I (August 2002)
Supplements:	Supplement (October 1988)
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	ASMFC scheduled for 2018

The Atlantic States Marine Fisheries Commission (ASMFC) coastwide stock assessment completed in 2007, found that American shad (*Alosa sapidissima*) stocks were at all-time lows and did not appear to be recovering to acceptable levels. Therefore, under ASMFC's Amendment 3 to the Interstate Fishery Management Plan (FMP) for Shad and River Herring, individual states were required to develop Implementation Plans (ASMFC 2010). Implementation Plans consisted of two parts: 1. Review and update of the fishing/recovery plans required under Amendment 1 for the stocks within their jurisdiction; and 2. Habitat plans. The updated fishing/recovery plan meets the requirements and is known as the North Carolina American Shad Sustainable Fishery Plan (SFP) (NCDMF 2011).

Addendum I (2002) changed the conditions for marking hatchery-reared alosines. The addendum clarifies the definition and intent of *de minimis* status for the American shad fishery. It also further modifies and clarifies the fishery-independent and fishery dependent monitoring requirements of Technical Addendum 1.

Technical Addendum I (2000) modified several technical errors and provided clarification of several monitoring requirements in Amendment 1.

Amendment 1 (1999) reported that the majority of American shad stocks to not be overfished, but almost all were believed to be at or near historically low levels. Therefore, Amendment 1 required increased annual reporting requirements on juveniles, adult spawning stocks, annual fishing mortality, and habitat. A fishing mortality threshold (overfishing) was defined as a reference point of $F_{30.}$

The Supplement (1988) reassessed the research priorities identified in the original FMP (1985) and created a new listing of research priorities.

The Original 1985 FMP does not require any specific management approach or monitoring programs within the management unit, asking only that states provide annual summaries of restoration efforts and ocean fishery activity. It specified four management objectives: regulate exploitation, improve habitat accessibility and quality, initiate programs to introduce alosine stocks into historic waters, and recommend and support research programs.

Management Unit

American shad and hickory shad management authority lies with the Atlantic Coastal states from Maine through Florida and is coordinated through the ASMFC. Responsibility for management action in the Economic Exclusive Zone (EEZ), located from 3 to 200 miles from shore, lies with the Secretary of Commerce through the Atlantic Coastal Fisheries Cooperative Management Act (ACFCMA) in the absence of a federal FMP.

Goal and Objectives

Migratory stocks of American shad have been managed under the ASMFC since 1985. These species are currently managed under Amendment 3 (American shad) and Amendment 1 (hickory shad) to the ASMFC FMP, Technical Addendum 1, and Addendum I. The goal of Amendment 2 and 3 is to protect, enhance, and restore East Coast migratory spawning stocks of American shad, hickory shad, alewife, and blueback herring in order to achieve stock restoration and maintain sustainable levels of spawning stock biomass. To achieve this goal, the plan adopts the following objectives:

1. Maximize the number of juvenile recruits emigrating from freshwater stock complexes.

2. Restore and maintain spawning stock biomass and age structure to achieve maximum juvenile recruitment.

3. Manage for an optimum yield harvest level that will not compromise Objectives 1 and 2.

4. Maximize cost effectiveness to the local, state, and federal governments, and the ASMFC associated with achieving Objectives 1 through 3.

STATUS OF THE STOCK

Stock Status

The most recent coastwide stock assessment of American shad stated that populations in the Albemarle Sound and Roanoke River are stable and low, whereas a determination of stock status could not definitively be assigned for the Tar/Pamlico, Neuse and Cape Fear rivers due to limited information (ASMFC 2007).

Amendment 3 required all states and jurisdictions without an approved sustainable fishery plan to close their fisheries (with the exception of catch and release fisheries) for American shad by January 1, 2013. In March 2012, the North Carolina Division of Marine Fisheries (NCDMF) North Carolina American Shad SFP was approved by ASMFC; it includes sustainable fishery parameters for the following areas: Albemarle Sound/Roanoke River, Tar/Pamlico River, Neuse River, and Cape Fear River.

Annual updates are completed each year to track those sustainable fishery parameters in each system.

Stock Assessment

The NCDMF American Shad SFP, effective in 2013, identified sustainability parameters for four regions of the state: Albemarle Sound/Roanoke River, Tar/Pamlico, Neuse, and Cape Fear River systems. As a directed roe fishery, all parameters are based on the female portion of the stock.

The Albemarle Sound/Roanoke River system has three sustainability parameters: female catch per unit effort (CPUE) based on the NCDMF Albemarle Sound Independent Gill Net Survey (IGNS), CPUE based on the North Carolina Wildlife Resources Commission (NCWRC) electrofishing survey, and female relative fishing mortality (*F)* based on commercial landings and a three-year average of the NCDMF IGNS index. As written in the SFP, exceeding the female CPUE based on IGNS or the female relative *F* parameters for three consecutive years will trigger management action. The female CPUE based on the NCWRC electrofishing survey will be used in conjunction with a second index for triggering management action.

The Tar/Pamlico, Neuse, and Cape Fear River systems have two sustainability parameters for the corresponding areas: female CPUE based on the NCWRC electrofishing survey, and female relative *F* based on the NCWRC electrofishing survey.

In 2013, 2014, and 2015 annual updates were completed for all areas to determine if any sustainability parameters were exceeding the thresholds. The Tar/Pamlico, Neuse, and Cape Fear River systems were not exceeding any of the thresholds and no management changes were made to those fisheries. The Albemarle Sound/Roanoke River system exceeded two thresholds, the CPUE index based on the NCWRC electrofishing survey and the female relative *F,* during the 2013 commercial fishing season. These parameters exceeding the threshold required management actions to be implemented for the 2014 fishing season. In February 2014, the North Carolina Marine Fisheries Commission (NCMFC) chose to reduce the American shad season in the Albemarle Sound/Roanoke River to March 3-24 to reduce overall commercial landings. The 2015 fishing season continued with the same seasonal dates. Additionally, 2015 updates of sustainability parameters for each area indicate that no thresholds are being exceeded.

STATUS OF THE FISHERY

Current Regulations

The NCMFC enacted a rule in 1995, which established a closed season for American shad and hickory shad (*Alosa mediocris*). It is unlawful to take these species by any method except hook-and-line from April 15 through December 31. The ocean intercept fishery for American shad was closed to all harvest January 1, 2005 (ASMFC 2002).

In the Albemarle, Croatan, Roanoke, and Currituck sounds and tributaries, floating gill nets of 5.25-inch stretch mesh (ISM) to 6.5 ISM, were limited to 1,000 yards and could only be utilized from March 3 through March 24, 2016 and must be fished at least once during a 24-hour period (no later than noon each day). The western portion of Albemarle Sound near the mouth of the Roanoke River (including Roanoke, Cashie, Middle and Eastmost Rivers) is closed to gill netting

year round. The large mesh gill net restrictions were imposed for striped bass conservation but also provided measures of protection for American shad. Gill nets of less than 3.25 ISM were not allowed due to the river herring closure. Gill nets with a mesh length of 3.25 - 4.00 ISM could not exceed 800 yards and were allowed the entire spring. Attendance for small mesh gill nets (3.0 – 4.0 ISM) was required May 18 – June 12, 2015. The Albemarle, Currituck, Croatan, and Roanoke sounds and their tributaries were closed to all gill nets except for 3.0 – 4.0 ISM run-around, strike, drop, and drift gill nets until the area was opened September 1, 2015. Gill net attendance was removed in this area on November 20, 2015.

In areas outside of the ASMA there is a rule that limits the amount of large mesh (4.0 -6.5 ISM) gill net sets in internal coastal waters to 3,000 yards. In an effort to reduce sea turtle interactions, that rule has been suspended in the majority of internal coastal waters and net yardage allowance has been reduced to 2,000 or 1,000 yards in the Tar/Pamlico, Neuse and Cape Fear systems. Nets can be set in lengths no greater than 100 yards and must have at least a 25-yard space between each individual length of net, with the exception of Management Unit C (Pamlico, Pungo, Bay, and Neuse Rivers). Only single overnight sets are allowed; nets can be set one hour prior to sunset and must be retrieved within one hour of sunrise, with no sets allowed Friday, Saturday or Sunday evenings. Additionally, in certain areas of the Tar/Pamlico and Neuse rivers, gill nets with a mesh size less than 5.0 ISM must be attended at all times.

Commercial Landings

Figure 1 shows all American shad landings in North Carolina from 1972 to 2015. Landings show a decreasing trend through 1990, until average landings leveled off through 2013. Commercial harvest is sporadic and cyclical and annual trends show these changes. Figure 2 describes that landings break down by the four areas of the state, as stated in the NCDMF American Shad SFP. Albemarle Sound accounts for approximately 50 percent, on average, of total state landings; the last 5 years ranged from 63 to 78 percent (Figure 2).

Recreational Landings

Recreational landings for American shad are minimal throughout the Albemarle Sound/Roanoke River, Tar/Pamlico, and Neuse Rivers. These areas accounted for approximately 3,260-11,500 lb of harvested fish in 2015. The bulk of the North Carolina recreational fishery occurs in the Cape Fear River system where substantial effort is targeted on American shad. In 2015 there was an estimated harvest of 4,136 fish that weighed approximately 11,500 lb.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial landings are reported from the NCDMF Trip Ticket Program (TTP). This program requires dealers to complete a trip ticket for each transaction with a fisherman and to submit these reports to the NCDMF on a monthly basis.

Table 1 includes mean, minimum and maximum lengths and total number of commercial samples pooled across all gears and areas in the state. Table 2 describes the variation in modal, minimum and maximum ages throughout the dependent sampling. The Albemarle Sound area (including Albemarle, Roanoke, Croatan and Currituck sounds and their tributaries)

accounts for approximately 50 percent of the state's total harvest, contributing the highest percentage of the in-river fisheries.

Fishery-Independent Monitoring

American shad are monitored using the NCDMF IGNS and NCWRC electrofishing surveys to estimate CPUEs and relative fishing mortality in the Albemarle Sound/Roanoke River area. In other areas of the state, NCWRC conducts electrofishing surveys to estimate abundance and the relative fishing mortality. Table 3 describes the modal, minimum, and maximum age and the number of fish aged throughout 2005 through 2015 in NCDMF independent surveys.

MANAGEMENT STRATEGY

Albemarle Sound/Roanoke River:
Figures 3 shows the female CPUE based on the NCDMF IGNS. Figure 4 shows the CPUE based on the NCWRC electrofishing survey. Figure 5 shows the female relative *F* based on commercial landings and a three-year average of the NCDMF IGNS index.

Tar/Pamlico system:
Figure 6 shows the female CPUE based on the NCWRC electrofishing survey and figure 7 shows the female relative *F* based on the NCWRC electrofishing survey.

Neuse system:
Figure 8 shows the female CPUE based on the NCWRC electrofishing survey and figure 9 shows the female relative *F* based on the NCWRC electrofishing survey.

Cape Fear River system:
Figure 10 shows the female CPUE based on the NCWRC electrofishing survey and figure 11 shows the female relative *F* based on the NCWRC electrofishing survey.

The 2014 update of the SFP sustainability parameters throughout the state demonstrated that all of the parameters were within the sustainable targets.

MANAGEMENT AND RESEARCH NEEDS

The following list of research needs have been identified in order to enhance the state or knowledge of the shad and river herring resources, population dynamics, ecology and the various fisheries for alosine species, as found in the ASMFC FMP Amendment 3.

Stock Assessment and Population Dynamics

- Continue to assess current aging techniques for shad and river herring, using known-age fish, scales, otoliths and spawning marks. Known age fish will be available from larval stocking programs that mark each year class. Conduct biannual aging workshops to maintain consistency and accuracy in aging fish sampled in state programs.
- Investigate the relation between juvenile production and subsequent year class strength for alosine species, with emphasis on the validity of juvenile abundance indices, rates and sources of immature mortality, migratory behavior of juveniles, natural history and ecology of juveniles, and essential nursery habitat in the first few years of life.

- Validate estimates of natural mortality for American shad stocks.
- Establish management benchmarks for data poor river systems identified within the stock assessment.
- Estimate and evaluate sources of mortality for alosine species from bycatch, and bait and reduction fisheries.
- Determine fishery specific catch, harvest, bycatch, and discard reporting rates.
- Estimate and evaluate river specific mortality from upstream and downstream passage of adults and downriver passage of juveniles past migratory barriers.
- Determine which stocks are impacted by mixed stock fisheries (including bycatch fisheries). Methods to be considered could include otolith microchemistry, oxytetracycline otolith marking, and/or tagging.
- Evaluate assumptions critical to in-river tagging programs in Georgia, South Carolina, and Maryland that are used to estimate exploitation rate and population size.
- Develop approaches to estimate relative abundance of spawning stocks in rivers without passage facilities and in rivers with passage facilities with unknown passage efficiencies. • Evaluate predation by striped bass and other predators as a factor of mortality for alosines. Research predation rates and impacts on alosines.
- Quantify fishing mortality (in-river, ocean bycatch, bait fisheries) for major river stocks after ocean closure of directed fisheries.
- Develop comprehensive and cost effective angler use and harvest survey techniques for use by Atlantic coastal states to assess recreational fisheries for American shad.
- Determine and update biological data inputs used in assessment modeling (fecundity-at-age, mean weight-at-age for both sexes, partial recruitment vector/maturity schedules) for American shad and river herring stocks in a variety of coastal river systems, including both semelparous and iteroparous stocks.
- Evaluate and ultimately validate large-scale hydroacoustic methods to quantify American shad escapement (spawning run numbers) in major river systems. Identify how shad respond (attract/repelled) by various hydroacoustic signals.

Habitat

- Identify ways to improve fish passage efficiency using hydroacoustics to repel alosines from turbine intakes or discharges or pheromones or other chemical substances to attract them to passage entrances. Test commercially available acoustic equipment at existing fish passage facility to determine effectiveness. Develop methods to isolate/manufacture pheromones or other alosine attractants.
- Determine the effects of passage impediments on all life history stages of American shad including turbine mortality and river and barrier specific passage efficiencies. Highest priority would be the lowermost obstruction.
- Develop and implement techniques to determine shad and herring population targets for tributaries undergoing restoration (dam removals, fishways, supplemental stocking, etc.).
- Characterize tributary habitat quality and quantity for alosine reintroductions and fish passage development.
- Determine impacts to American shad populations from changing ocean environment
- Identify and quantify potential American shad spawning and rearing habitat not presently utilized and conduct an analysis of the cost of recovery.
- Develop appropriate Habitat Suitability Index Models for alosine species in the fishery management plan. Possibly consider expansion of species of importance or go with the most protective criteria for the most susceptible species.
- Determine factors that regulate and potentially limit downstream migration, seawater tolerance, and early ocean survival of juvenile alosines.

- Review studies dealing with the effects of acid deposition on anadromous alosines.
- Determine effects of change in temperature and pH for all life stages.
- Determine optimal and tolerance for salinity, dissolved oxygen, pH, substrate, current velocity, depth, temperature, and suspended solids.
- Determine hard limits and range levels for water quality deemed appropriate and defensible for all alosines with emphasis on freshwater migratory, spawning, and nursery areas.
- There has been little research conducted on habitat requirements for hickory shad. Although there are reported ranges of values for some variables, such as temperature or depth, there is no information on tolerances or optimal for all life stages. Research on all life stages is necessary to determine habitat requirements.
- Determine impacts of declining submerged aquatic vegetation beds on juvenile cover and rearing habitat.
- Determine impacts of thermal power generation projects (e.g., nuclear and coal) that withdraw water for cooling (potential entrainment and impingement of fish) and discharge heated water (thermal barriers to migration, habitat degradation) on estuarine juvenile rearing and migration corridors.
- Determine impacts to migrating American shad (both spawning adults and out-migrating juveniles and adults) by proposed in-stream power generation developments such as tidal stream generation that draws energy from currents.
- Determine potential threats and their level of impact to coastal American shad habitat from: marine acidification; pharmaceutical, wastewater, pesticide contamination; 58 invasive species; niche displacement; and global climate change are in need of further study.
- Determine the impacts to migrating American shad (both spawning adults and migrating juveniles) by proposed wind power generation developments in near shore ocean environments.
- Conduct fish passage research and development with the goal of improving the efficiency of existing and future installations of fish passage measures and facilities in order to restore desired access to and utilization of critical American shad spawning and juvenile rearing habitat.
- Conduct studies to determine whether passing migrating adults upstream earlier in the year in some rivers would increase production and larval survival, and opening downstream bypass facilities sooner would reduce mortality of early emigrants (both adult and early-hatched juveniles).
- Conduct studies to determine the effects of dredging on diadromous habitat and migration.

Life History

- Conduct studies on energetics of feeding and spawning migrations of alosines on the Atlantic coast.
- Evaluate impacts of invasive species such as zebra mussels and flathead catfish on larval and juvenile survival.
- Conduct studies of egg and larval survival and development.
- Focus research on within-species variation in genetic, reproductive, morphological, and ecological characteristics, given the wide geographic range and variation at the intraspecific level that occurs in alosines.
- Ascertain how abundance and distribution of potential prey affect growth and mortality of early life stages.
- Conduct research on hickory shad migratory behavior. This may explain why hickory shad populations continue to increase while other alosines are in decline.

Stocking and Hatcheries

- Refine techniques for hormone induced tank spawning of American shad. Secure adequate eggs for culture programs using native broodstock.
- Refine larval marking techniques such that river and year class can be identified when year classes are later recaptured as juveniles or adults.

Socioeconomics

- Conduct and evaluate historical characterization of socio-economic development (potential pollutant sources and habitat modification) of selected alosine rivers along the Atlantic coast.
- Collect information from consumptive and non-consumptive users on: demographic information (e.g., age, gender, ethnicity/race), social structure information (e.g., historical participation, affiliation with NGOs, perceived conflicts), other cultural information (e.g., occupational motivation, cultural traditions related to resource's use), and community information.
- In order to improve the management-oriented understanding of historical stock trends and related assessments, the social and economic history of the river herring fisheries should be documented for time periods equivalent to the stock return level sought by the biological standards and this analysis should including documenting market trends, consumer preferences including recreational anglers, the role of product substitutes such as Atlantic herring and menhaden, and the levels of subsistence fisheries as can be obtained.
- Before recommending, re-authorizing and/or implementing stock enhancement programs for a given river system, it is recommended that state agencies or other appropriate management organization conduct ex-ante socioeconomic cost and benefit (e.g., estimate non-consumptive and existence values, etc.) analysis of proposed stocking programs

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NCDMF (North Carolina Division of Marine Fisheries) and WRC (North Carolina Wildlife Resources Commission). 2011. North Carolina American Shad Sustainable Fishery Plan, Report to the Atlantic States Fisheries Commission Shad and River Herring Technical Committee. Updated 2014.

TABLES

Table 1. Length (FL mm) data sampled from the American shad commercial fishery throughout North Carolina, 2005-2015.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2005	446	186	557	1,061
2006	430	296	515	861
2007	438	322	523	1,015
2008	436	145	526	899
2009	429	242	741	923
2010	434	305	520	1,148
2011	444	245	507	1,283
2012	444	235	552	1,549
2013	453	304	571	1,574
2014	455	295	508	1,026
2015	454	329	513	851

Table 2. Aging data collected from North Carolina American shad dependent sampling programs, 2005-2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	5	3	8	477
2006	6	3	8	499
2007	6	3	8	440
2008	6	3	9	447
2009	7	4	10	435
2010	6	3	9	453
2011	6	3	8	437
2012	5	3	8	536
2013	7	3	9	471
2014	7	3	9	433
2015	7	4	8	409

Table 3. Aging data collected from North Carolina American shad independent sampling programs from 2005-2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	5	3	7	194
2006	3	3	8	180
2007	5	3	8	176
2008	5	3	8	188
2009	6	4	9	126
2010	6	3	8	197
2011	6	2	8	79
2012	5	3	8	156
2013	7	3	8	210
2014	6	3	8	122
2015	7	3	9	118

FIGURES

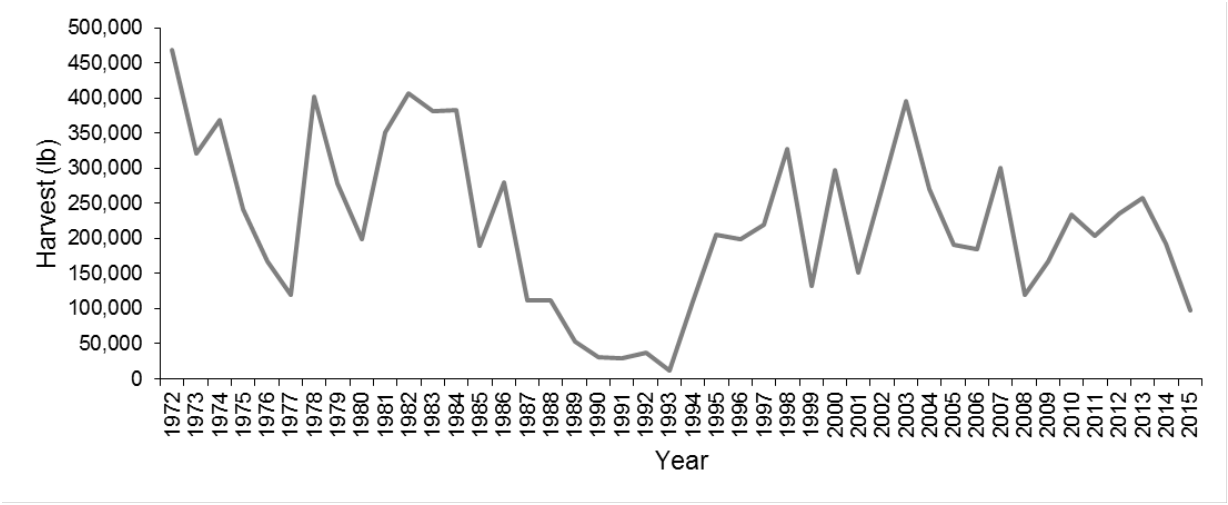

Figure 1. Landings of American shad (*Alosa sapidissima*) in North Carolina from 1972-2015, all waterbodies combined.

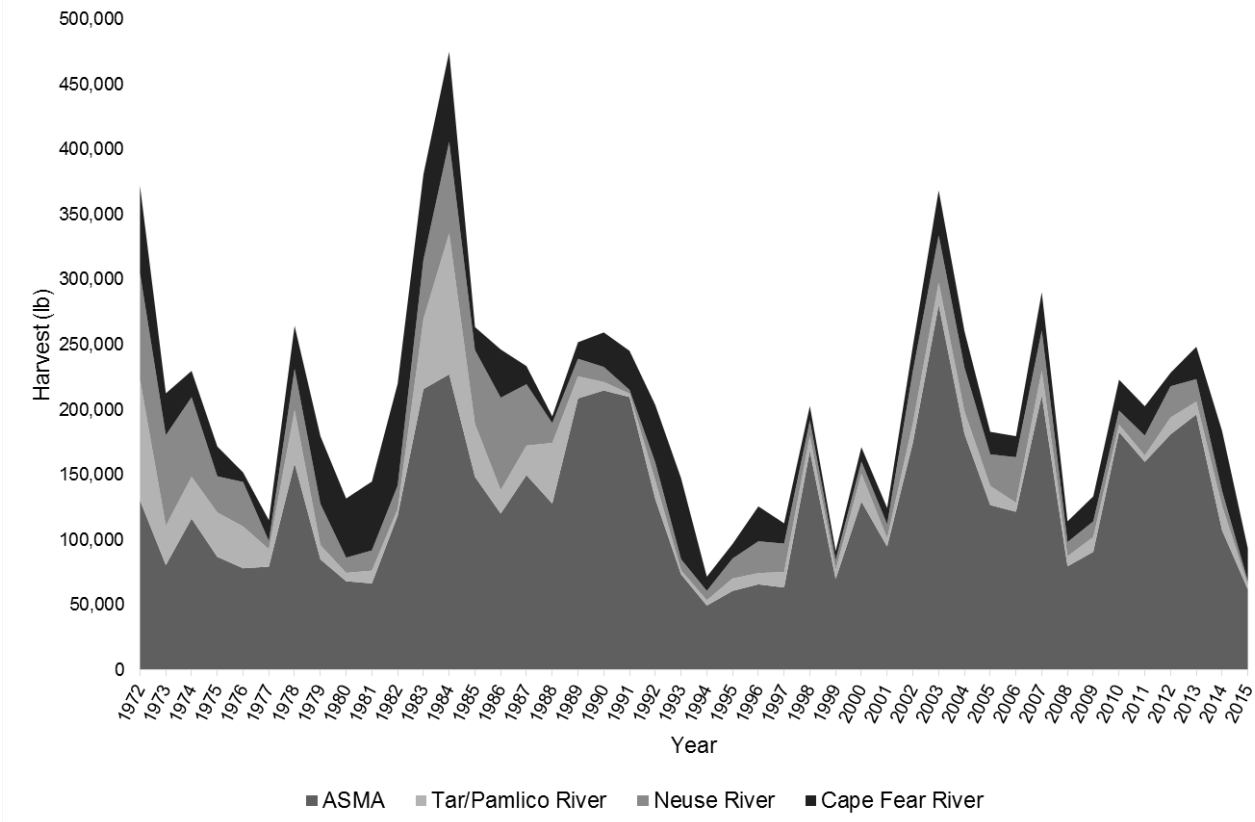

Figure 2. Landings of American shad in North Carolina by major waterbody from 1972-2015.

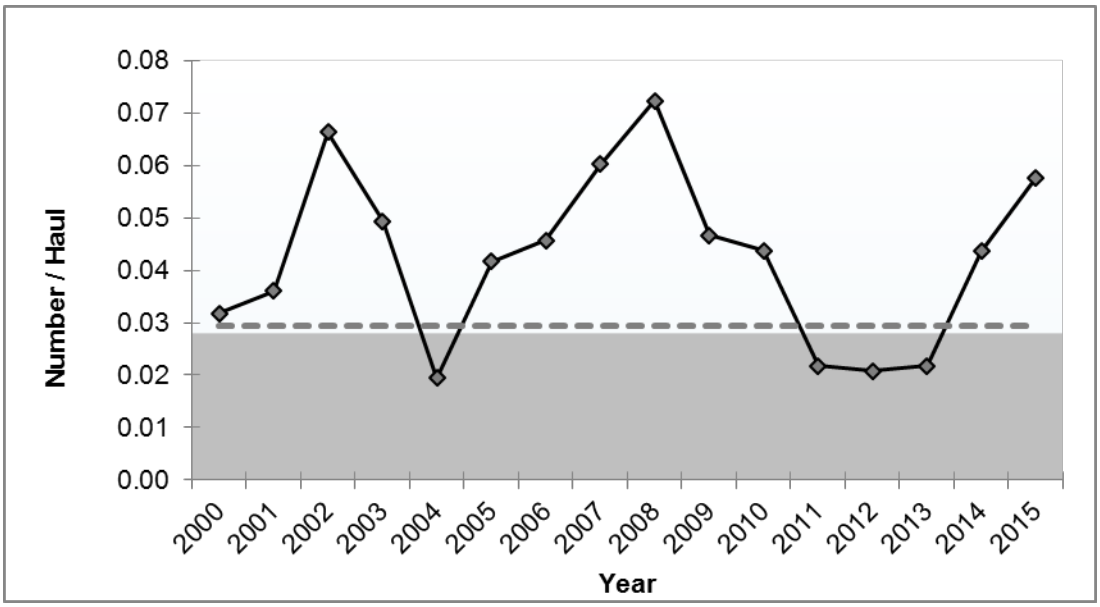

Figure 3. Albemarle Sound/Roanoke River sustainability parameter for female CPUE in the IGNS, 2000-2015. Grey areas represent a parameter exceeding the threshold.

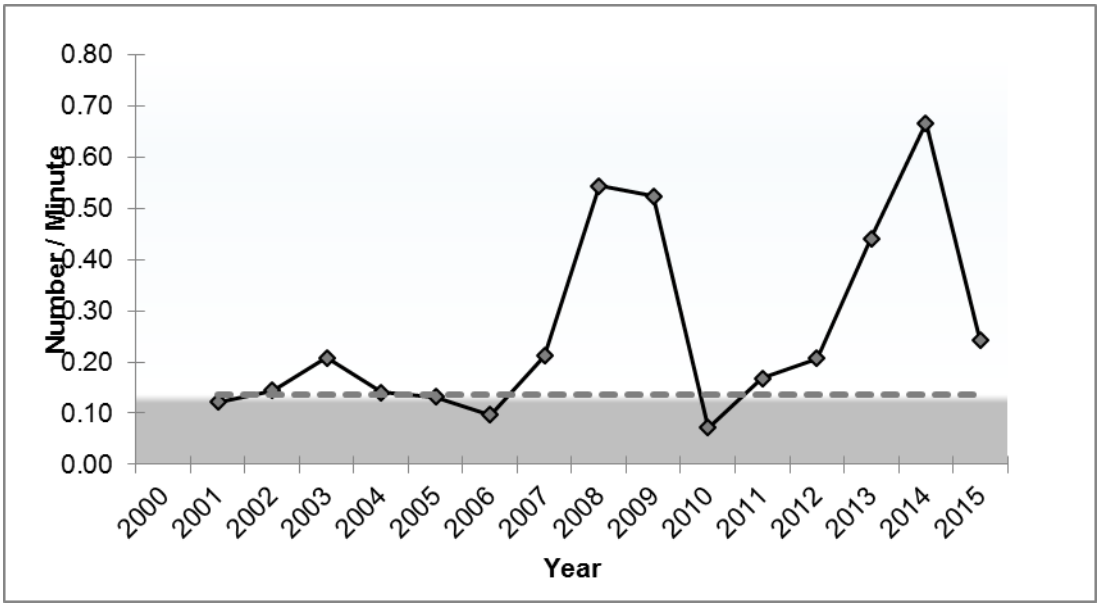

Figure 4. Albemarle Sound/Roanoke River sustainability parameter for female CPUE in NCWRC electrofishing survey, 2000-2015. Grey areas represent a parameter exceeding the threshold.

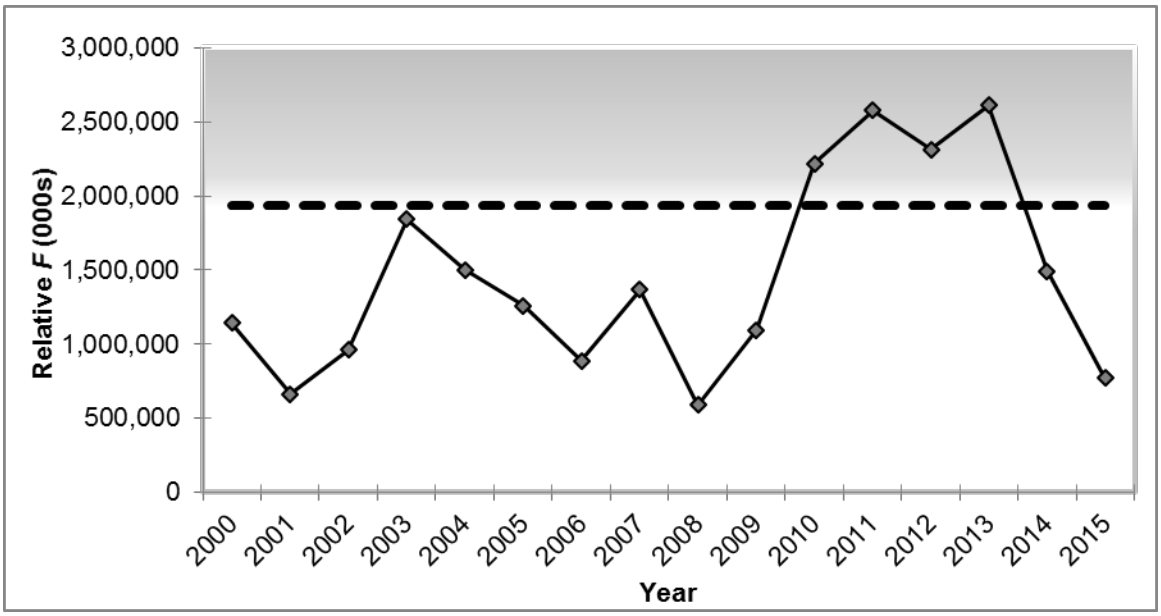

Figure 5. Albemarle Sound/Roanoke River sustainability parameter for female relative *F* in the IGNS, 2000-2015. Grey areas represent a parameter exceeding the threshold.

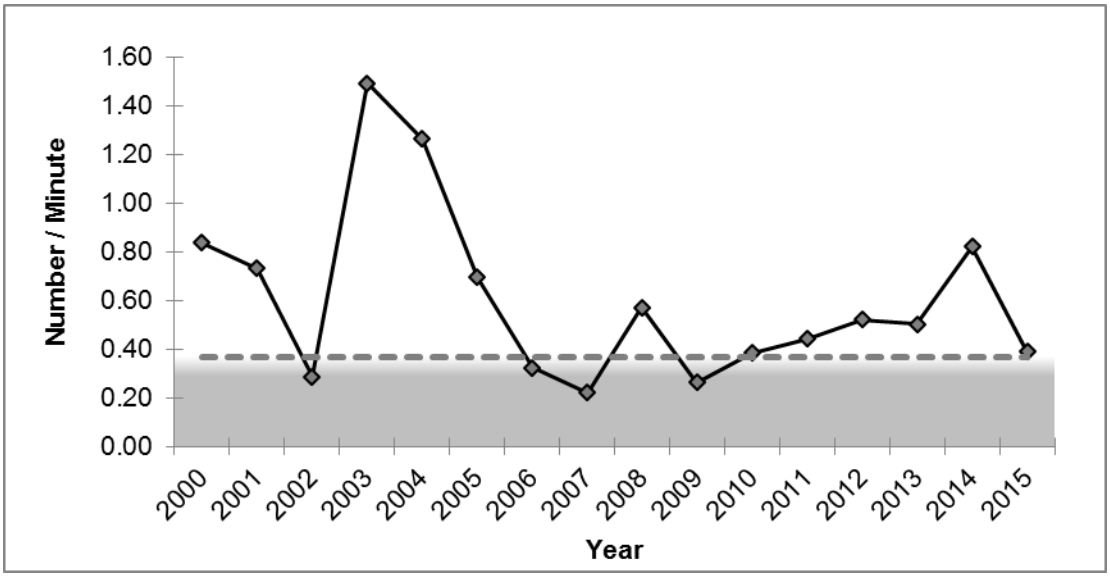

Figure 6. Tar/Pamlico River system sustainability parameter for female CPUE in NCWRC electrofishing survey, 2000-2015. Grey areas represent a parameter exceeding the threshold.

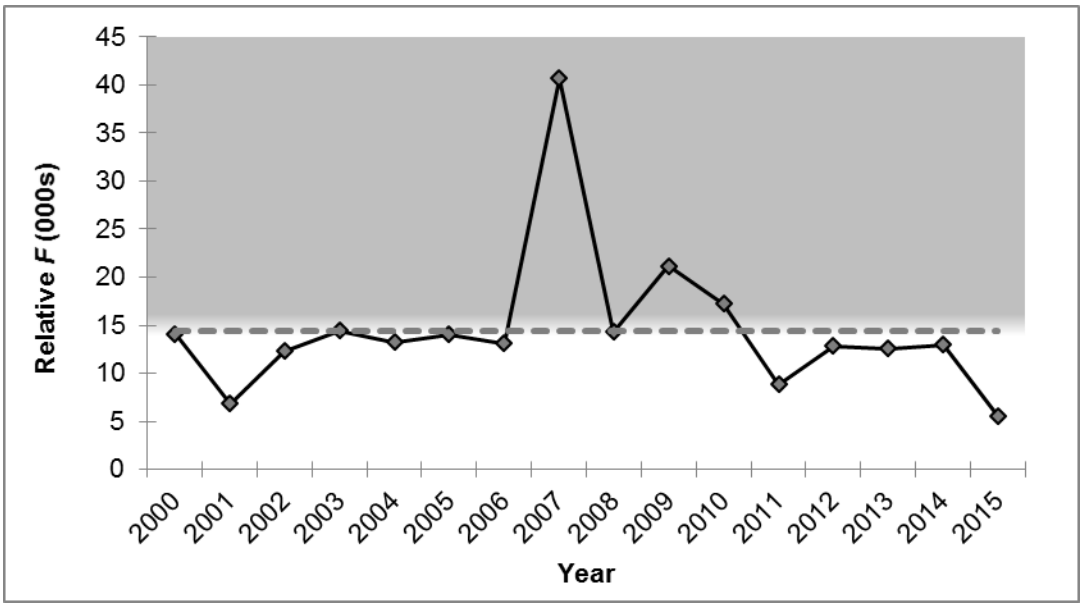

Figure 7. Tar/Pamlico River system sustainability parameter for female relative *F* in NCWRC electrofishing survey, 2000-2015. Grey areas represent a parameter exceeding the threshold.

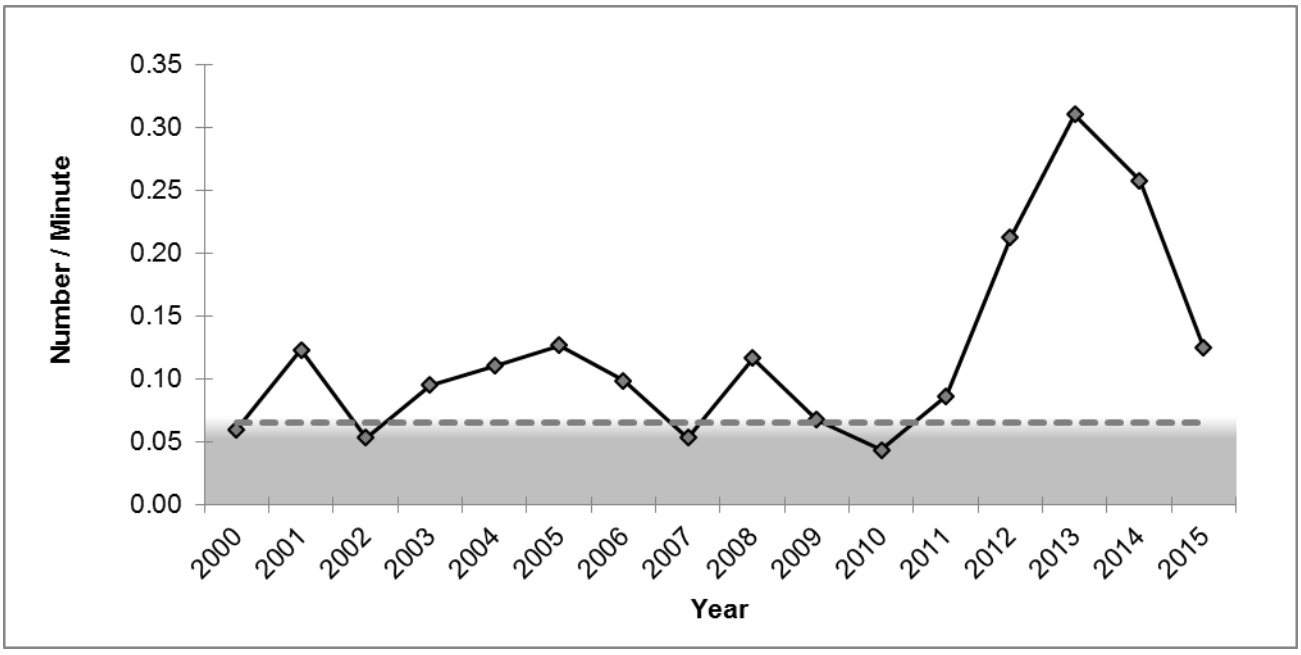

Figure 8. Neuse River system sustainability parameter for female CPUE in NCWRC electrofishing survey, 2000-2014. Grey areas represent a parameter exceeding the threshold.

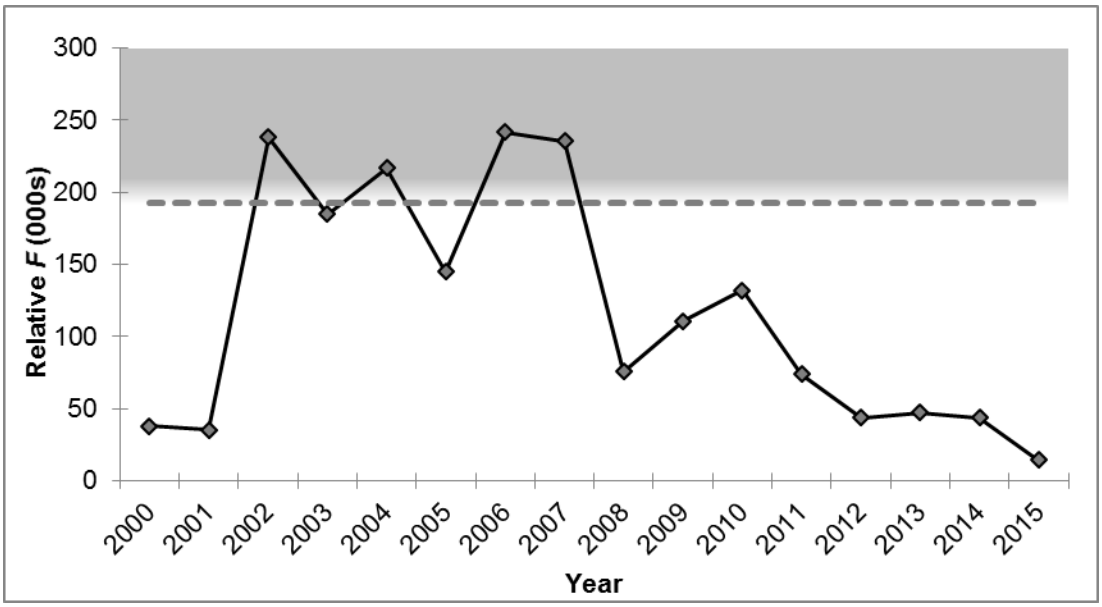

Figure 9. Neuse River system sustainability parameter for female relative *F* in NCWRC electrofishing survey, 2000-2014. Grey areas represent a parameter exceeding the threshold.

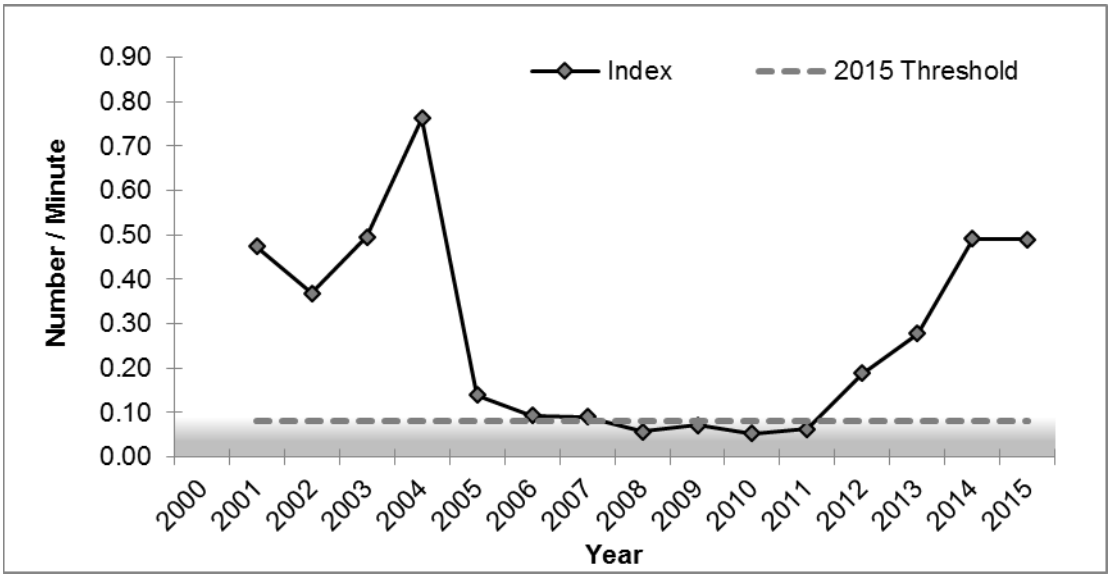

Figure 10. Cape Fear River system sustainability parameter for female CPUE in NCWRC electrofishing survey, 2000-2014. Grey areas represent a parameter exceeding the threshold.

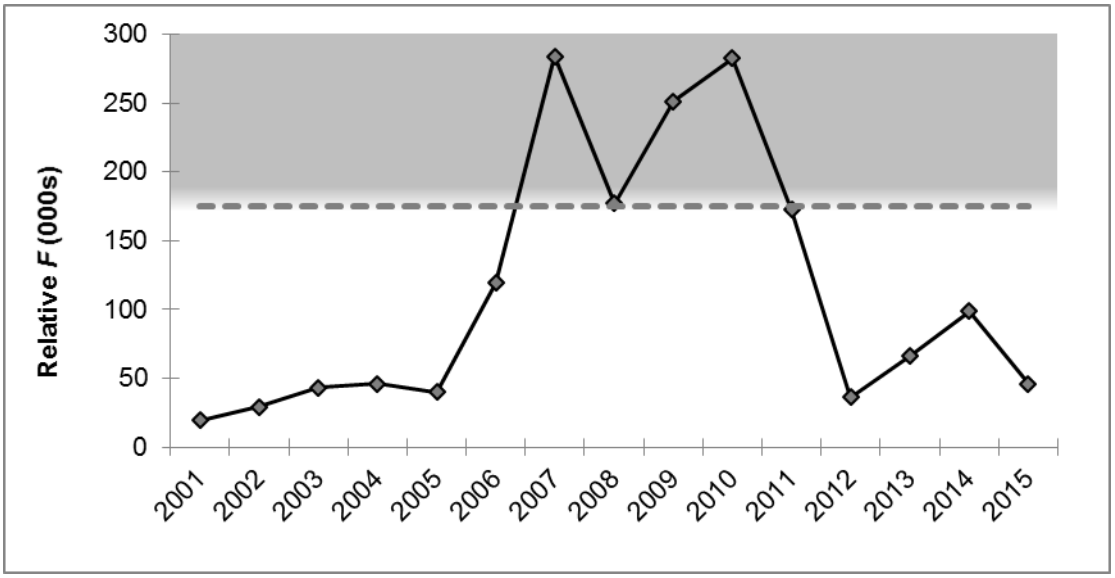

Figure 11. Cape Fear River system sustainability parameter for female relative *F* in NCWRC electrofishing survey, 2000-2014. Grey areas represent a parameter exceeding the threshold.

FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC CROAKER
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1987
Amendments:	Amendment 1 - November 2005 (implemented January 2006) Addendum I - March 2011 Addendum II - August 2014
Revisions:	N/A
Supplements:	N/A
Information Updates:	N/A
Schedule Changes:	N/A
Next Benchmark Review:	2016

The Fishery Management Plan for Atlantic croaker was adopted in 1987 (ASMFC 1987) and included states from Maryland through Florida. Upon review, the South Atlantic State/Federal Fisheries Management Board (hereinafter referred to as Board) found its recommendations to be vague and recommended that an amendment be prepared to define management measures necessary to achieve the goals of the FMP. The Interstate Fisheries Management Program Policy Board also adopted the finding that the original FMP did not contain any management measures that states were required to implement (ASMFC 2014).

In 2002, the Board directed the Atlantic Croaker Technical Committee to conduct the first coast wide stock assessment of the species in preparation of developing an amendment. The stock assessment was developed in 2003 and approved by a Southeast Data Assessment Review panel for use in management in June 2004. Amendment 1 was approved in November 2005 and fully implemented by January 1, 2006 (ASMFC 2005).

Amendment 1 expanded the management area to include the states from New Jersey through Florida. The amendment defined two Atlantic coast management regions: the south-Atlantic region, including the states Florida through South Carolina; and the mid-Atlantic region, including the states from North Carolina through New Jersey (ASMFC 2005).

Amendment 1 established biological reference points to define overfished and overfishing stock status for the mid-Atlantic region only. Amendment 1 did not require any specific measures restricting recreational or commercial harvest of Atlantic croaker, though states with more conservative measures were encouraged to maintain those regulations. Through adaptive management, the Board may revise Amendment 1, and regulatory and/or monitoring requirements could be included in the resulting addendum, along with procedures for

determining *de minimis* status and implementing alternative management programs via conservation equivalency.

Amendment 1 specified "triggers" for initiation of a stock assessment in non-assessment years. If upon review of the data the technical committee felt there was sufficient evidence of changes in the stock, a stock assessment could be initiated in the absence of hitting the triggers. The triggers considered by the technical committee were:

1. Relative percent change in landings
    a. A stock assessment will be triggered if the most recent year's commercial landings are less than 70% of the previous two year's landings.
    b. A stock assessment will be triggered if the most recent year's recreational landings are less than 70% of the previous two year's average landings.
2. Biological Data Monitoring:
    a. The technical committee will compare the most recent year's mean length data from the recreational fishery to the average of the last two years' mean lengths.
    b. The technical committee will compare the most recent year's mean size (length and weight) data from the commercial fishery to the average of the last two years' mean size (length and weight) data.
    c. The technical committee will monitor the overall age composition (proportion at age) and calculate the mean size at age for the age groups that are present in the state samples.
3. Effort vs. Landings (commercial)
    a. CPUE considerations for the near future: as effort data increases in quality, the trigger should change from a commercial landings basis to commercial CPUE by gear type. At this time, the technical committee will monitor effort (e.g. trips or days fished) vs. landings, on a gear type basis, to track parallel trends.
4. The technical committee will continue to derive a MRFSS CPUE, on a directed trip basis, to examine state-by-state catch rates on an annual basis.
5. Surveys

The first trigger is the only hard trigger, though the others were monitored annually for substantial changes.

Addendum I to Amendment 1 was initiated in August 2010. Addendum I consolidated the stock into one management unit and established a procedure by which the board may approve peer-reviewed biological reference points without a full administrative process, such as an amendment or addendum (ASMFC 2011).

Addendum II to Amendment 1 was initiated in February 2014 and was approved in August 2014. Addendum II establishes the use of the Traffic Light Approach (TLA) as a precautionary management framework in the management of Atlantic croaker. The management framework utilizing the Traffic Light Approach replaces the management triggers as stipulated in Addendum I (ASMFC 2014). The harvest component of the Atlantic croaker TLA is composed of composite commercial and recreational harvest data. The population, or adult abundance, component of the Atlantic croaker TLA is composed of a composite of fishery-independent survey indices (NMFS and SEAMAP). If thresholds for both population characteristics achieve or exceed the proportion of threshold for a three-year period management. Reaching the 30% threshold requires moderate management measures, and reaching the 60% threshold requires elevated management measures. Should a threshold be reached the appropriate percent reduction in harvest and state-by-state measures to achieve the reduction will be recommended

by the technical committee and approved by the Board. The overall harvest reduction would be proportional to the magnitude of exceeding the trigger. Management options size limits, bag/trip limits, seasonal closures, and gear restrictions. Management measures would remain in place for three years, and thresholds would not be applied to the harvest characteristics in assessing the fishery for three years, as this data may be influences by management action. The TLA is reviewed in July each year.

Management Unit

Single region New Jersey through east coast of Florida.

Goal and Objectives

The goal of Amendment 1 is to utilize interstate management to perpetuate the self-sustaining Atlantic croaker resource throughout its range and generate the greatest economic and social benefits from its commercial and recreational harvest and utilization over time. The four objectives of Amendment 1 are:

1. Manage the fishing mortality rate for Atlantic croaker to provide adequate spawning potential to sustain long-term abundance of the Atlantic croaker population.

2. Manage the Atlantic croaker stock to maintain the spawning stock biomass above the target biomass levels and restrict fishing mortality to rates below the threshold.

3. Develop a management program for restoring and maintaining essential Atlantic croaker habitat.

4. Develop research priorities that will further refine the Atlantic croaker management program to maximize the biological, social, and economic benefits derived from the Atlantic croaker population.

STATUS OF THE STOCK

Stock Status

Stock status is based on the data and results of the 2010 stock assessment (ASMFC 2010). Atlantic croaker is not experiencing overfishing and likely not overfished. Biomass has been increasing and the age-structure of the population has been expanding since the late 1980s, it is unlikely the stock is in trouble. The next stock assessment is scheduled for completion in late 2016.

Stock Assessment

A statistical catch-at-age model was used to assess Atlantic croaker. This model combines the catch-at-age data from the commercial and recreational fisheries with information from fishery-independent surveys and biological information such as growth rates and natural mortality rates to estimate the size of each age class and the exploitation rate of the population. Biological reference points in the 2010 stock assessment are ratio based and apply to the entire stock. Overfishing is occurring if F/F_{MSY} is greater than 1 and the stock is considered overfished if $SSB/(SSB_{MSY}(1-M))$ is less than 1.

Atlantic croaker is not experiencing overfishing. Biomass has been increasing and fishing mortality decreasing since the late 1980s. Biomass conclusions are based on information from the data compiled for the assessment, namely increasing indices of relative abundance and expanding age structure in the catch and indices. Model estimated values of fishing mortality (*F*), spawning stock biomass (SSB), and biological reference points are too uncertain to be used to determine overfished stock status. Stock status cannot be assessed with confidence until the discards of Atlantic croaker from the South Atlantic shrimp trawl fishery can be adequately estimated and incorporated into the stock assessment (ASMFC 2014).

In order to evaluate the status of the stock between stock assessments, the Traffic Light Analysis established under Addendum II was reviewed. Management triggers were not tripped in 2014 since both population characteristics (harvest and abundance) were not above the 30% threshold for 2012-2014 (Figures 1-3). However, analysis shows declining trends in fishery-independent indices and commercial and recreational harvest.

STATUS OF THE FISHERY

Current Regulations

There are no commercial or recreational regulations on Atlantic croaker in North Carolina.

Commercial Landings

Commercial harvest of Atlantic croaker in North Carolina ranged from 1,819,066 to 14,429,197 pounds from 1994 to 2015, with the lowest landings occurring in 2015 (Figure 4). Landings have averaged 7,931,461 pounds from 1994-2015. In general harvest has decreased since 2003 but between 2013 and 2014 there was a 36% increase in landings largely due to an in increase in effort from the ocean fly net fishery.

Recreational Landings

Recreational harvest of Atlantic croaker in North Carolina ranged from 99,298 to 241,993 pounds from 2006 to 2015 and was estimated at 187,590 pounds in 2015 (Table 1). While recreational harvest has fluctuated there has generally been a decreasing trend. However, the number of releases has generally increased. Harvest decreased by 40,359 pounds from 2014 to 2015 and releases decreased by 180,837 individuals from 2014 to 2015.

Number of Atlantic croaker measured during MRIP sampling has generally remained stable from 2006 to 2015 (Table 2). Mean length of Atlantic croaker in 2015 was 236 mm and has fluctuated little since 2006. Similarly, minimum and maximum lengths have also fluctuated little since 2006.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The number of Atlantic croaker lengths obtained from fishery dependent sources from 2006 through 2015 ranged from 9,172 to 20,262 (Table 3). Mean length varied little ranging from

267.2 mm to 301.2 mm. Minimum length ranged from 113 mm to 192 mm. Maximum length ranged from 394 mm to 630 mm.

Fishery-Independent Monitoring

The Atlantic croaker juvenile abundance index (JAI) from the Pamlico Sound Survey from 2006 through 2015 has been variable (Table 4). The JAI has ranged from 82.7 individuals per tow in 2009 to 1,175.4 individuals per tow in 2010. There has been a decreasing trend since 2012 with a JAI in 2015 of 270.6 individuals per tow. The mean JAI over the 10-year time series is 422.1 individuals per tow.

The number of Atlantic croaker aged in North Carolina from 2005 through 2014 has ranged from 237 to 1,071 in 2014 (Table 5). The modal age has ranged from zero in 2008 to five in 2007. While the modal age has varied, in 6 of the 10 years it was one or two. Minimum age was zero in every year while the maximum age ranged from 7 to 15. From 2005-2010 the maximum age was between 13 and 15 and from 2011-2014 the maximum age was between 7 and 8. Ages from 2015 are not currently available.

MANAGEMENT STRATEGY

Per Addendum II to Amendment 1, the Traffic Light Approach is used as a precautionary management framework for Atlantic croaker. The Traffic Light Approach provides guidance in lieu of a current stock assessment for Atlantic croaker. Under this management program, if the amount of red in the Traffic Light for both population characteristics (adult abundance and harvest) meet or exceed the threshold for the specified three-year period, then management action is required. See Table 6 for a summary of management strategies. Management triggers were not tripped in 2014 since both population characteristics (harvest and adult abundance) were not above the 30% threshold for 2012-2014. The next benchmark stock assessment is scheduled for completion in late 2016.

MANAGEMENT AND RESEARCH NEEDS

There are no research or monitoring programs required of the states except for the submission of an annual compliance report. See Table 7 for a summary of management and research needs.

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ASMFC. 2005. Amendment I to the interstate fishery management plan for Atlantic croaker. Washington (DC): ASMFC. Fishery Management Report No. 44. 92 pp.

ASMFC. 2010. Atlantic croaker 2010 benchmark stock assessment. Washington (DC): ASMFC. 366 pp.

ASMFC. 2011. Addendum I to Amendment I to the Atlantic croaker fishery management plan. Washington (DC): ASMFC. 7 pp.

ASMFC. 2014. Addendum II to Amendment I to the Atlantic croaker fishery management plan. Washington (DC): ASMFC. 7 pp.

TABLES

Table 1. North Carolina recreational harvest of Atlantic croaker 2006-2015, with landings in number of pounds, and number of discards. Percent Standard Error (PSE) is given for each.

Year	Harvest Number	PSE	Weight	PSE	Number Released	PSE
2006	556,024	19.3	222,286	21.1	2,578,819	10.3
2007	461,162	17.6	131,185	18.8	1,608,120	12.7
2008	317,940	15.7	132,731	17.1	1,419,019	12.1
2009	368,990	16.7	131,742	16.5	1,912,670	11
2010	478,156	12.4	241,993	12.4	1,598,139	8.9
2011	246,676	12.9	99,298	13.2	1,798,230	10.7
2012	288,813	11.5	105,530	11.9	1,255,216	8.7
2013	411,882	14.6	141,880	13.6	1,984,701	9.8
2014	541,657	13.3	227,949	14.6	2,713,787	11.7
2015	463,867	12.3	187,590	13	2,532,950	10.9
Average	413,517		162,218		1,940,165	

Table 2. Total number measured, mean, minimum, and maximum length in mm of Atlantic croaker measured by MRIP sampling in North Carolina, 2006-2015.

Year	Number Measured	Mean Length	Minimum Length	Maximum Length
2006	198	236	122	378
2007	113	201	103	348
2008	188	244	141	392
2009	210	224	145	402
2010	330	248	157	427
2011	255	239	148	363
2012	230	233	124	358
2013	267	229	151	392
2014	215	236	105	357
2015	142	236	147	352

Table 3. Total number measured, mean, minimum, and maximum length in mm of Atlantic croaker from North Carolina commercial fish house samples, 2006-2015.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	298.2	188	630	18,703
2007	301.2	140	494	13,347
2008	294.0	174	495	13,291
2009	289.1	192	486	19,235
2010	287.8	151	452	20,262
2011	297.0	162	422	15,040
2012	286.7	188	454	10,520
2013	284.4	172	437	8,545
2014	267.2	113	423	10,951
2015	276.5	137	394	9,172

Table 4. Atlantic croaker juvenile abundance index (CPUE; number per tow), with Percent Standard Error (PSE), from the Pamlico Sound Survey (P195) from 2006-2015.

Year	N	CPUE	PSE
2006	54	131.54	16
2007	51	113.36	20
2008	54	312.38	22
2009	54	82.7	17
2010	54	1,175.44	17
2011	54	90.47	19
2012	54	1,149.18	14
2013	54	570.95	14
2014	54	324.14	16
2015	54	270.58	13

Table 5. Total number aged, modal, minimum, and maximum age of Atlantic croaker in North Carolina from 2005-2014. Age data from 2015 is not currently available.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005	3	0	14	597
2006	1	0	13	658
2007	5	0	15	321
2008	0	0	15	739
2009	1	0	14	709
2010	4	0	13	703
2011	1	0	8	237
2012	2	0	7	349
2013	1	0	8	577
2014	2	0	8	1,071

Table 6. Summary of management strategies and needs.

Management Strategy	**Objectives**	**Outcome**
Establish Traffic Light method for monitoring the stock in non-assessment years	1,2,3,4	Addendum 2 to Amendment 1, approved August 2014. Replaced triggers established by Amendment 1
Change management unit to single coast wide stock (New Jersey to east coast of Florida) and set new biological reference points	1,2,3,4	Addendum 1 to Amendment 1, approved March 2011
Establish triggers to be used in monitoring stock in non-assessment years ASMFC annual state compliance reports submitted in July each year	1,2,3,4	Amendment 1 to the Interstate Fisheries Management Plan for Atlantic croaker, approved November 2005
Encourage the use of circle hooks to minimize recreational discard mortality	1,2,4	Needed
Consider approval of *de minimis* requests from Delaware, South Carolina, Georgia, and Florida	2	Ongoing
Consider basic research and monitoring information needed for informed management in light of budgetary constraints	1,2,3,4	Ongoing

Table 7. Summary of management and research recommendations.

Management Strategy/Research Need	Objectives	Outcome
Fishery-Dependent Priorities		
High		
Encourage fishery-dependent biological sampling, including extraction of ageing structures, to improve age-length keys. Age-length keys should be representative of all gear types in the fishery. Supplement underrepresented length bins with additional ageing samples to avoid the necessity of weighting length-at-age estimates by length frequencies.	1, 2	Ongoing in North Carolina
Obtain gear specific effort information and improve fishery-dependent catch and effort statistics and catch size and age structure.	1, 2	Ongoing in North Carolina
Recover detailed historical landings data from NOAA as indicated by historical summaries.	1, 2, 4	Needed
Moderate		
Develop and implement state-specific commercial scrap fisheries monitoring programs to evaluate relative importance of croaker scrap landings.	1, 2	Ongoing in North Carolina
Conduct studies on discard mortality from varying gears in recreational and commercial fisheries.	1, 2, 4	Ongoing; needed in North Carolina
Assess and monitor the effects of bycatch reduction devices (BRD's) on croaker catch.	1, 2, 4	Ongoing in North Carolina
Monitor fisheries with significant croaker bycatch and determine extent of unutilized bycatch and F on fish less than age 1.	1, 2, 4	Ongoing in North Carolina
Determine the onshore versus offshore components of the croaker fishery.	1, 2	Needed
Increase observer coverage of commercial discards.	1, 2	Ongoing in North Carolina
Fishery-Independent Priorities		
Moderate		
Expand fishery-independent surveys and subsample for individual weights and ages, especially in the southern range.	1, 2, 3	Ongoing in North Carolina
Continue monitoring juvenile croaker populations in major nursery areas.	1, 2, 3	Ongoing in North Carolina
Develop coast wide juvenile croaker indices to clarify stock status.	1, 2	Ongoing
Modeling/Quantitative Priorities		
High		
Develop size, age, and sex specific relative abundance estimates from fishery-independent and fishery- dependent data.	1, 2	Ongoing
Identify and evaluate environmental covariates in stock assessment models.	3, 4	Needed

Moderate		
Incorporate bycatch estimates into croaker assessment models.	1, 2	Needed
Analyze croaker YPR to establish a minimum size that maximizes YPR.	1, 2	Needed
Life History, Biological, and Habitat Priorities		
High		
Conduct studies on fecundity and reproductive dynamics and develop maturity schedules.	1, 2, 4	Work by Fabrizio and Tuckey examining the effects of hypoxia on reproduction of Chesapeake Bay croaker in progress
Conduct studies on growth and age structure throughout species range.	1, 2, 4	Ongoing in North Carolina
Conduct collaborative coast wide genetics and tagging studies to determine migratory patterns, stock identification, and stock mixing.	1, 2, 3, 4	Needed
Moderate		
Identify essential habitat requirements.	3, 4	Ongoing in North Carolina
Re-examine historical ichthyoplankton studies of the Chesapeake Bay for an indication of the magnitude of estuarine spawning.	3, 4	Needed
Low		
Determine species interactions and predator-prey relationships between croaker (prey) and predator species targeted in more valued fisheries.	2, 3, 4	Ongoing in North Carolina, work by Binion (NCSU)
Assess the impacts of any dredging activity (i.e., for beach re-nourishment) on all life history stages of croaker.	2, 3, 4	Needed
Management, Law Enforcement, and Socioeconomic Priorities		
Moderate		
Determine the optimum utilization (economic and biological) of a long term fluctuating croaker population.	1, 2, 3, 4	Needed
Evaluate socioeconomic aspects of croaker fisheries.	1, 2, 3, 4	Needed

FIGURES

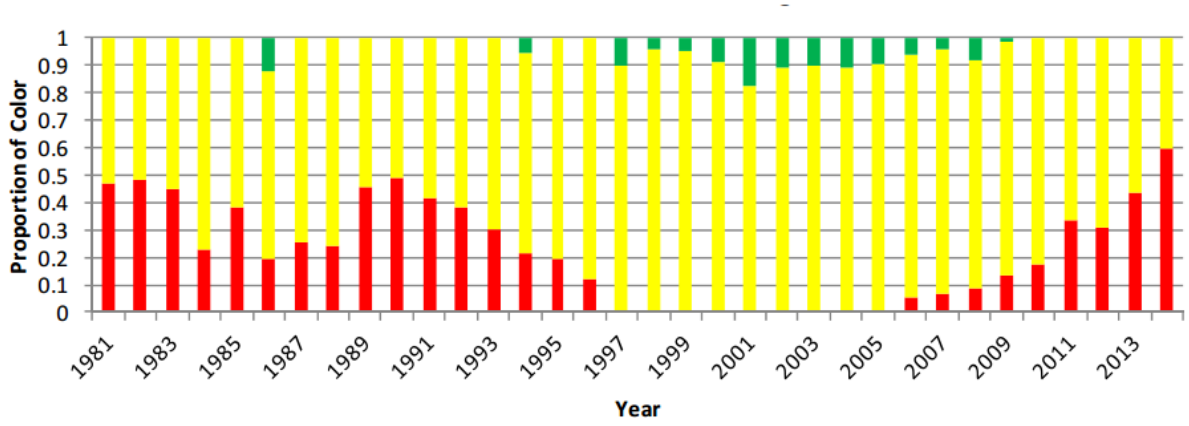

Figure 1. Annual color proportions for the harvest composite TLA of Atlantic croaker recreational and commercial landings, 1981-2014.

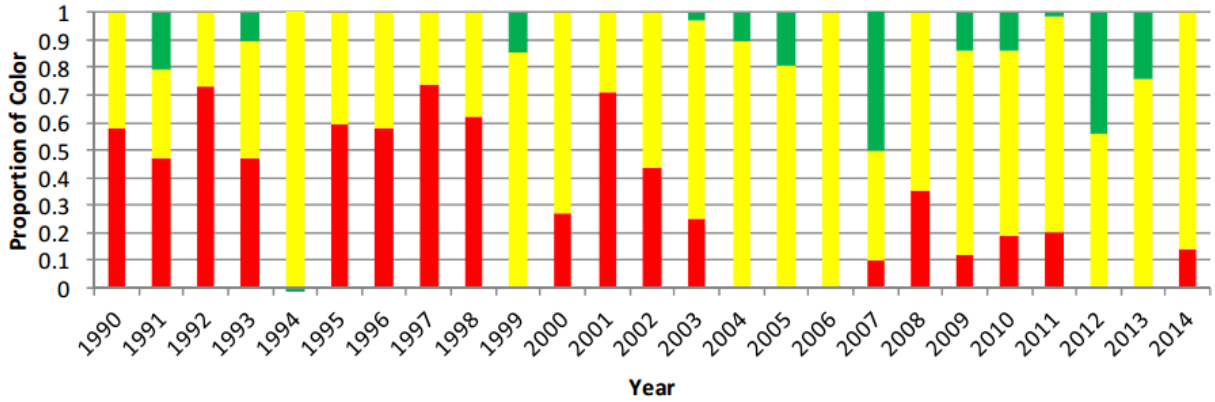

Figure 2. Adult croaker TLA composite characteristic index (NMFS and SEAMAP surveys), 1990-2014.

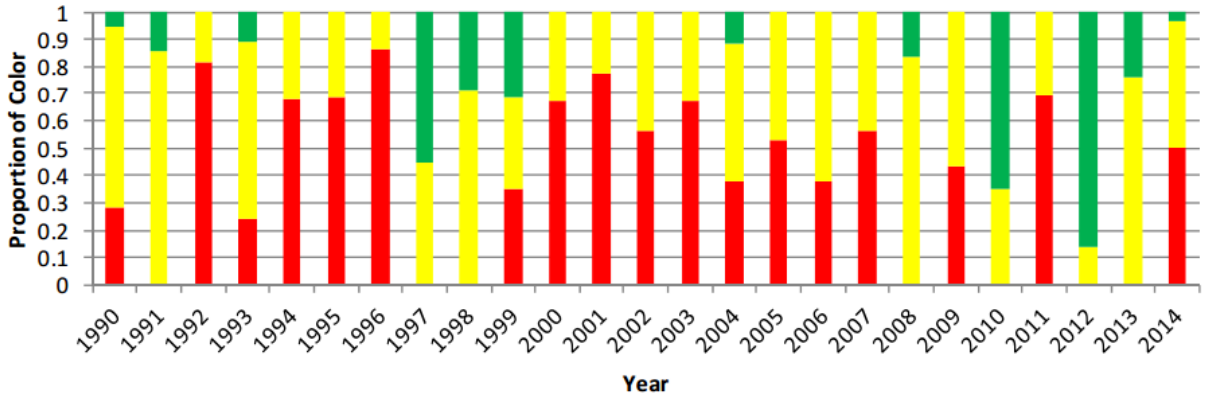

Figure 3. Juvenile croaker TLA composite characteristic index (NC P195 and VIMS surveys), 1990-2104.

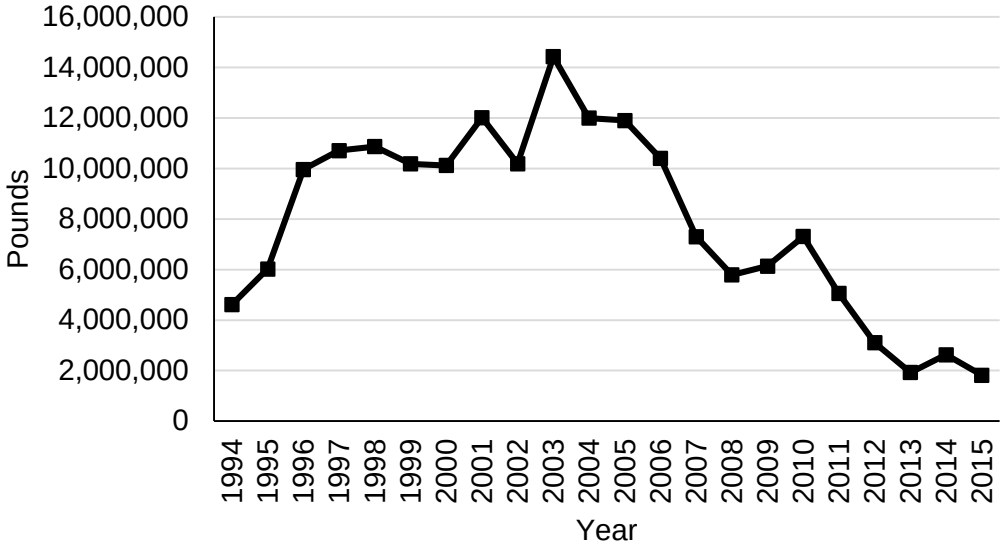

Figure 4. North Carolina commercial landings of Atlantic croaker from 1994-2015.

FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC MENHADEN
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	August 1981
Amendments:	Amendment 1 – July 2001 Amendment 2 – December 2012
Revisions:	Revision – September 1992 Addendum I – August 2004 Addendum II – October 2005 Technical Addendum I – February 2006 Addendum III – October 2006 Addendum IV – November 2009 Addendum V – November 2011 Technical Addendum I – May 2013
Supplements:	Supplement – October 1986
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	2020

The revised Atlantic States Marine Fisheries Commission (ASMFC) Atlantic Menhaden Fishery Management Plan (FMP) was approved in 1992. The revised FMP was the result of an updated stock assessment. In 2001, Amendment 1 to the FMP was approved. This Amendment adopted a new stock assessment, and new overfishing definition, as well as required mandatory reporting for all menhaden purse seine fisheries. Addendum I of Amendment 1 was approved in August 2004 to modify the biological reference points, stock assessment schedule and revise the habitat section. The 2003 stock assessment used a new model with a fecundity-based biological reference point to determine stock status. Addendum II was approved by the ASMFC Atlantic Menhaden Management Board and established a five-year annual cap on reduction fishery landings in Chesapeake Bay and was implemented in 2006. Addendum II also established a research program to determine menhaden population in the Chesapeake Bay and to address localized depletion. Passed in November of 2006, Addendum III mirrored the intent and provisions of Addendum II but incorporates 2005 landings data and allows for the transfer of under-harvest to the following year's harvest. The ASMFC Atlantic Menhaden Management Board then approved Addendum IV in November of 2009 which extended the Chesapeake Bay reduction fishery harvest cap, established through Addendum III, for an additional three years (2011 to 2013). In 2010, the ASMFC Atlantic Menhaden Management Board tasked the Atlantic Menhaden Technical Committee (TC) to develop alternative reference points. In addition, the Policy Board directed the Multispecies TC to work with the Menhaden TC to explore reference points that account for predation. Addendum V was approved in November 2011 and

established a new interim fishing mortality threshold and target (based on maximum spawning potential or MSP) with the goal of increasing abundance, spawning stock biomass, and menhaden availability as a forage species. The new threshold and target equates to a MSP of 15% and 30%, respectively. The development of Amendment 2 established a 170,800 MT (376,549,545 lb) total allowable catch (TAC) beginning in 2013 that continued until completion of and Board action on the 2014 benchmark stock assessment. The Board adopted new biological reference points for biomass based on maximum spawning potential (MSP), with the goal of increasing abundance, spawning stock biomass, and menhaden availability as a forage species. The spawner-per-recruit based reference points were based on the maximum F value experienced at age-2 during this time frame as during the time period from 1960-2012 and median F value at age-2 as the target along with the associated population fecundity. In 2013, Technical Addendum I established a set aside program for episodic events. The 2014 Atlantic menhaden stock assessment was completed and menhaden are not overfished and overfishing is not occurring.

Management Unit

The management unit is defined as the Atlantic menhaden resource throughout the range of the species within U.S. waters of the northwest Atlantic Ocean from the estuaries eastward to the offshore boundary of the EEZ.

Goal and Objectives

The goal of Amendment 2 is to manage the Atlantic menhaden fishery in a manner that is biologically, economically, socially and ecologically sound, while protecting the resource and those who benefit from it. The Amendment is designed to minimize the chance of a population decline due to overfishing, reduce the risk of recruitment failure, reduce impacts to species which are ecologically dependent on Atlantic menhaden, and minimize adverse effects on participants in the fishery.

STATUS OF THE STOCK

Stock Status

Based on the current adopted benchmarks, the Atlantic menhaden stock status is not overfished and overfishing is not occurring. The current benchmarks are calculated through spawner-per-recruit-based analysis using the mean values of any time-varying components over the time series 1955-2013 and full fishing mortality rate defined as the maximum rate across ages for each year. The biological reference point used to determine the fecundity target is defined as the mature egg production one would expect when the population is being fished at the threshold fishing mortality rate. Population fecundity, a measure of reproductive capacity, was estimated to be well above both the threshold and the target in recent years. In fact, in 2013, fecundity is estimated to have been 71% higher than the target value, which is calculated to be 100 trillion eggs. This means that the spawning stock in 2013 appears to be more than adequate to produce the target number of eggs, and thus the population is not overfished.

Stock Assessment

The 2014 benchmark stock assessment for Atlantic menhaden was initiated in late 2012. The TC initiated the benchmark stock assessment to identify and evaluate all available data sources

and explore alternative model configurations as recommended by the 2009 peer review panel. In this benchmark assessment, significant changes were made to growth, maturity, natural mortality, indices of relative abundance, and fishery selectivities. Additionally, this benchmark assessment incorporates a “fleets-as-areas” base model configuration such that the reduction and bait fisheries were divided into northern and southern regions, creating four separate fleets.

STATUS OF THE FISHERY

Current Regulations

No regulatory changes were made in 2015 to affect menhaden.

Effective January 1, 2013 a law was passed making it unlawful to harvest menhaden with a purse seine net deployed by a mother ship and one or more runner boats within North Carolina’s three-mile jurisdiction.

Commercial Landings

Atlantic menhaden landings have been on a decline due to changes in management. Landings remained relatively constant over the past 10 years (Table 1), with 1,250,310 pounds mean annual landings. The 2013 and 2014 landings were regulated under the total allowable catch initiated in Amendment 2. Gill nets were the most common gear used throughout the state.

Recreational Landings

Data are not available for recreational landings.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Atlantic menhaden are sampled in a variety of North Carolina Division of Marine Fisheries (NCDMF) dependent surveys for compliance with ASMFC requirements. However, NCDMF surveys were not used in the most recent benchmark stock assessment. Surveys include the sink net fishery, winter trawl fishery, estuarine gill net fishery, and sciaenid pound net fishery. Commercial landings of Atlantic menhaden are monitored through the NCDMF Trip Ticket Program. Table 2 describes the mean, minimum, and maximum lengths of Atlantic menhaden sampled from the North Carolina fishery-dependent monitoring. Mean lengths in the menhaden commercial fishery have remained fairly consistent from 2009 to 2015.

Fishery-Independent Monitoring

Atlantic menhaden are sampled in a variety of NCDMF independent surveys for compliance with ASMFC requirements. However, NCDMF surveys were not used in the most recent benchmark stock assessment. Atlantic menhaden are sampled in the estuarine trawl survey, Pamlico Sound trawl survey, and the Albemarle Sound striped bass and alosine juvenile trawl and seine survey. For analysis, juveniles are defined by size categories through the year: <90mm in May, <110 mm in June, <125 mm in July and August, and <150 mm in September and October.

MANAGEMENT STRATEGY

In May 2015, the ASMFC Atlantic Menhaden Management Board approved a TAC for the 2015 and 2016 fishing seasons at 187,880 metric tons (414,204,498 lb) per year, a 10% increase from the 2014 TAC. The increase was response to the positive findings of the 2015 Atlantic menhaden benchmark assessment which indicated the resource is not overfished and overfishing is not occurring. The Board also committed to moving forward with the development of an amendment to establish ecological based reference points that reflect Atlantic menhaden's role as a forage species. The amendment will additionally consider changes to the current state-by-state allocation scheme.

MANAGEMENT AND RESEARCH NEEDS

Many of the research and modeling recommendations from the last benchmark stock assessment remain relevant for the update stock assessment as well. The highest priorities are to:

- Develop a coastwide fishery independent index of adult abundance at age. One possible methodology being an air spotter survey with ground trothing of biological data (eg. Size and age composition). In all cases, a sound statistical design is essential. Statisticians should be involved in the design development and review. Trial surveys may be necessary. (Long-term: 6+ years)
- Conduct Management Strategy Evaluation (MSE) (Short-term: 3-6 years)
- Conduct multi-object decision analysis (MODA) (Short-term: 3-6 years)

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TABLES

Table 1. North Carolina Atlantic menhaden annual commercial landings, 2006-2015.

Year	Landings (pounds)
2006	962,648
2007	1,134,167
2008	645,231
2009	2,124,733
2010	1,299,130
2011	3,529,967
2012	538,783
2013	454,172
2014	794,658
2015	896,891

Table 2. Atlantic menhaden length data sampled from the North Carolina commercial fishery, 2006-2015.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	203	95	348	1,431
2007	206	122	383	1,112
2008	205	100	325	1,061
2009	230	100	343	1,066
2010	226	147	319	225
2011	236	95	347	1,400
2012	220	70	362	789
2013	237	141	385	847
2014	225	123	324	1,528
2015	232	122	470	3,068

FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC STURGEON
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 1990
Amendments:	Amendment 1 July 1998 Technical Addendum #1 to Amendment 1 October 2000 Addendum I January 2001 Addendum II May 2005 Addendum III November 2006 Addendum IV September 2012
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	January 2017

Amendment 1 to the Interstate Fishery Management Plan (FMP) for Atlantic Sturgeon was developed by the Atlantic States Marine Fisheries Commission (ASMFC) with a goal to restore Atlantic sturgeon spawning stocks to a population level which will provide for sustainable fisheries, and ensure viable spawning populations. Addendum I was completed to allow importation on non-indigenous Atlantic sturgeon and permit the development of private aquaculture facilities. Addendum II required the compliance with ASMFC Terms, Limitations, Enforcement and Reporting Requirements for each exemption to the harvest and possession moratoria as outlined in Section 4 of the FMP. It also allowed for Lapaz Inc. to import Atlantic sturgeon fingerlings, produce fish, and sell the meat. Further exemption was provided to Acadian Sturgeon and Caviar to import fish to North Carolina. Addendum III compliments Addendum II and provides authority for LaPaz Inc. to import Atlantic sturgeon from Supreme Sturgeon and Caviar for commercial aquaculture. Addendum IV is the Atlantic Sturgeon Habitat Addendum.

Management Unit

Atlantic Ocean and adjacent estuaries and coastal rivers from Maine through Florida.

Goal and Objectives

The goal is to restore Atlantic sturgeon spawning stocks to population levels which will provide for sustainable fisheries, and ensure viable spawning populations (ASMFC 1998). Amendment

1 to the Atlantic Sturgeon FMP was approved in July 1998. In order to achieve this goal the plan sets forth the following objectives:

- Establish 20 protected year classes of females in each spawning stock;
- Close the fishery for a sufficient time period to reestablish spawning stocks and increase numbers in current spawning stocks;
- Reduce or eliminate bycatch mortality;
- Determine the spawning sites and provide protection of spawning habitats for each spawning stock;
- Where feasible, reestablish access to historical spawning habitats for Atlantic sturgeon; and
- Conduct appropriate research as needed.

STATUS OF THE STOCK

Stock Status

Reported landings peaked in 1890 at 3.4 million kg (7,495,717 lb) and declined precipitously. Currently, populations of Atlantic sturgeon throughout their range are either extirpated or at historically low abundance. Recruitment is variable at low levels in all regions. The stock is considered overfished but overfishing is not occurring. The target fishing mortality (F) rate was defined as that level of F that generated an eggs-per-recruit (EPR) equal to 50% of the EPR at F = 0.0 (i.e., virgin stock). This rate (F 50) equals 0.03 (annual harvest rate of 3%) for a restored population. This target is far below recent estimates of F prior to enactment of fishing moratoria, which ranged from 0.01 - 0.12 for females and 0.15 - 0.24 for males in the Hudson River. These numbers may not apply to southern stocks, where more signs toward recovery are being seen.

Stock Assessment

The 1998 Atlantic sturgeon assessment relied on data from Maine, the Hudson River, Delaware Bay, South Carolina and Georgia. Egg-per-recruit (EPR) and yield-per-recruit (YPR) models were used to estimate a target F rate and potential yield in number of recent age-one abundance (recruitment) estimates. Mortality rates associated with targeted fisheries were estimated for the Hudson River population through a catch-at-age analysis. The spawning stock biomass (SSB) is undocumented for all river systems. The stock assessment report presented a comprehensive review of the current status of Atlantic sturgeon in the U.S. From this review it is obvious that fishing seriously depleted the Atlantic sturgeon by the early 1900s. Since that time, some stocks are believed to have been extirpated, while others have persisted at very low levels. Catches of juveniles suggest that sporadic spawning is occurring in some of the larger rivers throughout the historic range, but because of the migratory nature of juvenile Atlantic sturgeon, the origin of these juveniles older than age 2 is uncertain. Although time series are sparse for most river stocks, declines in abundance have been noted. The ASMFC has identified members to initiate a new benchmark stock assessment and has completed the initial data workshops. The estimated completion for a peer reviewed stock assessment is early 2017.

STATUS OF THE FISHERY

Current Regulations

Coastwide commercial and recreational moratorium.

Commercial Landings

No landings recorded since 1991

Recreational Landings

No recreational fishery.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The NCDMF provides at sea observer coverage for the fall flounder fishery as well as other large and small mesh fisheries throughout the state. Staff observed large mesh trips and small mesh trips throughout the estuaries of North Carolina.

Fishermen participating in the American shad fishery conducted in the Cape Fear (drift nets) and Brunswick rivers (anchored gill nets) were interviewed for interactions with Atlantic sturgeon during nine fishing trips. No Atlantic or shortnose sturgeon were reported during 2013 or 2014.

North Carolina developed a Section 10 Incidental Take Permit for the estuarine waters of North Carolina relative to gill net fishing. Through this process North Carolina developed a zero inflated poisson general linear model that estimated bycatch in the gill net fisheries. This model divided the state estuarine waters into management units and estimated takes (live and dead) within each of these units, by season, and mesh size (large and small). Results from this model are available in the Application for an Incidental Take Permit submitted to the National Marine Fisheries Service in December 2012 by the NCDMF.

A total of 250 Atlantic sturgeon have been encountered in the North Carolina on board observer program since 2003. These sturgeon have ranged from 270 to 1,524 mm FL and averaged 644 mm FL (Table 1). One-hundred and ninety-three of the 250 sturgeon have been encountered in the Albemarle Sound Management Unit. An additional 38 Atlantic sturgeon were observed through the alternate platform observer program during 2013, 2014, and 2015. These fish ranged in size from 410 to 1,016 mm FL and averaged 727 mm TL. Thirty-one of the 38 sturgeon encountered were observed in the Albemarle Sound Management Unit.

Fishery-Independent Monitoring

The North Carolina Division of Marine Fisheries (NCDMF) currently has three independent gill net programs that encounter and tag Atlantic sturgeon. The Albemarle Sound Independent Gill Net Survey (IGNS) is a stratified random gill net survey that employs gill nets with mesh sizes that range from 2.5 in stretch mesh (ISM) through 7 ISM (0.5 ISM increments) and 8 ISM and 10

ISM of floating and sinking nets. Gill nets are fished in 40 yard shots totaling 960 yards per set. Each set is fished for approximately 24 hours before retrieval. Nets were fished from January through May, November, and December each year from 1991 through 2015. Lengths of sturgeon collected have ranged from 153 mm FL to 1,498 and average 518 mm FL (Table 2). Six fish were collected with a fork length greater than 1,000 mm, and only 3 of 1,583 fish collected were adults. Catch per unit effort shows an increasing trend over the entire time series but annual CPUE are variable (Figure 1).

The Pamlico Sound Independent Gill Net Survey (PSIGNS) is conducted in Pamlico Sound, Pungo, Pamlico, and Neuse rivers, and consists of gill net sets, ranging in mesh size from 3.0 ISM through 6.5 ISM (0.5 ISM increments) and are fished for approximately 12 hours before retrieval. The Pamlico Sound portion has been conducted since 2001 and the rivers portion since 2003. A total of 47 sturgeon have been collected in Pamlico Sound and an additional 64 have been collected in the Pamlico, Pungo, and Neuse rivers. Average lengths are larger than those seen in the Albemarle, indicating capture of more sub-adult fish than young of year fish (Tables 3, 4). Two adults have been collected in the Pamlico Sound Survey and two adults have been collected in the Rivers Survey.

The Fisheries Independent Assessment Program (FIAP) is modeled after the PSIGNS. The areas fished include the New and Cape Fear rivers. Two-hundred and forty yards were fished per sample and 120 samples were completed. Trips conducted in the Atlantic Ocean include an additional 2.5 ISM net. The areas fished include the coastal ocean waters off the New and Cape Fear rivers. Two-hundred and seventy yards were fished per sample. Effort has been ongoing since 2008. Sampling was discontinued in the Ocean on July 1, 2015. Five fish have been collected in the Cape Fear River IGNS and they ranged from 569 to 873 mm FL. No adult Atlantic sturgeon have been collected in this survey.

During 2010, The NCDMF joined a multi-state grant entitled “Research and Management of Endangered and Threatened Species in the Southeast: Riverine Movements of Shortnose and Atlantic Sturgeon” cooperating with South Carolina Department of Natural Resources, The University of Georgia, and North Carolina State University (NCSU). Funding was provided through the National Marine Fisheries Service (NMFS), Section 6. Ninety-four Atlantic sturgeon were tagged with acoustic transmitters from 2011 through 2013 in the Cape Fear River and Albemarle Sound. These fish ranged from 772 to 1,753 mm FL and averaged 928 mm FL (Table 5). Collections in the Albemarle Sound were low, however the Cape Fear River crew were very successful, contrary to the IGNS survey conducted within the same river but in different locations. The Cape Fear River tagging was also conducted using gill nets but were targeting Atlantic sturgeon with appropriate mesh and twine sizes for the species.

MANAGEMENT STRATEGY

Atlantic coastal states implemented a moratorium on harvest and possession of Atlantic sturgeon in 1998. Furthermore, harvest is not permitted in the exclusive economic zone (EEZ). The best available data indicate that river-specific populations are appropriate management units. It is recommended that the moratorium remain in place for each population until it can be documented that the spawning population includes at least 20 year classes of adult females (half the number of year classes that probably existed in unfished populations). Given that female Atlantic sturgeon do not mature until about 20 years of age, the moratorium can be expected to remain in place for several decades from when harvest of a given population ended. As populations increase during restoration, bycatch of sturgeon will increase; hence,

managers should ensure that mechanisms are in place to monitor the level of bycatch and make reductions if necessary.

The NMFS listed the Carolina Distinct Population Segment of Atlantic sturgeon as an endangered species under the 1973 Endangered Species Act (ESA). This listing determination drastically influences the management strategy in North Carolina. The largest influence was the requirement of the NCDMF to obtain a Section 10 Incidental Take Permit to allow the estuarine gill net fisheries to continue. Without the Section 10 Permit interactions in the fishery would have been illegal. Any future fishery for Atlantic sturgeon will only be possible if the NMFS removes Atlantic sturgeon from the ESA. However, additional protections provided through the ESA listing should increase the potential recovery.

MANAGEMENT AND RESEARCH NEEDS

Biological/Captive Propagation

- Standardize and obtain baseline data on population status for important sturgeon rivers. Data should include assessment of stock status in various rivers, size and composition of the spawning population, reproductive success and juvenile production;
- Develop long-term marking/tagging procedures to provide information on individual tagged Atlantic sturgeon for up to 20 years;
- Establish success criteria in order to evaluate the effectiveness of stocking programs;
- Determine size at maturity for Mid- and North Atlantic sturgeon;
- Monitor catch/effort and size/age composition of landings of any future authorized directed fisheries;
- Determine length at age by sex for North, Mid- and South Atlantic stocks;
- Determine maturity at age by sex for North, Mid- and South Atlantic stocks;
- Determine fecundity at age, length, and weight for North, Mid-, and South Atlantic stocks;
- Characterize size and condition of Atlantic sturgeon by gear and season taken as bycatch in various fisheries;
- Establish environmental tolerance levels (D.O., pH, temperature, etc.) for different life stages;
- Establish coastal tagging projects to delineate migratory patterns (This measure is being implemented by the USFWS and member states.);
- Expand tagging of juveniles in major spawning rivers to allow estimates of rates of loss to bycatch;
- Establish a tag recovery clearinghouse and database for consolidation and evaluation of tagging and tag return information including associated biological, geographic, and hydrographic data (This measure is being implemented by the USFWS through the Maryland Fisheries Resources Office located in Annapolis, Maryland.);
- Encourage shortnose sturgeon researchers to include Atlantic sturgeon research in their projects;
- Establish methods for the recovery of tags and associated information (This measure is being implemented through ASMFC/USFWS cooperative efforts.);
- Evaluate existing groundfish survey data to determine what can be learned about at-sea migratory behavior;
- Conduct basic culture experiments to provide information on: a) efficacy of alternative spawning techniques, b) egg incubation and fry production techniques, c) holding and rearing densities, d) prophylactic treatments, e) nutritional requirements and feeding techniques, and f) optimal environmental rearing conditions and systems;

- Determine the extent to which Atlantic sturgeon are genetically differentiable among rivers;
- Conduct research to identify suitable fish sizes, and time of year for stocking cultured fish;
- Conduct and monitor pilot-scale stocking programs before conducting large-scale efforts over broad geographic areas;
- Determine effects of contaminants on early life stages;
- Develop methods to determine sex and maturity of captured sturgeon;
- Develop sperm cryopreservation techniques and refine to assure availability of male gametes;
- Refine induced spawning procedures;
- Develop the capability to capture wild broodstock and develop adequate holding and transport techniques for large broodstock;
- Conduct studies to identify tissue(s) suitable for genetic analyses and the techniques for their collection and storage. In those states which permit future harvest of Atlantic sturgeon, material for genetic analysis should be collected from up to 50% of the fish landed in the commercial fisheries. In states with no future directed fisheries, federal and state programs which encounter sturgeon should be encouraged to collect specified tissues for genetic analysis;
- Standardize collection procedures to obtain biological tissues, and identify a suitable repository to archive all materials;
- Conduct research to determine the susceptibility of Atlantic sturgeon to sturgeon adenovirus and white sturgeon iridovirus. Methods should be developed to isolate the sturgeon adenovirus and an Atlantic sturgeon cell line should be established for infection trials;
- Conduct research to identify the major pathogens of Atlantic sturgeon and a cell line for this species should be developed .

Social

- To evaluate the social impacts the needed data might include the following for consumptive and non-consumptive users: demographic information (e.g. age, gender, ethnicity/race, etc.), social structure information (e.g. historical participation, affiliation with NGOs, perceived conflicts, etc.), other cultural information (e.g. occupational motivation, cultural traditions related to resource's use), and community information.
- A cost and benefit analysis (CBA) of possible stocking protocols is needed.

Monitoring population status through juvenile indices and abundance, characterizing the incidence of bycatch in various fisheries and associated mortalities, conducting tag/recapture studies for estimates of bycatch loss are being addressed through current sampling. It should be noted that any sampling that encounters Atlantic sturgeon whether incidental or targeted now require Section 10 permits through NMFS or a Section 7 consultation if funded through a federal grant program. These permit requirements directly influence the data collection abilities of the NCDMF and the thus completing research recommendations.

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TABLES

Table 1. Mean, minimum, and maximum lengths of Atlantic sturgeon collected from the North Carolina Division of Marine Fisheries Observer Program from 2003 through 2015.

Year	Mean	Minimum	Maximum	Collection Number
2003	N/A	N/A	N/A	1
2004	581	330	820	25
2005	631	467	814	28
2006	600	336	1,135	39
2007				
2008	639	480	845	18
2009				
2010				
2011	763	464	1,386	4
2012	651	464	900	10
2013	643	492	920	29
2014	684	405	1,524	42
2015	683	270	995	54
Total	644	270	1,524	250

Table 2. Mean, minimum, and maximum lengths of Atlantic sturgeon collected from the Albemarle Sound Independent Gill Net survey from 2005 through 2015.

Year	Mean	Minimum	Maximum	Collection Number
2005	516	231	850	48
2006	570	230	1,473	62
2007	528	230	770	66
2008	543	257	840	124
2009	629	391	800	55
2010	579	395	812	32
2011	604	393	1,498	47
2012	574	296	1,060	64
2013	556	275	1,395	139
2014	609	355	1,180	69
2015	587	355	980	86

Table 3. Mean, minimum, and maximum lengths of Atlantic sturgeon collected from the Pamlico Sound Independent Gill Net survey from 2005 through 2015.

Year	Mean	Minimum	Maximum	Collection Number
2005	657	574	795	20
2006	765	522	790	13
2007	531	654	1,495	5
2008	663	643	947	2
2009	967	967	967	1
2010	606	200	698	4
2011				0
2012	1,415	1,415	1,415	1
2013				0
2014				0
2015	N/A	N/A	N/A	1

Table 4. Mean, minimum, and maximum lengths of Atlantic sturgeon collected from the Pamlico, Pungo, and Neuse Rivers Independent Gill Net survey from 2005 through 2015.

Year	Mean	Minimum	Maximum	Collection Number
2005	463	358	794	29
2006	627	480	735	4
2007	516	400	714	3
2008	532	532	532	1
2009	706	716	716	1
2010				0
2011	2,300	2,300	2,300	1
2012	625	625	625	1
2013				0
2014	N/A	N/A	N/A	1
2015	612	365	1,435	23

Table 5. Mean, minimum, and maximum lengths of Atlantic sturgeon collected through section 6 funding in the Cape Fear River and Albemarle Sound, North Carolina, 2011-2013.

Year	Mean	Minimum	Maximum	Number
2011	960	630	1,620	45
2012	948	772	1,753	21
2013	862	605	1,162	28
Total	928	772	1,753	94

FIGURES

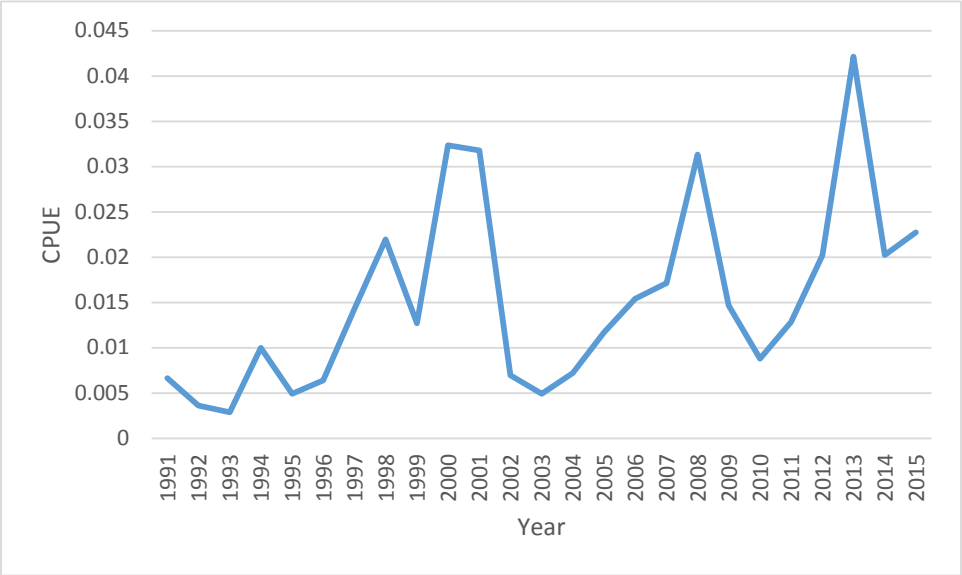

Figure 1. Catch per unit effort of Atlantic sturgeon collected from the Albemarle Sound Independent Gill Net Survey from 1991 through 2015.

FISHERY MANAGEMENT PLAN UPDATE
BLACK DRUM
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	June 2013
Amendments:	None
Revisions:	None
Supplements:	None
Information Updates:	February 2015
Schedule Changes:	None
Next Benchmark Review:	February 2020

The Atlantic States Marine Fisheries Commission (ASMFC) formed a Black Drum Working Group and conducted a series of webinars and conference calls in February and March 2011, compiling data on the status of black drum from New Jersey to Florida. General trends in these black drum fishery dependent and independent data sources and the feasibility of developing a coastwide stock assessment were presented to the Interstate Fisheries Management Program Policy Board in August 2011. The Policy Board accepted the working group's recommendation to initiate an Interstate Fisheries Management Plan (FMP) for black drum. In November 2011, the Management Board also voted to initiate the FMP and a stock assessment concurrently. A Public Information Document (PID) outlining the Commission's intent to develop an Interstate FMP for black drum was released and sent out for public comment in February 2012. In October 2012, the Management Board approved the Draft FMP for black drum for public comment. Public hearings were held in April and March 2013 to solicit comments on a range of issues from the Draft FMP, including management goals and objectives; recreational and commercial management measures; flexibility to react to new assessment information; de minimis levels and exemptions; monitoring requirements and recommendations; and recommended measures for implementation by NOAA Fisheries in federal waters. In April 2013, the Black Drum Technical Committee met for a data workshop to compile fishery independent and dependent data to be used in the first coastwide benchmark stock assessment for black drum. In June 2013, the ASMFC adopted the Interstate FMP for Black Drum and required all states to maintain their current regulations for black drum and implement a maximum possession limit and minimum size limit (of no less than 12 inches) by January 1, 2014. States were also required to further increase the minimum size limit (to no less than 14 inches) by January 1, 2016. In response to the ASMFC request, the North Carolina Marine Fisheries Commission implemented a 14- to 25-inch total length slot size limit (with one fish over 25 inches), 10-fish recreational bag limit and a 500-pound commercial trip limit effective January 1, 2014.

Management Unit

In North Carolina, black drum is included in the Interjurisdictional FMP, which defers to Atlantic States Marine Fisheries Commission (ASMFC) FMP compliance requirements. The FMP includes all states from Florida to New Jersey. The management unit is defined as the black drum (*Pogonias cromis*) resource throughout the range of the species within U.S. waters of the northwest Atlantic Ocean from the estuaries eastward to the offshore boundaries of the EEZ (ASMFC 2013).

Goal and Objectives

The goal of the Black Drum FMP is to provide an efficient management structure to implement coastwide management measures. The objectives of the FMP include:

1. Provide a flexible management system to address future changes in resource abundance, scientific information, and fishing patterns among user groups or area.

2. Promote cooperative collection of biological, economic, and sociological data required to effectively monitor and assess the status of the black drum resource and evaluate the management efforts.

3. Manage the black drum fishery to protect both young individuals and established breeding stock.

4. Develop research priorities that will further refine the black drum management program to maximize the biological, social, and economic benefits derived from the black drum population.

STATUS OF THE STOCK

Stock Status

The stock status of black drum is currently “viable”. The 2015 ASMFC Black Drum Stock Assessment determined that the stock is not overfished and not experiencing overfishing. Prior to the completion of the stock assessment the stock status was listed as “unknown”.

Stock Assessment

Variable catch history in state surveys and fisheries coupled with complex migratory patterns made the use of traditional statistical catch-at-age models difficult, thus a data–poor modeling approach was used for the first coastwide benchmark stock assessment (ASMFC 2015). Data-poor models estimate reference points based on historical catch data and life history information. A Depletion-Based Stock Reduction analysis (DB-SRA) model was used to estimate biomass and maximum sustainable yield (MSY). While the median biomass has declined steadily from the 1900s, the assessment determined that black drum is not overfished and not experiencing overfishing. The median biomass was estimated to be 90.78 million pounds, well above the median biomass that produces maximum sustainable yield (B_{MSY}; 47.26 million pounds).

STATUS OF THE FISHERY

Current Regulations

Minimum Size Limit

- It is unlawful to possess black drum less than 14-inches total length or greater than 25-inches total length, except that one (1) black drum over 25-inches total length may be retained.

Harvest Limits

- It is unlawful to possess more than ten (10) black drum per person per day by hook and line or for recreational purposes.

- It is unlawful for any commercial fishing operation, regardless of the number of persons, license holders or vessels involved, to possess more than 500 pounds of black drum per trip.

Commercial Landings

Black drum is primarily caught as bycatch in several North Carolina commercial fisheries; however, they are predominately landed in the estuarine gill net and pound net fisheries. The commercial harvest of black drum has been highly variable over the last ten years (Table 1, Figure 1). On average 117,354 pounds of black drum were landed annually from 2006 to 2015. Commercial landings have ranged from a low of 51,089 pounds in 2015 to a high of 301,998 pounds in 2008. Commercial landings decreased slightly from 2014 to 2015.

Recreational Landings

The recreational harvest has also been highly variable over the last ten years (Table 2, Figure 1). The harvest (pounds of fish) increased 91% from 2014 to 2015. In 2015, 115,609 pounds of black drum were landed. Recreational releases (number of fish) increased 55% from 2014 to 2015.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial black drum landings are monitored through the North Carolina trip ticket program. Under this program licensed fishermen can only sell commercial catch to licensed North Carolina Division of Marine Fisheries (NCDMF) fish dealers. The dealer is required to complete a trip ticket every time a licensed fisherman lands fish. Trip tickets capture data on gears used to harvest fish; area fished, species harvested, and total weights of each individual species. Trip tickets are submitted to NCDMF on the 10th of the month following the month in which the landings occurred. Landings are available approximately 30-45 days after they are submitted from the dealers. Commercial fishing activity is monitored through fishery dependent sampling conducted under Title III of the Interjurisdictional Fisheries Act and has been ongoing since 1982. Biological samples (lengths, aggregate weights) are obtained from the NCDMF commercial fisheries dependent sampling program (P400s). Black drum lengths and aging structures are collected at local fish houses or on the water. Subsequent to sampling a portion of the catch, the

total weight of the catch by species and market grade are obtained for each trip, either by using the trip ticket weights or some other reliable estimate.

Since the implementation of the 14- to 25-inch slot limit in 2014, the mean TL of commercially harvest black drum has increased. The mean total length (TL) has ranged from 13- inches to 19-inches (Table 3). In 2015, the minimum TL was 10-inches and the maximum TL was 44-inches.

The Marine Recreational Intercept Program (MRIP) is the primary survey used to collect data on angler harvest and effort. MRIP provides estimates of catch and effort at a regional level from the recreational fishing community and consists of two components, the Access-Point Angler Intercept Survey (APAIS) and the Coastal Household Telephone Survey (CHTS). The CHTS uses a random digit dialing telephone survey approach to collect marine recreational fishing effort information from residential households located in coastal counties. Individual catch and discard data for calculation of catch rate at the species level are collected through APAIS, an onsite intercept survey conducted at fishing access-sites (e.g., boat ramps, beaches, piers, marinas, etc.). Creel clerks collect intercept data year-round (in two-month waves) by interviewing anglers completing fishing trips in one of four fishing modes (man-made structures, beaches, private boats, and for-hire vessels). Individual lengths (inches-TL) and weights (pounds) are recorded for each individual species sampled. Results from both component surveys are combined at the state, area, fishing mode and wave level to provide estimates of the total number of fish caught, released, and harvested; the weight of the harvest; the total number of trips; and total participation in marine recreational fishing.

The mean total length (TL) of recreational caught black drum ranged from a low of 10-inches in 2011 to a maximum of 17-inches in 2015 (Table 4). In 2015, the minimum TL dropped two inches and the maximum TL increased two inches.

Fishery-Independent Monitoring

A fishery independent gill net survey was initiated by the NCDMF in May of 2001. The survey utilizes a stratified random sampling scheme designed to characterize the size and age distribution for key estuarine species in Pamlico Sound (Pamlico Sound Independent Gill Net Survey, North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries Completion Report, Grant F-70, 1991-2013). By continuing a long-term database of age composition and developing index of abundance for black drum this survey will help managers assess the black drum stocks without relying solely on commercial and recreational fishery dependent data. Additionally, data collected is used to help improve bycatch estimates, evaluate the success of management measures, and look at habitat usage.

The annual weighted black drum CPUE from the independent gill net survey has ranged from a high of 3.52 in 2002 to a low of 0.38 in 2012 (Table 5, Figure 3). In 2015, the CPUE was 1.04, slightly above the time-series average. Proportional Standard Error (PSE) has ranged from 12 to 39.

Black drum age structures are collected from various fishery independent (scientific surveys) and dependent (fisheries) sources throughout the year. In 2015, 400 black drum were aged; the majority of the age structures were collected from independent sources (Table 6). Ages ranged in from 0 to 4 years.

MANAGEMENT STRATEGY

Data poor models such as the one used for 2015 ASMFC Back Drum Stock Assessment are designed to estimate reference points based on historical catch data and the life history of a particular species. Due to the uncertainty of the inputs and the nature of data poor methods the ASMFC stock assessment subcommittee (SASC) recommended that a precautionary maximum sustainable yield (MSY) estimate of 2.12 million pounds with an interquartile range of 1.60-3.05 million pounds as the recommended target reference point (Figure 2). The threshold MSY or overfishing limit (OFL) was set at 4.12 million pounds. The SASC also recommended that future assessments include “rumble-strip” approach that has been implemented by the Mid-Atlantic Fisheries Management Council for other data poor species. This method allows managers to examine a set of indicators that detect major changes in harvest and F that could trigger a reassessment of the reference points.

See Table 7 for current management strategies and implementation status of the ASMFC Black Drum FMP.

MANAGEMENT AND RESEARCH NEEDS

The FMP outlines management and research needs for black drum. The ASMFC Black Drum Plan Review Team (PRT) will annually review and prioritize the research needs annually as part of the Commission’s FMP Review Process. The research recommendations outlined in the 2015 Black Drum Stock Assessment include:

High Priority

- Age otoliths that have been collected and archived.
- Collect information to characterize the size composition of fish discarded in recreational fisheries.
- Collect information on the magnitude and sizes of commercial discards. Obtain better estimates of bycatch of black drum in other fisheries, especially juvenile fish in the southern Atlantic states.
- Increase biological sampling in commercial fisheries to better characterize the size and age composition of commercial fisheries by state and gear.
- Increase biological sampling in recreational fisheries to better characterize the size and age composition by state and wave.
- Obtain estimates of selectivity-at-age for commercial fisheries by gear, recreational harvest, and recreational discards.
- Continue all current fishery-independent surveys and collect biological samples for black drum on all surveys.
- Develop fishery-independent adult surveys. Consider long line and purse seine surveys. Collect age samples, especially in states where maximum size regulations preclude the collection of adequate adult ages.

Moderate Priority

- Conduct reproductive studies, including: age and size-specific fecundity, spawning frequency, spawning behaviors by region, and movement and site fidelity of spawning adults.

- Conduct a high reward tagging program to obtain improved return rate estimates. Continue and expand current tagging programs to obtain mortality and growth information and movement at size data.
- Improve sampling of night time fisheries.
- Conduct studies to estimate catch and release mortality rates in recreational fisheries.

LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission). 2013. Fisheries Management Report of the Atlantic States Marine Fisheries Commission: Interstate Fishery Management Plan for Black Drum. Washington, DC. June 2013. 72p.

ASMFC (Atlantic States Marine Fisheries Commission). 2015. Fisheries Management Report of the Atlantic States Marine Fisheries Commission: Black Drum Stock Assessment and Peer Review Reports. Washington, DC. February 2015. 319p.

TABLES

Table 1. North Carolina commercial black drum landings (lb), number of dealers and ex-vessel value, 2006-2015 (NCTTP).

Year	Dealers	Ex-Vessel Value	Pounds
2006	228	38,076	125,214
2007	203	50,320	148,231
2008	248	104,937	301,998
2009	227	64,875	148,994
2010	190	32,805	69,194
2011	189	26,432	56,083
2012	240	54,133	94,352
2013	243	79,480	127,170
2014	179	32,298	51,217
2015	173	43,340	51,089

Table 2. North Carolina recreational black drum harvest (lb), harvest number (n) and number released (n) and PSE=Proportional Standard Error, 2006-2015 (MRIP).

	Harvest Weight		Harvest Number		Released Alive	
Year	Pounds	PSE	Number	PSE	Number	PSE
2006	162,932	21.5	92,956	21.5	93,229	25.4
2007	220,454	22.3	209,372	22.3	226,463	27.0
2008	524,138	20.6	359,702	20.6	188,680	24.8
2009	121,038	22.8	92,058	22.8	69,484	28.5
2010	305,517	20.5	122,709	20.5	102,348	20.6
2011	151,407	18.0	211,396	18.0	104,286	20.8
2012	243,965	15.9	139,363	15.9	91,895	20.0
2013	713,047	20.7	363,466	20.7	121,306	28.1
2014	60,406	28.4	24,058	28.4	361,514	26.4
2015	115,609	30.0	35,529	29.4	559,251	30.1

Table 3. Commercial black drum length data from NCDMF fisheries dependent sampling programs (P400s), 2006-2015.

Year	Mean TL (inches)	Minimum TL (inches)	Maximum TL (inches)	Total Measured (number
2006	14	7	48	1,543
2007	14	7	50	1,919
2008	15	7	50	2,695
2009	16	7	48	1,060
2010	17	8	49	658
2011	13	7	33	1,204
2012	15	6	37	1,123
2013	16	5	36	866
2014	17	10	47	381
2015	19	10	44	310

Table 4. Recreational black drum length data from Marine Recreational Intercept Program (MRIP), 2006-2014.

Year	Mean TL (inches)	Minimum TL (inches)	Maximum TL (inches)	Total Measured (number)
2006	14	9	33	104
2007	11	7	20	191
2008	13	7	48	363
2009	12	8	25	191
2010	14	7	29	258
2011	10	7	24	567
2012	13	7	26	237
2013	13	7	26	154
2014	16	13	23	33
2015	17	11	25	75

Table 5. Annual weighted black drum CPUE (ages combined) from the North Carolina Pamlico Sound Independent Gill Net Survey. N=number of samples; CPUE=Catch per unit effort; SE=Standard Error; PSE=Proportional Standard Error.

Year	N	CPUE	SE	PSE
2001	237	1.91	0.41	21
2002	320	3.52	0.46	13
2003	320	1.16	0.30	26
2004	320	0.46	0.09	20
2005	304	0.49	0.13	27
2006	320	0.78	0.09	12
2007	320	0.76	0.16	21
2008	320	0.87	0.16	18
2009	320	0.79	0.16	20
2010	320	0.54	0.18	33
2011	298	0.84	0.15	18
2012	308	0.38	0.07	18
2013	308	0.42	0.07	17
2014	308	0.76	0.17	22
2015	306	1.04	0.41	39

Table 6. Summary of black drum age samples collected from both dependent (commercial and recreational fisheries) and independent (surveys) sources from 2011-2016.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2011	0	0	60	140
2012	1	0	3	327
2013	2	0	4	187
2014	1	0	31	409
2015	0	0	4	400

Table 7. Summary of ASMFC management strategies and their implementation status for Black Drum Fishery Management Plan.

Management Strategy	**Implementation Status**
HARVEST MANAGEMENT	
Implement a maximum possession limit and size limit (of no less than 12 inches) by January 1, 2014	Accomplished (other states)
Implement a maximum possession limit and size limit (of no less than 14 inches) by January 1, 2016	Proclamation FF-73-2013
DATA AND RESEARCH NEEDS	
Age otoliths that have been collected and archived.	Ongoing
Collect information to characterize the size composition of fish discarded in recreational fisheries.	Ongoing
Collect information on the magnitude and sizes of commercial discards. Obtain better estimates of bycatch of black drum in other fisheries, especially juvenile fish in south Atlantic states	Ongoing
Increase biological sampling in commercial fisheries to better characterize the size and age composition of commercial fisheries by state and gear	Ongoing
Increase biological sampling in recreational fisheries to better characterize the size and age composition by state and wave	Ongoing
Obtain estimates of selectivity-at-age for commercial fisheries by gear, recreational harvest, and recreational discards	Ongoing
Continue all current fishery-independent surveys and collect biological samples for black drum on all surveys	Ongoing
Develop fishery-independent adult surveys. Consider long line and purse seine surveys. Collect age samples, especially in states where maximum size regulations preclude the collection of adequate adult ages	Ongoing
Conduct reproductive studies, including: age and size-specific fecundity, spawning frequency, spawning behaviors by region, and movement and site fidelity of spawning adults	Needed
Conduct a high reward tagging program to obtain improved return rate estimates. Continue and expand current tagging programs to obtain mortality and growth information and movement at size data	Needed
Improve sampling of night time fisheries	Needed
Conduct studies to estimate catch and release mortality rates in recreational fisheries	Needed

FIGURES

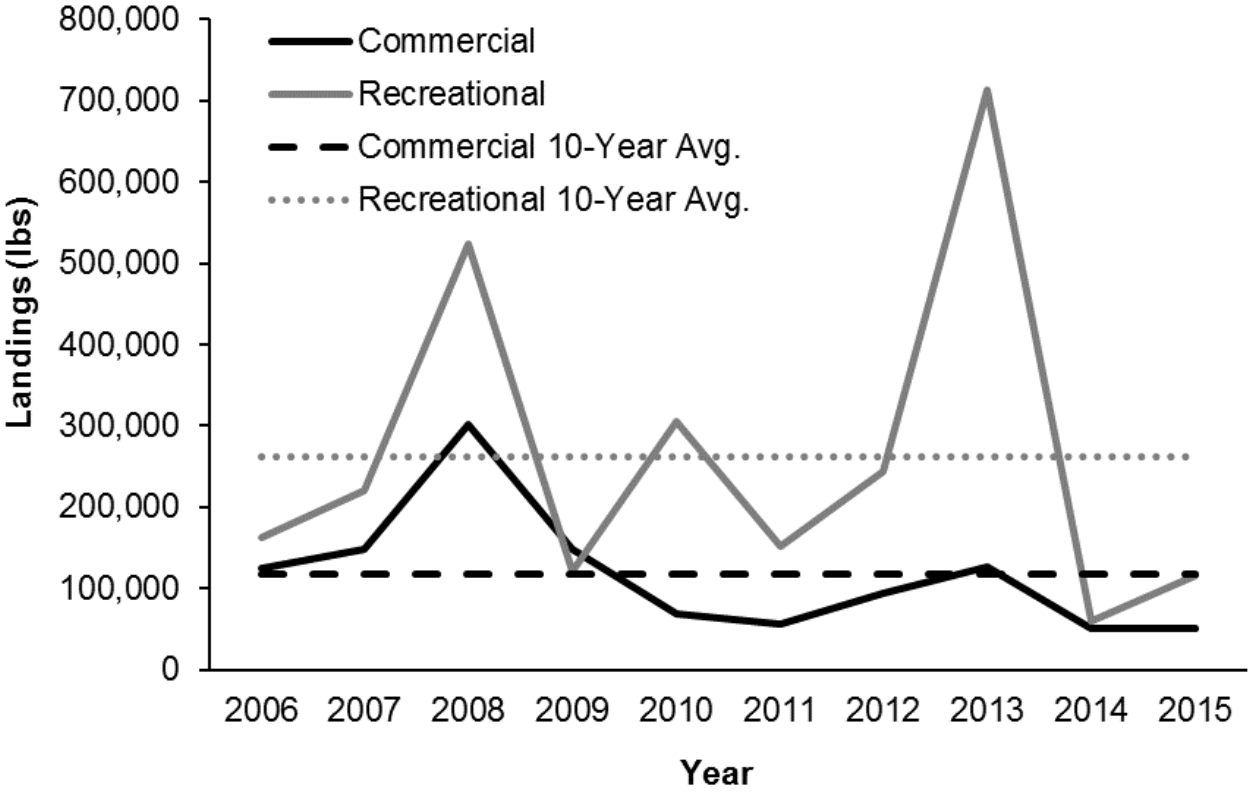

Figure 1. North Carolina commercial (NCTTP) and recreational (MRIP) black drum landings (lb), 2006-2015.

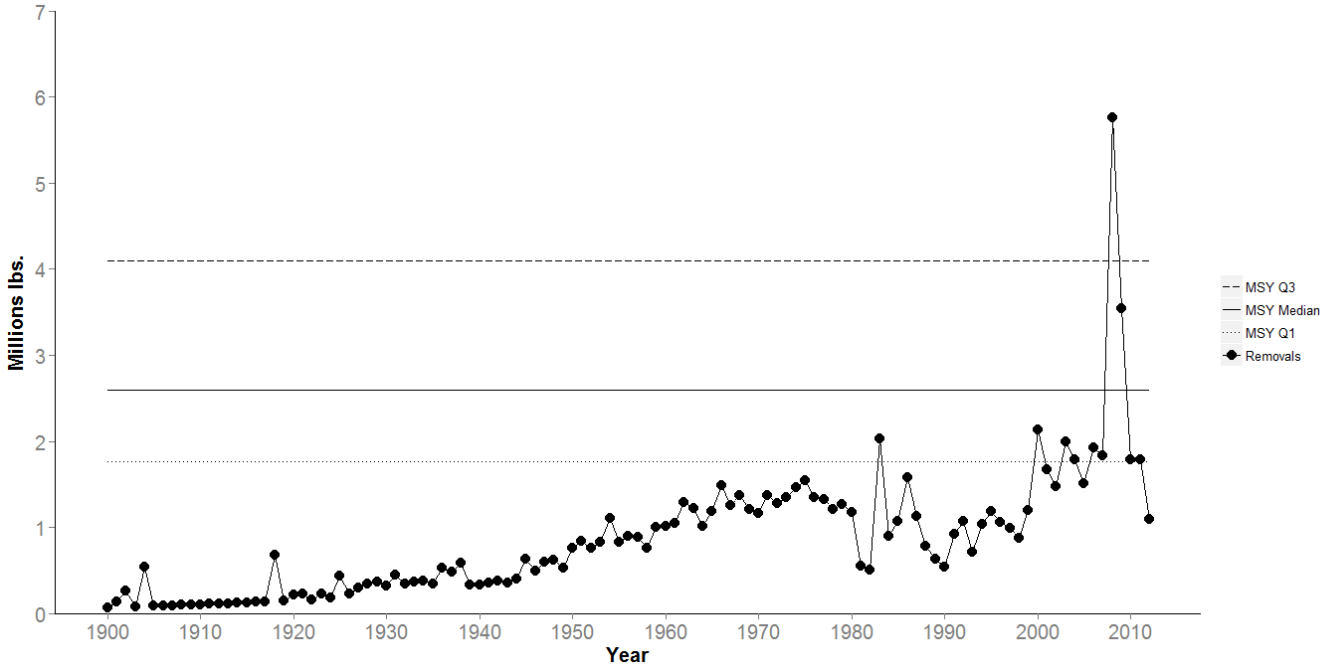

Figure 2. Observed removals and the median (2.60 million pounds) and interquartile range (1.76 – 4.10 million pounds) of the MSY estimate from the DB-SRA base configuration (ASMFC 2015).

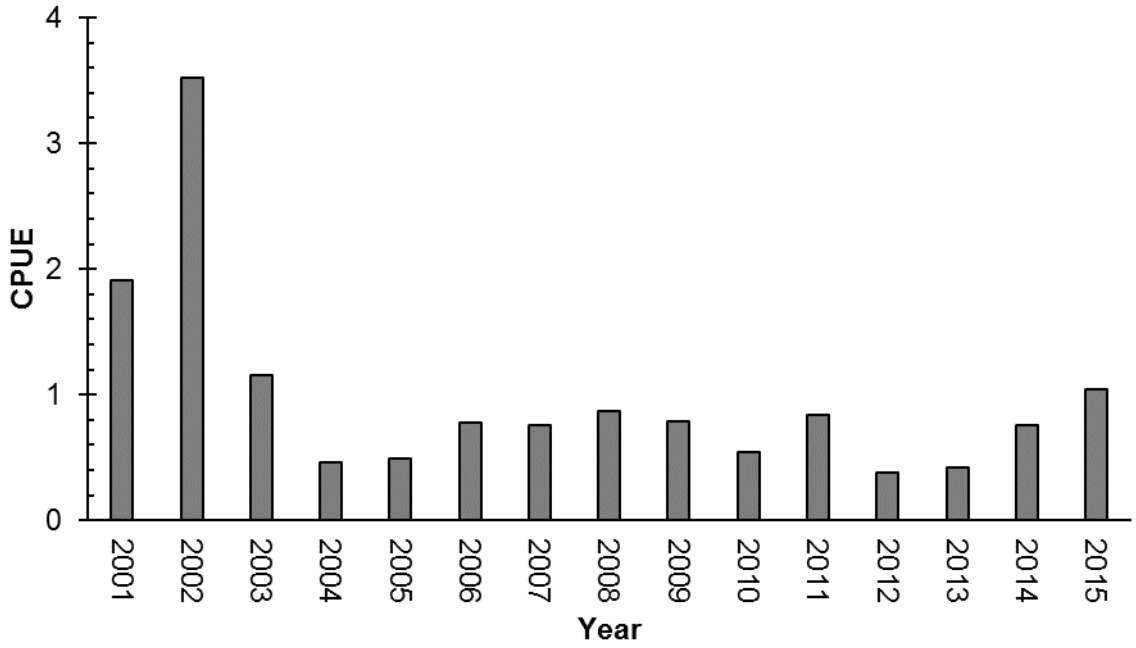

Figure 3. Annual weighted black drum CPUE (ages combined) from the North Carolina Pamlico Sound Independent Gill Net Survey, 2001-2015.

FISHERY MANAGEMENT PLAN UPDATE
BLACK SEA BASS NORTH OF CAPE HATTERAS
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	Incorporated into Summer Flounder FMP through Amendment 9 in 1996
Amendments:	Amendment 11 in 1998 Amendment 12 in 1999 Amendment 13 in 2003 Amendment 15 in 2011 Amendment 16 in 2007
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	Stock assessment to begin in 2016

Because of their presence in, and movement between, state waters (0-3 miles) and federal waters (3-200 miles), the Mid Atlantic Fisheries Management Council manages black sea bass north of Cape Hatteras cooperatively with the Atlantic States Marine Fisheries Commission (ASMFC). The two management entities work in conjunction with the National Marine Fisheries Service (NMFS) as the federal implementation and enforcement entity. The Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP) and amendments use output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial and recreational fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries. Recreational bag/size limits and seasons are determined on a state-by-state basis using conservation equivalency. The commercial quota is divided into state-by-state quotas based on historical landings. Specific details for each Amendment include:

Amendments 1-8 to the FMP were completed prior to black sea bass being incorporated in the Summer Flounder, Black Sea Bass and Scup FMP.

Amendment 9 - Incorporated Black Sea Bass into Summer Flounder FMP; established black sea bass measures, including commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements.

Amendment 11 - Modified certain provisions related to vessel replacement and upgrading, permit history transfer, splitting, and permit renewal regulations.

Amendment 12 - Revised FMP to comply with the Sustainable Fisheries Act and established framework adjustment process; established quota set-aside for research for summer flounder, scup, and black sea bass; established state-specific conservation equivalency measures; allowed the rollover of winter scup quota; revised the start date for summer quota period for scup fishery; established a system to transfer scup at sea.

Amendment 13 - Revised black sea bass commercial quota system; addressed other black sea bass mgmt. measures; Established multi-year specification setting of quota for all three species; Established region-specific conservation equivalency measures for summer flounder; built flexibility into process to define and update status determination criteria for each plan species.

Amendment 15 - Established Annual Catch Limits (ACLs) and Accountability Measures.

Amendment 16 - Standardized bycatch reporting methodology.

Management Unit

U.S. waters in the western Atlantic Ocean from Cape Hatteras northward to the U.S.-Canadian border.

Goal and Objectives

The objectives of the Summer Flounder, Black Sea Bass and Scup FMP are to:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fisheries to assure that overfishing does not occur;

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass (SSB);

3. Improve the yield from these fisheries;

4. Promote compatible management regulations between state and federal jurisdictions;

5. Promote uniform and effective enforcement of regulations;

6. Minimize regulations to achieve the management objectives stated above.

The 2011 Omnibus Amendment contains Amendment 15 to the Summer Flounder, Black Sea Bass and Scup FMP (the most recent Amendment that impacts the black sea bass fishery). The amendment is intended to formalize the process of addressing scientific and management uncertainty when setting catch limits for the upcoming fishing year(s) and to establish a comprehensive system of accountability for catch (including both landings and discards) relative to those limits, for each of the managed resources subject to this requirement. Specifically: (1) Establish Allowable Biological Catch (ABC) control rules, (2) Establish a Council risk policy, which is one variable needed for the ABC control rules, (3) Establish ACL(s), (4) Establish a system of comprehensive accountability, which addresses all components of the catch, (5) Describe the process by which the performance of the annual catch limit and comprehensive

accountability system will be reviewed, (6) Describe the process to modify the measures above in 1-5 in the future.

Addendum XXV to the Summer Flounder, Black Sea Bass and Scup Fishery Management Plan, established regional management of the summer flounder and black sea bass recreational fisheries for the 2014 fishing year.

STATUS OF THE STOCK

Stock Status

The NCDMF considers the stock status to be 'concern' due to uncertainty in recent stock assessments and low catches in North Carolina waters. The ASMFC also considers the stock to be concern based on uncertainty in the most recent assessment and the unique life history traits of the fish.

Stock Assessment

The NEFSC 2008 stock assessment used a length based model (SCALE model) due to lack of age data. Although it passed peer-review there was considerable uncertainty about results. The 2011 NEFSC benchmark assessment included a statistical catch at age model calculated using the Age Structured Assessment Program. The 2011 assessment did not pass review for use in management. In 2012 an update of the 2008 SCALE model was completed. However, results from the 2012 assessment are considered too uncertain to provide a reliable stock status determination. From 2010 to 2015, black sea bass have been managed under a constant catch approach. In a departure from this strategy, the ASMFC and Council recently approved a 21% increase in the Acceptable Biological Catch for 2016 and 2017. The increase is based on updated catch and survey information. Although the Atlantic States Marine Fisheries Commission (ASMFC) considers the stock to be rebuilt, concerns remain due to uncertainty in recent stock assessments. A new benchmark stock assessment if scheduled for late 2016.

STATUS OF THE FISHERY

Current Regulations

Commercial: 11 in total length (TL) minimum size limit. Landings windows are set by proclamation with variable harvest limits by gear and time-period (see most recent NCDMF proclamation).

Recreational: 12 ½ in TL minimum size limit, 15-fish bag limit. The 2016 season is May 15 through September 21 and October 22 through December 31.

Commercial Landings

Most black sea bass landings from north of Cape Hatteras were from trawls although flynets, fish pots and rod and reel gears caught small numbers. Landings are constrained by the coastwide quota. Landings generally declined since 2006 but increased notably in 2014 and 2015 (Figure 1). The low landings in 2012-2013 were partly due to the closure of Oregon Inlet to large vessels (such as trawlers) and the consequent transfer of most of North Carolina's

quota allocation to Virginia and other states. In 2014 and 2015, more winter trawl vessels returned to North Carolina to land catches rather than transferring quota to Virginia and other states. Trends in commercial trips have generally followed landings trends (Figure 1). Trips include the number of trip ticket records with landings reported. Trips typically represent more than one day of fishing, especially for trawling.

Recreational Landings

Recreational harvest of black sea bass from north of Cape Hatteras generally declined since 2006 with the exception of a peak in 2011 (Figure 2). Recreational trips generally followed harvest trends but with a more clearly declining trend, with a slight increase in 2015 (Figure 2).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Three NCDMF sampling programs collect biological data on commercial and recreational fisheries that catch black sea bass north of Cape Hatteras. Program 433 (Winter Trawl Fishery) and Program 438 (Offshore Live Bottom Fishery) are the primary programs that collect harvest length data. Other commercial sampling programs focusing on fisheries that do not target black sea bass collect biological data rarely. NCDMF sampling of the recreational fishery through the Marine Recreational Information Program (MRIP) collects harvest length data.

There were no clear trends in commercial length data in 2006 to 2015 (Table 1). Annual mean lengths were fairly consistent for the time-series. There was a slight decrease in the annual maximum length in recent years compared to earlier years in the time-series, with an increase in 2015. The number of fish measured in 2015 was the highest in the time-series. Age data were not collected for black sea bass north of Cape Hatteras until 2014. In 2015, 109 otoliths were collected, but age data was not available at the time of this report.

There were some potential trends in length data in the recreational fishery but sample size was low throughout 2006-2015 (Table 2). Mean lengths were fairly consistent, although higher earliest in the time-series. The maximum annual length may be declining slightly. The number of measurements clearly declined – following the harvest decline with the exception of 2012 (very high harvest). Age data were not collected for black sea bass north of Cape Hatteras from recreational fisheries.

Fishery-Independent Monitoring

NCDMF independent sampling programs rarely encounter black sea bass north of Cape Hatteras (Table 3). Most of the small number of samples came from Program 120 (Estuarine Trawl Survey), which typically collects a few samples of black sea bass juveniles from inshore waters each year. One black sea bass was collected from Program 120 in 2015 at 103 mm. However, it is not clear that samples collected inshore north of Cape Hatteras are from the northern stock of black sea bass; this combined with the small sample numbers means that these data cannot be used in an abundance index. NCDMF currently does not have independent sampling programs in ocean waters north of Cape Hatteras.

MANAGEMENT STRATEGY

Management of black sea bass has been based on results from stock assessments. Despite concerns about data uncertainty etc., results from the 2012 stock assessment update are being used to guide management in combination with a constant catch-based strategy (based on landings in recent years). A new stock assessment is scheduled for 2016.

MANAGEMENT AND RESEARCH NEEDS

At the 2013 Black Sea Bass Data Workshop, a series of research recommendations were developed to address concerns of the MAFMC and SSC had about the 2011 stock assessment. Text in parenthesis for each number indicates known progress made to address needs.

Research to address uncertainty in the spatial structure of the stock:

- Explore the impact of spatial heterogeneity on the stock assessment results. Conduct sensitivity analyses on this topic. Specifically, if you break the stock north-south do you get qualitatively different stock status results than coastwide stock? (progress unknown)
- Explore the use of time-varying catchability to account for changes in density dependent surveys catchability. This was a criticism of use of trawl surveys for a “structure-obligate” species. This will need to be added to the current assessment model (SCALE) code. (progress unknown)
- Use paired trawl experiments coefficient/data as prior's when estimating survey selectivities and estimate the change in selectivity instead of specifying it. This will need to be added to the assessment model code. (progress unknown)
- Build a simulation model that incorporates spatial structure for black sea bass as well as other necessary features (e.g. protogynous life history, sex-specific, etc.). Use existing data to simulate/ determine the scale at which management could be implemented. This simulation exercises should be developed at a complex level, but then be used to determine how simple your models need to be to provide management advice. The simulation can be used to identify critical model features (e.g., plasticity of the size/age at transition from female to male, etc.) and data gaps. (progress unknown)
- Evaluate the ability of the existing data to support a spatially-explicit assessment for management (if needed based on the simulation study above) and implement any necessary data collection protocols to support this approach. (progress unknown)
- If needed, build a spatially-structured, sex-specific assessment model for management. (progress unknown)
- Characterize ageing uncertainty: a) Conduct ageing validation study. b) Conduct formal ageing comparison of NEAMAP & NMFS ageing. c) Conduct formal ageing comparison between south and north Atlantic and borrow their ALKs. Conduct aging exchanges for otoliths (no scales). d) Develop ageing error matrices using this comparison study data for informing model inputs. (progress unknown)
- Explore cohort tracking in surveys (formally check that all surveys with multiple age classes show coherence). Determine if the surveys are tracking strong year classes such that age or length structure in the data could inform the assessment model. (progress unknown)
- Compare the temporal and spatial trends among surveys and report on the evidence of spatial structure of stock among surveys or lack thereof (e.g., spatial autocorrelation of catch and LF, cluster analysis). (progress unknown)
- Explore the catchability of surveys relative to black sea bass migration (e.g., correlation with temperature cues, etc.). Conduct a comprehensive spatio-temporal comparison of availability

(side-by-side mapping and analysis of catch in each survey by date and location). (progress unknown)
- Conduct paired scup/BSB pot survey and VAS data with NJ trawl comparison using nearby locations. Explore if BSB are truly structure obligate and if trawls are valid for BSB. Compare catch and length frequency on/off structure. (progress unknown)
- Build an index of relative abundance using Jon Hare's larval survey data (status unknown).
- Look at the implication of pooling samples in the age-length keys (ALK) versus filling parts of the annual keys that are low on samples. (progress unknown)
- Collect additional biological data on all FI surveys. (progress unknown)
- The collection of nearshore commercial trawl and pot fishery biosamples (i.e., lengths and sex) are needed (data collection has begun in NC, other states progress unknown)
- Sex ratio data should be collected from commercial and recreational port/intercept sampling to explore importance of sex information in assessment modeling (data collection has begun in NC, other states progress unknown)
- Ages should be collected from nearshore surveys (MA, RI, CT, NJ) for use in development of regional/local age length keys. (progress unknown)
- Tagging study (natural or artificial) should be conducted to determine mixing/migration. (progress unknown)

Research to address unusual life history:
- Studies should be conducted to understand the general reproductive behavior of black sea bass. What is the role of non-dominant males (e.g., sneaker males) in reproductive stock dynamics? Do black sea bass develop spawning harems or leks? (progress unknown)
- Studies should be conducted to determine the relationship between fertilization rates and sex ratio so this can be included into population dynamics models. A parentage analysis could be used to determine fecundity. (progress unknown)
- Work should be conducted to determine the natural mortality by sex; life stage research is needed. (progress unknown)

LITERATURE CITED

NEFSC. 2011. 53rd Northeast Regional Stock Assessment Workshop (53rd SAW) Assessment Report. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

TABLES

Table 1. Summary of harvest length (TL, mm) and age data for black sea bass north of Cape Hatteras from NCDMF commercial fishery sampling programs.

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	389	135	620	4,166	ND	ND	ND	ND
2007	386	235	670	2,476	ND	ND	ND	ND
2008	375	234	656	4,206	ND	ND	ND	ND
2009	381	233	662	2,506	ND	ND	ND	ND
2010	378	226	635	3,415	ND	ND	ND	ND
2011	377	228	631	2,353	ND	ND	ND	ND
2012	373	260	586	858	ND	ND	ND	ND
2013	378	229	611	1,346	ND	ND	ND	ND
2014	381	214	622	5,609	ND	ND	ND	ND
2015	392	219	618	7,672	ND	ND	ND	ND

Table 2. Summary of length (TL, mm) and age data for black seas bass north of Cape Hatteras from NCDMF recreational fishery sampling

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	342	203	582	64	ND	ND	ND	ND
2007	429	280	553	26	ND	ND	ND	ND
2008	358	273	501	48	ND	ND	ND	ND
2009	379	293	611	48	ND	ND	ND	ND
2010	356	276	529	29	ND	ND	ND	ND
2011	361	273	568	36	ND	ND	ND	ND
2012	384	304	511	14	ND	ND	ND	ND
2013	350	238	518	15	ND	ND	ND	ND
2014	378	314	523	8	ND	ND	ND	ND
2015	397	326	511	34	ND	ND	ND	ND

Table 3. Summary of length (TL, mm) and age data for black sea bass north of Cape Hatteras from NCDMF fishery-independent sampling programs

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	153	153	153	1	ND	ND	ND	ND
2007	198	194	202	2	ND	ND	ND	ND
2008	123	110	133	5	ND	ND	ND	ND
2009	94	40	111	11	ND	ND	ND	ND
2010	60	42	71	4	ND	ND	ND	ND
2011	76	69	88	3	ND	ND	ND	ND
2012	127	127	127	1	ND	ND	ND	ND
2013	63	32	123	3	ND	ND	ND	ND
2014	ND	ND	ND	0	ND	ND	ND	ND
2015	103	103	103	1	ND	ND	ND	ND

FIGURES

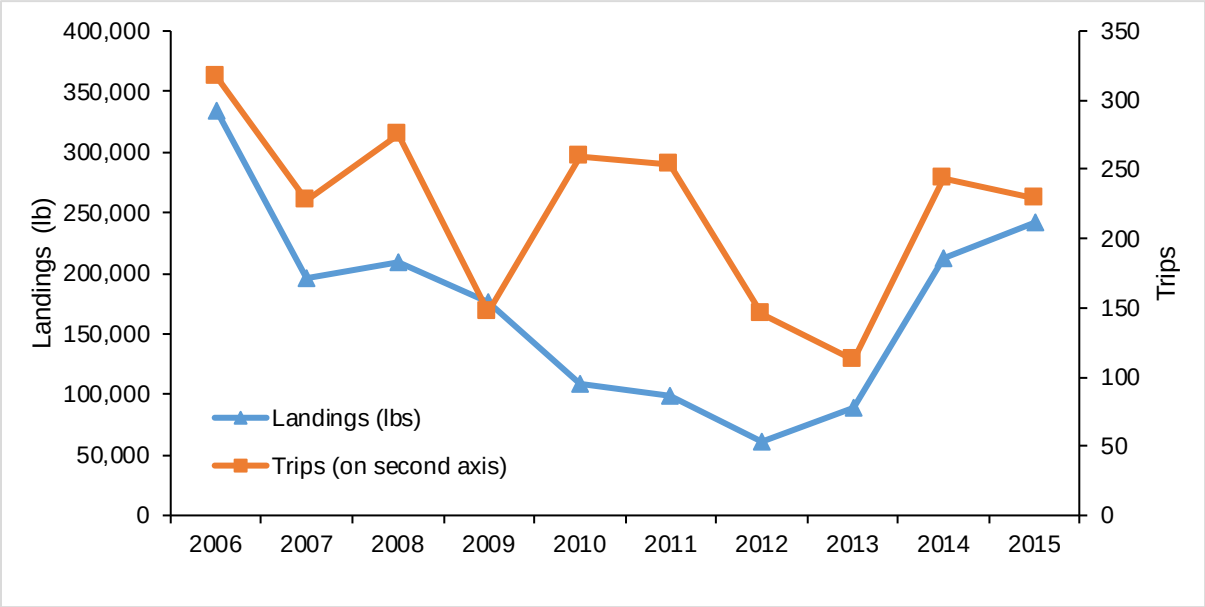

Figure 1. North Carolina commercial landings (lb) and trips for black sea bass north of Cape Hatteras 2006-2015.

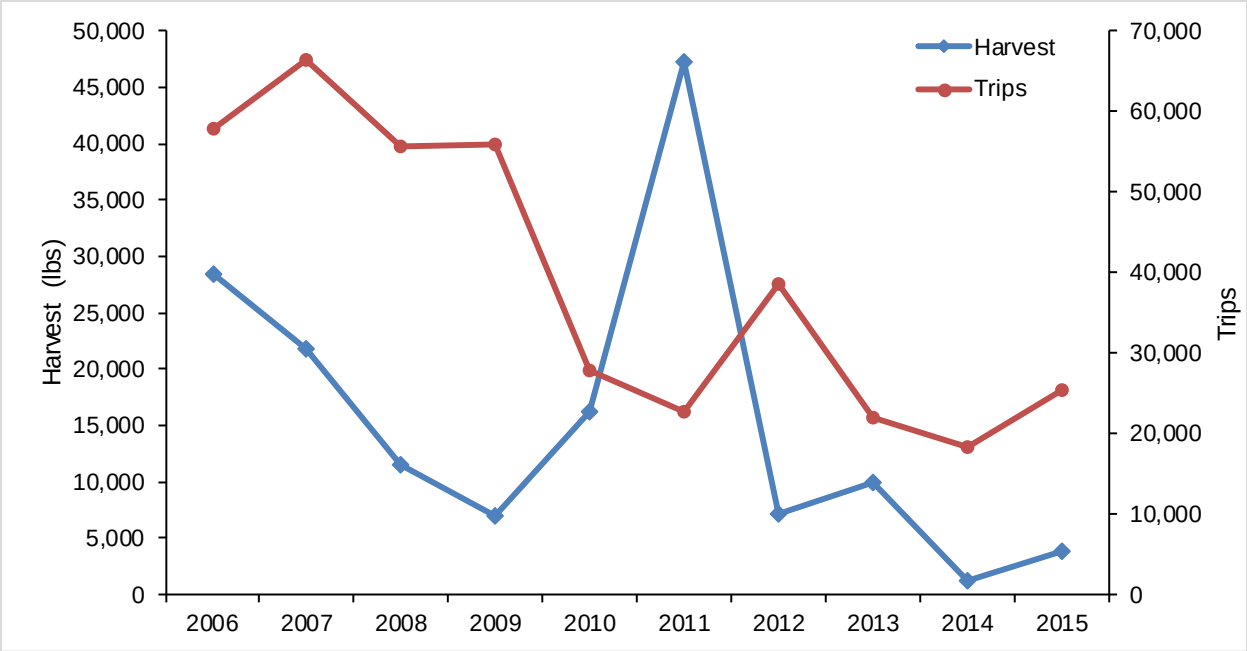

Figure 2. Recreational hook and line harvest of black sea bass in numbers of fish from MRIP data north of Cape Hatteras 2006-2015.

FISHERY MANAGEMENT PLAN UPDATE
BLUEFISH
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	October 1989 (Atlantic States Marine Fisheries Commission)
Amendments:	Amendment 1 – January 1998 Addendum I – February 2012
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	July 2020

The ASMFC/MAFMC Bluefish Fishery Management Plan (FMP) is the first plan developed jointly by an interstate commission (Atlantic States Marine Fisheries Commission or ASMFC) and a federal fishery management council (Mid-Atlantic Fishery Management Council or MAFMC). The ASMFC and the MAFMC jointly manage bluefish under Amendment 1 to the Bluefish FMP. After it was implemented in July 2000, Amendment 1 initiated a ten-year rebuilding schedule to eliminate overfishing and allow for stock rebuilding to a level which would support harvests at or near maximum sustainable yield (MSY) by the year 2010 or earlier. The stock was declared rebuilt in 2009.

The FMP allows a state-by-state commercial quota system and recreational harvest limit to reduce fishing mortality. The ASMFC and MAFMC adjust both annually by the specification setting process that is detailed in Amendment 1. Amendment 1 outlines a series of permitting and reporting requirements such as the requirement of operator permits for commercial, party, and charter boats; vessel permits for commercial, party and charter boats, as well as, dealer permits. The Monitoring Committee is responsible for reviewing the best available data on an annual basis and recommending commercial and recreational management measures designed to ensure that the resource does not exceed the target fishing mortality rate.

In North Carolina, bluefish is currently included in the Interjurisdictional FMP, which defers to the ASMFC/MAFMC FMP compliance requirements. The FMP allows annually adjusted, state-by-state commercial quota system and recreational harvest limits to reduce fishing mortality.

In 2005, the Stock Assessment Review Committee (SARC) approved the use of an age structured assessment program (ASAP) for bluefish. The bluefish stock successfully rebuilt under the management program in Amendment 1, but the MAFMC and ASMFC were exploring ways to address uncertainties involved in the stock assessment. More specifically, the most

recent benchmark assessment revealed gaps in age length keys used in the ASAP model, and therefore, the assessment results should be used with caution (NEFSC 2005). The purpose of Addendum I was increase the number of aging samples available for the stock assessment and extend the geographic range of age samples to develop a coastwide age-length key.
States that account for more than 5% of total coastwide bluefish harvest (recreational and commercial combined) are required to collect a minimum of 100 bluefish ages (50 from January through June, 50 from July through December). These states are: Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and North Carolina.

In 2015, the SARC approved a new benchmark stock assessment model for bluefish. Based on the 2015 benchmark stock assessment and peer review conducted by the Northeast Regional 60th Stock Assessment Workshop (SAW60), bluefish are not overfished and not experiencing overfishing. Though the assessment indicated bluefish are neither experiencing overfishing nor considered overfished, the assessment indicates lower biomass estimates and reference points relative to the previous assessment. These lower estimates have resulted in decreased annual catch limits.

Management Unit

The FMP defines the management unit as bluefish occurring in U.S. waters of the western Atlantic Ocean and is considered a single stock of fish. States with a declared interest in the bluefish FMP include all member states, with the exception of Pennsylvania and the District of Columbia.

Management issues are addressed through the ASMFC Bluefish Management Board and the MAFMC Coastal Migratory Species Committee. The ASMFC Bluefish Technical Committee provides technical advice. A joint ASMFC/MAFMC Technical Monitoring Committee conducts annual plan monitoring and provides framework adjustment recommendations. The ASMFC Stock Assessment Subcommittee addresses stock assessment matters.

Goal and Objectives

On July 26, 2000, the National Marine Fisheries Service published the final rule to implement the measures contained in Amendment 1 of the ASMFC/MAFMC Bluefish FMP. The goal of Amendment 1 is to conserve the bluefish resource along the Atlantic coast, specifically to: 1) increase understanding of the stock and fishery; 2) provide highest availability of bluefish to U.S. fishermen; while maintaining, within limits, traditional uses of bluefish; 3) provide for cooperation among the coastal states, the various regional marine fishery management councils, and federal agencies involved along the coast to enhance the management of bluefish throughout its range; 4) prevent recruitment overfishing; and 5) reduce the waste in both the commercial and recreational fisheries.

STATUS OF THE STOCK

Stock Status

A new benchmark stock assessment was completed in 2015 and indicates that bluefish are not experiencing overfishing and are not overfished. Fishing mortality has steadily declined since 1991. Though the assessment indicated bluefish are neither experiencing overfishing nor considered overfished, the assessment indicates lower biomass estimates and reference points relative to the previous assessment.

Stock Assessment

The original ASMFC benchmark bluefish stock assessment was completed in 2005. The assessment passed peer review (SARC 41) and was approved by the ASMFC Bluefish management Board and the MAFMC Coastal Migratory Species Committee. The assessment developed reference points for both bluefish biomass and fishing mortality. The Age Structured Assessment Program (ASAP) model used to calculate population abundance in this assessment is updated annually each spring with landings and survey indices, and the output from the model is used to set the annual Total Allowable Catch (TAC).

The 2015 benchmark stock assessment (using 2014 catch data) indicate that bluefish are not overfished and overfishing is not occurring, based on the biological reference points developed for review in the 2015 Stock Assessment Review Committee. Estimates from the model using state and federal indices show a decreasing trend in fishing mortality. Though the assessment indicated bluefish are neither experiencing overfishing nor considered overfished, the assessment indicates lower biomass estimates and reference points relative to the previous assessment (Figure 1). These lower estimates have resulted in substantially lower annual catch limits. For the 2016 fishing season, the Commission and Council approved an acceptable biological catch of 19.45 million pounds, a decrease of approximately 10% from 2015 levels.

STATUS OF THE FISHERY

Current Regulations

There is a recreational bag limit of 15 fish per day. Only five of the 15 fish bag limit can be greater than 24 in total length.

Commercial Landings

Bluefish landings have fluctuated annually since landings have been recorded (Figure 2). Landings have been on a relatively stable trend since 1994. Bluefish landings reached the second lowest point in the time series in 2015. The vast majority of bluefish are harvested from the ocean gillnet fishery, followed by the estuarine gillnet fishery.

Recreational Landings

Recreational landings for bluefish have been relatively stable since the 1990's (Figure 3). Most of bluefish are harvested from the ocean by anglers fishing from the beach or man-made structures such as piers, jetties, and bridges. Bluefish are one of the most frequently harvested fish in North Carolina.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Bluefish are sampled from a variety of commercial fishery surveys, including the estuarine long haul, ocean trawl, pound net, ocean gill net, estuarine gillnet and ocean beach seine fisheries in NC. Trip ticket information is obtained of the total catch in the trip. Information on the location(s) of the catch should be obtained in as much detail as possible (e.g. water body, nearest

landmark, marker number, etc.). Questions for the fisherman include: What gear or gears were used, gear parameters, (i.e. mesh size, number of meshes deep, twine size, etc.), time fished with each gear, location and depth of water fished. Biological information on landed catch of bluefish is collected, including: fork length (mm) and aggregate weight (kg) by market grade.

A total of 59,392 were measured from 2006 to 2015 (Table 1). Mean fork length (mm) has ranged from 348 mm to 461 mm with a minimum of 122 mm and 886 mm seen in the measurements.

Fishery-Independent Monitoring

Bluefish are found in several of NCDMF sampling programs, including the juvenile trawl (P120), the Pamlico Sound trawl (P195), and the Pamlico Sound independent gillnet (P915), and Long-line (P365) surveys. The Division's Pamlico Sound Independent Gill Net Survey (PSIGNS) was initiated in May of 2001 and has sampled continuously since. This survey catches more bluefish than any other independent surveys. This survey provides fishery independent indices of relative abundance by size class, which when applied to the appropriate age-length keys can produce annual catch-at-age (CAA) estimates. These estimates will provide essential data for input into future stock assessments. The Catch per Unit of Effort (CPUE) or number of bluefish per set has ranged from 2.7 in 2015 to 7.8 in 2007 during the last 15 years (Figure 4).

The vast majority of bluefish age samples are obtained from the Pamlico Sound Independent Gillnet survey. Bluefish ages range from 0 to 11 years old, with modal ages ranging from 1 to 3 years old (Table 2).

MANAGEMENT STRATEGY

Bluefish is managed under Amendment 1 to the Fishery Management Plan for the Bluefish Fishery and Addendum I. The Commission and Council approved Amendment 1 to the FMP in 1998. Amendment 1 allocates 83% of the resource to recreational fisheries and 17% to commercial fisheries. However, the commercial quota can be increased up to 10.5 million pounds if the recreational fishery is projected to not land its entire allocation for the upcoming year. The commercial fishery is controlled through state-by-state quotas based on historic landings from 1981-1989. The recreational fishery is managed using a 15 fish bag limit.

A coastwide biological sampling program to improve the quantity and quality of information used in future bluefish stock assessments was approved and implemented in 2012 through Addendum I. A 2013 review the inaugural biological sampling program found the geographic range, distribution of sampling times, and program design are effectively capturing age data. A new benchmark stock assessment was completed in 2015.

The ASMFC FMP allocates 32% of the Atlantic coast total bluefish quota to North Carolina. The FMP for bluefish welcomes individual states to implement management measures in addition to those required by the FMP or FMP amendments. The scope of North Carolina's bluefish proclamation authority is limited to actions which "comply with the management requirements incorporated in…Atlantic States Marine Fisheries Commission plans" (15A NCAC 3M.0512). North Carolina continues to maintain a 15 fish recreational bag limit on bluefish that has been in place since June 19, 2001. An additional restriction that only 5 of the 15 fish can be >24" TL,

did not fall within the proclamation authority of the NCDMF Director, and required a NC rule change. This management measure had full support of recreational anglers and advisory committees, was passed unanimously by the NC Marine Fisheries Commission (4/23/2002), and the rule (15A NCAC 03M .0511) went into effect 4/01/2003. The possession limits will remain at 15 fish for 2016.

MANAGEMENT AND RESEARCH NEEDS

- Continue research on species interactions and predator-prey relationships.
- Investigate the feasibility of alternative survey methods that target bluefish across all age classes to create a more representative fishery-independent index of abundance
- Initiate sampling of offshore populations in winter months
- Initiate coastal surf zone seine study to provide more complete indices of juvenile Abundance
- Determine whether NC scale data from 1985-1995 are available for age determination; if available, re-age based on protocols outlined in ASMFC (2011); if re-aging results in changes to age assignments, quantify the effects of scale data on the assessment
- Develop additional adult bluefish indices of abundance (e.g., broad spatial scale longline survey or gillnet survey)
- Expand age structure of SEAMAP index
- Investigate species associations with recreational angler trips targeting bluefish (on a regional and seasonal basis) to potentially modify the MRIP index used in the assessment model
- Explore age- and time-varying natural mortality from, for example, predator prey relationships; quantify effects of age- and time-varying natural mortality in the assessment model
- Continue to evaluate the spatial, temporal, and sector-specific trends in bluefish growth and quantify their effects in the assessment model
- Continue to examine alternative models that take advantage of length-based assessment frameworks. Evaluate the source of bimodal length frequency in the catch (e.g., migration, differential growth rates)
- Modify thermal niche model to incorporate water temperature data more appropriate for bluefish in a timelier manner [e.g., sea surface temperature data & temperature data that cover the full range of bluefish habitat (SAB and estuaries)]

LITERATURE CITED

Northeast Fisheries Science Center. 2005. 41st Northeast Regional Stock Assessment Workshop (41st SAW): 41st SAW Assessment Report. Northeast Fisheries Science Center Reference Document 05-14.

Northeast Fisheries Science Center. 2015. 60th Northeast Regional Stock Assessment Workshop (60th SAW) Assessment Report. U.S. Department of Commerce, Northeast Fisheries Science Center Reference Document 15-08; 870 pp.

TABLES

Table 1. Summary of length data sampled from the bluefish commercial fishery.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	450	122	840	7,751
2007	387	142	833	7,089
2008	416	131	826	6,359
2009	461	145	860	5,784
2010	422	146	886	5,388
2011	406	155	843	4,653
2012	348	134	862	5,731
2013	359	158	830	5,819
2014	371	192	858	5,485
2015	352	180	778	5,333

Table 2. Bluefish age data collected from all sources combined, 2006-2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	3	0	10	532
2007	2	0	11	432
2008	1	0	10	656
2009	3	0	10	489
2010	3	0	8	527
2011	3	0	9	552
2012	1	0	9	811
2013	0	0	9	741
2014	1	0	9	792
2015	1	0	9	530

FIGURES

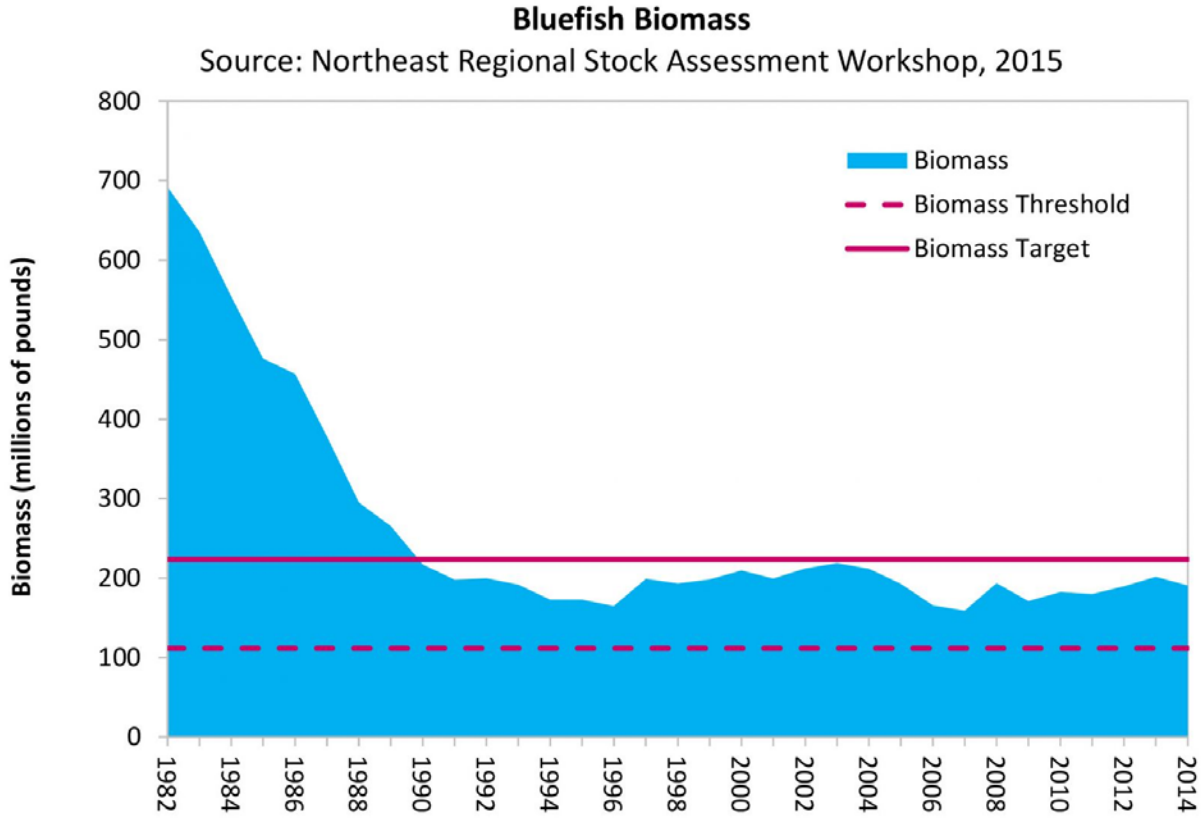

Figure 1. Bluefish spawning stock biomass (SSB), target SSB (solid line), and threshold SSB (dotted line) as estimated in ASAP benchmark model updated through 2014 (cited from NEFSC 2015; http://www.asmfc.org/species/bluefish).

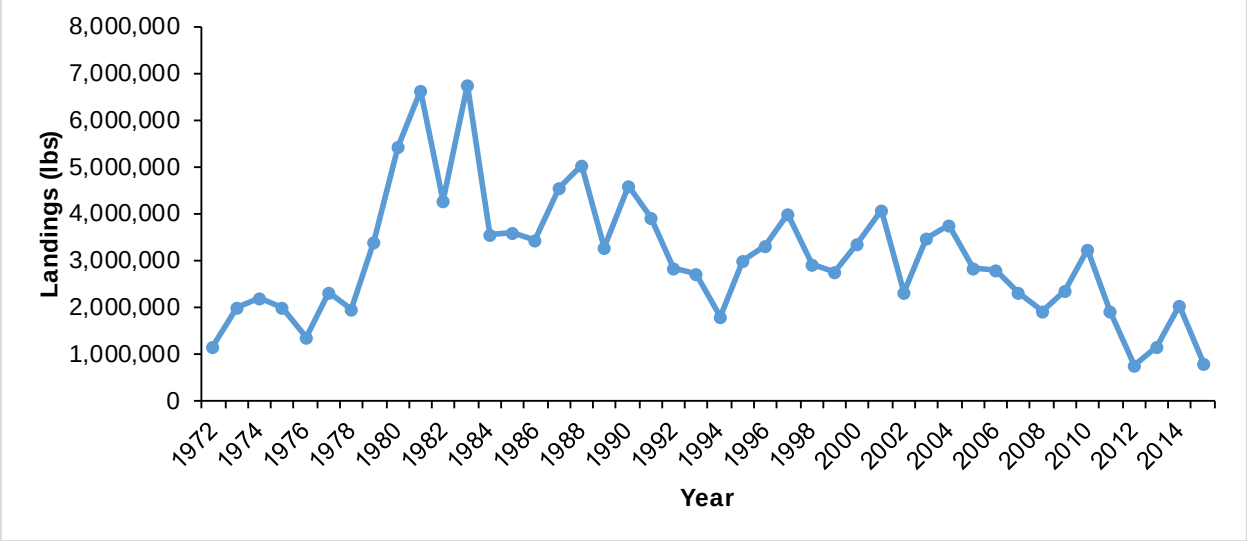

Figure 2. North Carolina commercial landings of bluefish from 1972 to 2015.

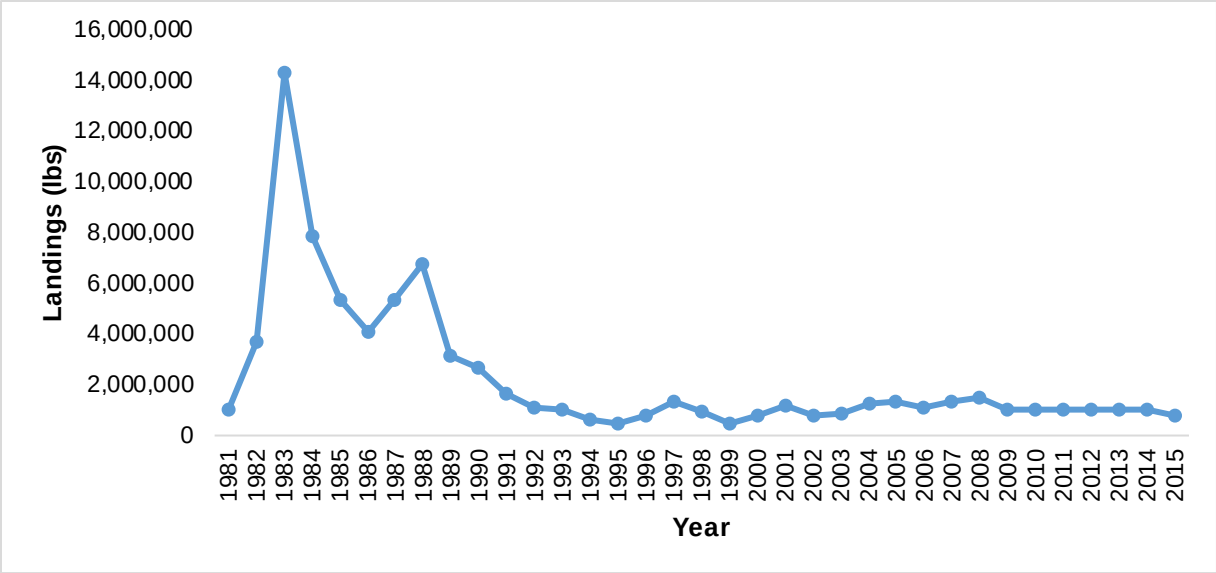

Figure 3. North Carolina recreational landings of bluefish from 1981 to 2015.

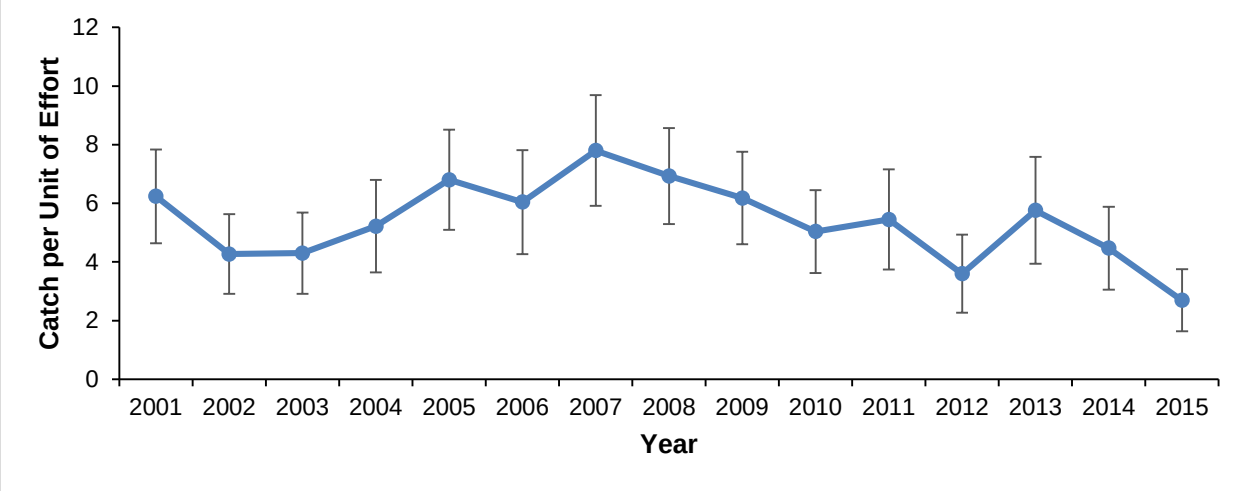

Figure 4. Catch per Unit of Effort of bluefish, from the Pamlico Sound Independent Gillnet survey from 2001 to 2015.

FISHERY MANAGEMENT PLAN UPDATE
SPOT
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	ASMFC October 1987
Amendments:	ASMFC Omnibus Implementation Plan - October 2011 ASMFC Omnibus Amendment to the Interstate Fishery Management Plans for Spanish mackerel, Spot, and Spotted Seatrout - August 2012 Addendum I - August 2014
Revisions:	N/A
Supplements:	N/A
Information Updates:	N/A
Schedule Changes:	N/A
Next Benchmark Review:	ASMFC benchmark stock assessment scheduled for 2016.

The original interstate Fishery Management Plan (FMP) for spot was adopted in 1987 with recommendations to improve data collections to produce a stock assessment and improve information for management (ASMFC 1987). The original FMP for spot was adopted prior to passage of the Atlantic Coastal Fisheries Cooperative Management Act (1993) and the Atlantic States Marine Fisheries Commission (ASMFC) Interstate Fishery Management Program (ISFMP) Charter (1995). After passage of the Act, the ASMFC adopted the Charter in order to establish standards and procedures for the preparation and adoption of the FMPs. Once an FMP was amended to incorporate the standards and procedures in the ISFMP Charter, the Commission could adopt management requirements that can be enforced through the Act. The Omnibus Amendment updates the spot FMP with the Act and Charter requirements and initiated annual trigger exercises to monitor the status of the spot resource while also directing the Board to consider management action depending on the results of the trigger exercise (ASMFC 2012). Without coast-wide minimum management measures, the trigger exercises did little to provide effective management in between stock assessments. Because of this, Addendum I to the Amendment was developed establishing the use of the Traffic Light Approach (Caddy and Mahon 1995; Caddy 1998; Caddy 1999) with a precautionary management framework for spot. The management framework utilizing the Traffic Light Approach replaced the management triggers established in the Omnibus Amendment.

Management Unit

The ASMFC management area extends from Delaware to the east coast of Florida.

Goal and Objectives

The primary goal of the Omnibus Amendment is to bring the FMPs for Spanish mackerel, spot, and spotted seatrout under the authority of the Act, providing for more efficient and effective management and changes to management in the future. The objectives for spot under this amendment include:

1. Increase the level of research and monitoring of spot bycatch in other fisheries, in order to complete a coast-wide stock assessment.

2. Manage the spot fishery to encourage reduced mortality on spot stocks until age 1.

3. Develop research priorities that will further refine the spot management program to maximize the biological, social, and economic benefits derived from the spot population. The Omnibus Amendment does not require specific fishery management measures in either the recreational or commercial fisheries for states within the management unit range.

STATUS OF THE STOCK

Stock Status

No coast-wide assessment has been completed for spot; however, spot are a target or component of several state surveys using trawls, gill nets, or seine nets. Abundance indices have been highly variable throughout the survey time series. The status of spot has been considered of concern due the generally declining trends in commercial and recreational landings. The first benchmark stock assessment is scheduled for completion in 2016.

Stock Assessment

An ASMFC benchmark stock assessment is scheduled for 2016. In order to evaluate the status of the stock until the assessment is completed, the South Atlantic Board reviewed the Traffic Light Analysis (TLA) established under Addendum I. The composite harvest index did not trip in 2013-2014 with the mean red proportion of 29.4% (Figure 1). The index did trip in 2013 (38.1%) and 2012 (34.8%). The decline in the harvest index was driven primarily by declining commercial landings rather than declining recreational harvest. The composite abundance index for adult spot (NMFS and SEAMAP surveys) did trigger in 2014 with a mean red proportion for 2013-2014 of 43.5% (Figure 2). Since both population characteristics (harvest and abundance) were not above the 30% threshold for 2013-2014, management triggers were not tripped. The traffic light is updated in September each year, therefore, the 2015 update is not available.

STATUS OF THE FISHERY

Current Regulations

None.

Commercial Landings

Commercial landings since 1994 have averaged 1.7 million lb. Commercial spot landings have fluctuated but generally declined since 2001 (Figure 3). Commercial landings in 2015 were 377,358 lb, a drop from 2014 landings of 764,689 lb.

Recreational Landings

Recreational angler harvest data are collected by the Marine Recreational Information Program (MRIP). Recreational spot harvest averaged 551,875 lb from 2006 through 2015 (Table 1). Harvest of spot decreased from 2006 through 2010 before rebounding slightly in 2011 then dropping to a ten-year low of 230,250 lb in 2012. Harvest increased from 2012 to 704,445 lb in 2014 before decreasing to 375,642 lb in 2015. Number of releases has averaged 1,186,258 individuals from 2006 through 2015 and has been consistent from 2007 through 2015.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Since 1994, the North Carolina Trip Ticket Program (NCTTP) has collected data on the commercial harvest of spot. Commercial fishing activity is also monitored through fishery dependent sampling conducted by the division since 1982. Data collected in this program allow the size and age distribution of spot to be characterized by gear/fishery. Several North Carolina Division of Marine Fisheries (NCDMF) sampling programs collect biological data on commercial fisheries that harvest spot. The primary programs that collect length and age data for harvested spot include: P461 (estuarine gill net), P437 (long haul seine), and P434 (ocean gill net). Total number of measured spot has decreased since 2006 (Table 2). Mean, minimum, and maximum length has fluctuated but generally has been stable. Mean length ranged from 205.8 mm in 2012 to 216.4 mm in 2006. In 2015, 4,387 spot were measured from commercial fisheries with a mean length of 208.2 mm, and a minimum of 162 mm and maximum of 324 mm.

There were no noticeable trends in mean length of spot measured by MRIP samplers from 2006-2015 (Table 3). Mean length has ranged from 200 mm in 2012 to 230 mm in 2007. In 2015, 214 spot were measured (a 10 year low) with a mean length of 207 mm, a minimum of 154 mm and a maximum of 314 mm.

Harvest data from the Recreational Commercial Gear License were collected from 2002 to 2008. The program was discontinued in 2009 due to lack of funding. From 2002-2008, an average of 10,917 RCGL trips harvested 203,383 lb of spot per year (Table 4).

North Carolina awards a citation to applicants for any spot caught by hook and line if the weight exceeds one pound. A total of 27 spot citations have been awarded from 2006-2015, with 24 of those awarded in 2006 (Figure 4). No citations were awarded in 2015, and only one has been awarded since 2008.

Fishery-Independent Monitoring

The Pamlico Sound Survey (P195) samples 54 randomly selected stations (grids) in June and September. Stations are randomly selected from strata based upon depth and geographic location. Tow duration is 20 minutes, using double rigged demersal mongoose trawls (9.1 m

headrope, 1.0 X 0.6 m doors, 2.2-cm bar mesh body, 1.9-cm bar mesh cod end and a 100-mesh tailbag extension). Data from this survey is used to produce juvenile abundance indices for spot from 1987-2015. Length cutoffs for juvenile spot are fish <120 mm fork length (FL) in June, and fish <140 mm FL in September. The June index varied greatly with a peak of 1,347.35 individuals per tow in 2008 (Figure 5). The 2015 CPUE was 405.48 individuals per tow, a slight drop from the 2014 CPUE and slightly below the time series average of 417.32 individuals per tow.

Modal age of spot was one from 2005 to 2014 (Table 5). Minimum age was zero and maximum age ranged from three to six over that same time period. Age data is not currently available for 2015.

MANAGEMENT STRATEGY

Addendum I established use of a TLA to evaluate fisheries trends and develop state-specific management actions (e.g. bag limits, size restrictions, time and area closures, and gear restrictions) when harvest and abundance thresholds are exceeded for two consecutive years. The name comes from assigning a color (red, yellow, green) to categorize relative levels of indicators on the condition of the fish population (abundance metric) or fishery (harvest metric). For example, as harvest or abundance decrease, the amount of red in that year becomes more predominant. The TLA improves the management recommendations in response to declines in the stock or fishery. The 'harvest' characteristic is comprised of composite commercial and recreational harvest data. Similarly, a composite of fishery independent survey indices will be used to derive the adult abundance characteristic. The benchmark stock assessment for spot is scheduled to be completed in 2016.

MANAGEMENT AND RESEARCH NEEDS

High Priority

- State monitoring and reporting on the extent of unutilized bycatch and fishing mortality on fish less that age-1 in fisheries that take significant numbers of spot.
- Evaluate the effects of mandated bycatch reduction devices on spot catch in those states with significant commercial harvests.
- Develop fishery-dependent and fishery-independent size and sex specific relative abundance estimates.
- Develop cooperative coastwide spot juvenile indices to clarify stock status.
- Continue monitoring long-term changes in spot abundance, growth rates, and age structure.
- Continue monitoring of juvenile spot populations in major nursery areas.
- Improve spot catch and effort statistics from the commercial and recreational fisheries, along with size and age structure of the catch, in order to develop production models.
- Conduct age validation studies.
- Cooperatively develop criteria for aging spot otoliths and scales.
- Develop catch-at-age matrices for recreational and commercial fisheries.
- Determine the effect that anthropogenic perturbations may be having on growth, survival, and recruitment.

Medium Priority

- Develop stock assessment analyses appropriate to current data.
- Cooperatively develop a yield-per-recruit analysis.
- Develop stock identification methods and investigate the degree of mixing between state stocks during the annual fall migration.
- Determine migratory patterns through tagging studies.
- Determine the onshore vs. offshore components of the spot fishery.

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TABLES

Table 1. Recreational harvest, with number harvested, weight in pounds and number of releases of spot from 2006-2015. Percent Standard Error (PSE) is given for each.

Year	Harvest Number	PSE	Weight	PSE	Number Released	PSE
2006	2,978,506	24.6	1,059,852	24.8	2,588,647	20.0
2007	3,078,346	17.2	982,463	16.9	1,197,005	17.8
2008	1,843,343	18.0	670,511	19.4	1,322,408	14.4
2009	1,056,346	18.0	363,998	17.9	1,222,053	13.5
2010	834,560	14.2	260,341	13.8	871,054	13.8
2011	1,207,335	15.8	410,317	16.8	1,000,566	11.6
2012	784,272	22.1	230,250	24.0	759,081	11.9
2013	1,464,592	15.3	460,928	16.8	1,314,199	12.1
2014	2,111,880	20.5	704,445	21.8	890,831	12.1
2015	1,035,020	28.8	375,642	29.9	696,736	14.7
Average	1,639,420		551,875		1,186,258	

Table 2. Mean, minimum, and maximum fork length in mm and total number of spot measured during fishery dependent sampling, 2006-2015.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	216.4	136	335	10,872
2007	206.6	152	306	11,649
2008	209.3	105	337	8,786
2009	208.5	111	298	8,526
2010	208.8	139	294	6,715
2011	210.1	116	334	7,179
2012	205.8	165	486	4,109
2013	212.9	119	339	4,624
2014	207.8	161	334	6,376
2015	208.2	162	324	4,387

Table 3. Number of spot measured by MRIP and mean, minimum, and maximum length in mm, 2006-2015.

Year	Number Measured	Mean Length	Minimum Length	Maximum Length
2006	1,216	226	122	342
2007	1,243	230	144	299
2008	1,344	213	128	311
2009	682	216	126	274
2010	1,096	209	147	306
2011	1,534	209	149	283
2012	611	200	141	298
2013	484	207	115	293
2014	344	210	121	258
2015	214	207	154	314

Table 4. North Carolina RCGL harvest of spot 2002-2008, with number of trips, and landings in lb. Estimates of trips and landings are from a RCGL survey conducted from 2002-2008; funding was discontinued in 2009.

Year	Trips	Pounds
2002	16,731	339,077
2003	11,799	255,060
2004	12,610	252,291
2005	9,703	193,769
2006	10,511	180,342
2007	7,399	97,753
2008	7,664	105,392
Mean	10,917	203,383

Table 5. Summary of spot age data collected from 2006-2015. Age data from 2015 is not currently available.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2006	1	0	5	501
2007	1	0	3	284
2008	1	0	3	408
2009	1	0	3	365
2010	1	0	3	268
2011	1	0	3	413
2012	1	0	4	230
2013	1	0	3	360
2014	1	0	4	702

FIGURES

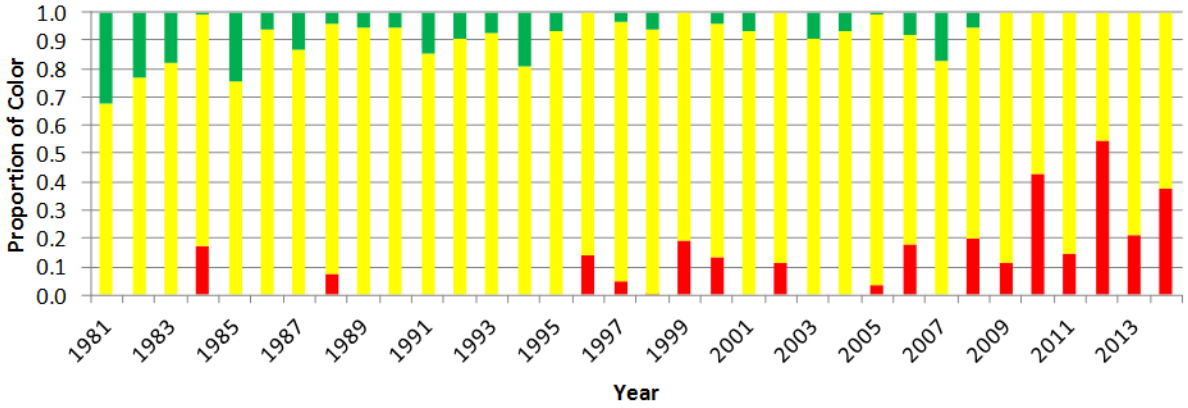

Figure 1. Harvest composite index (using a 1989-2012 reference period), 1981-2014.

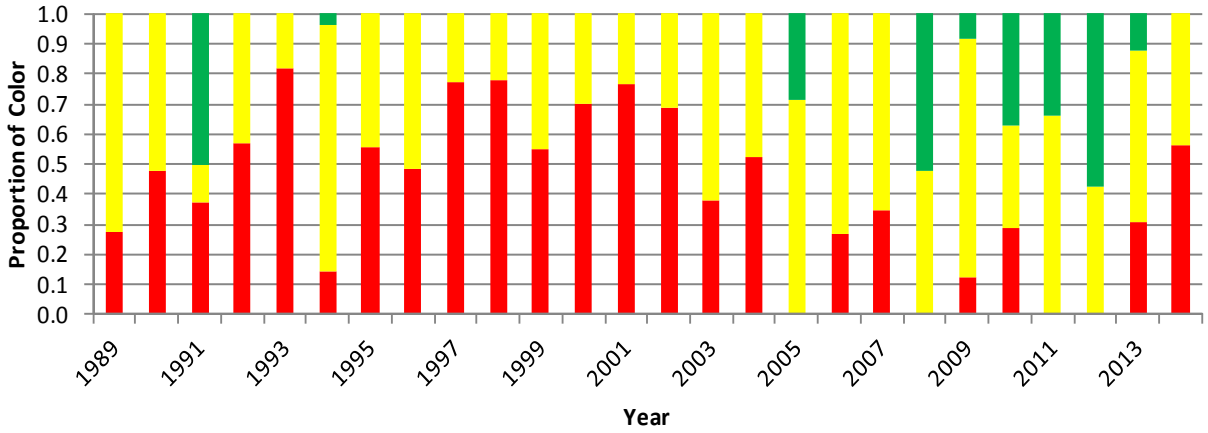

Figure 2. Abundance composite index (using a 1989-2012 reference period), 1989-2014.

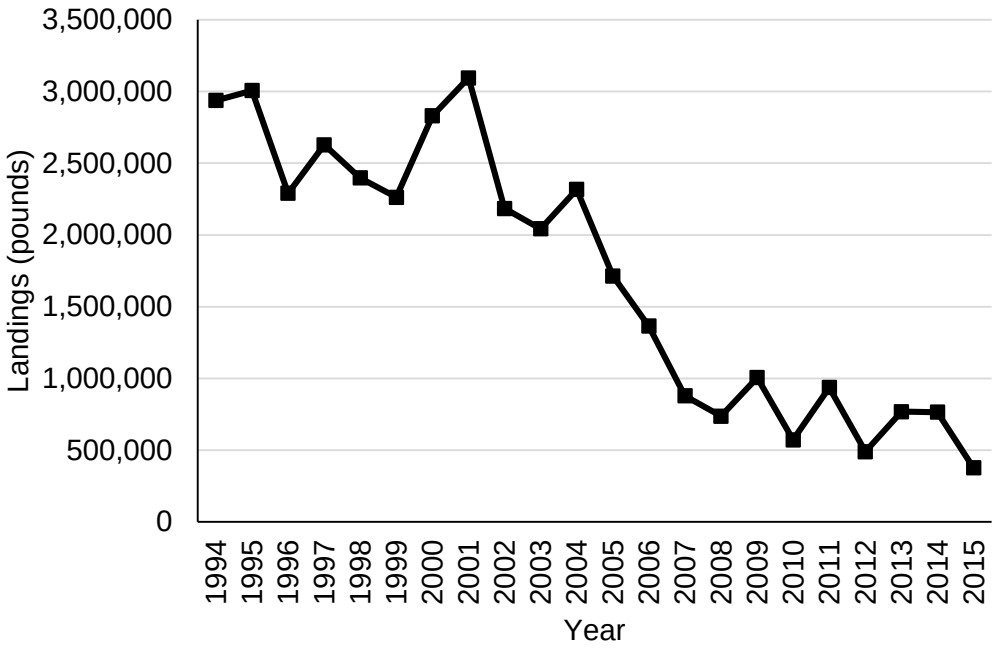

Figure 3. North Carolina commercial spot landings from 2006-2015.

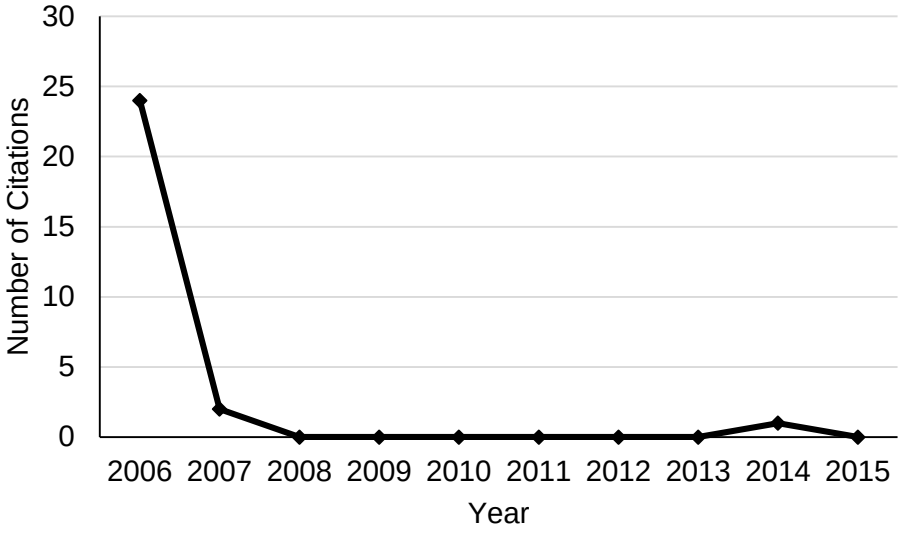

Figure 4. Number of spot citations awarded (>1 pound) from 2006-2015.

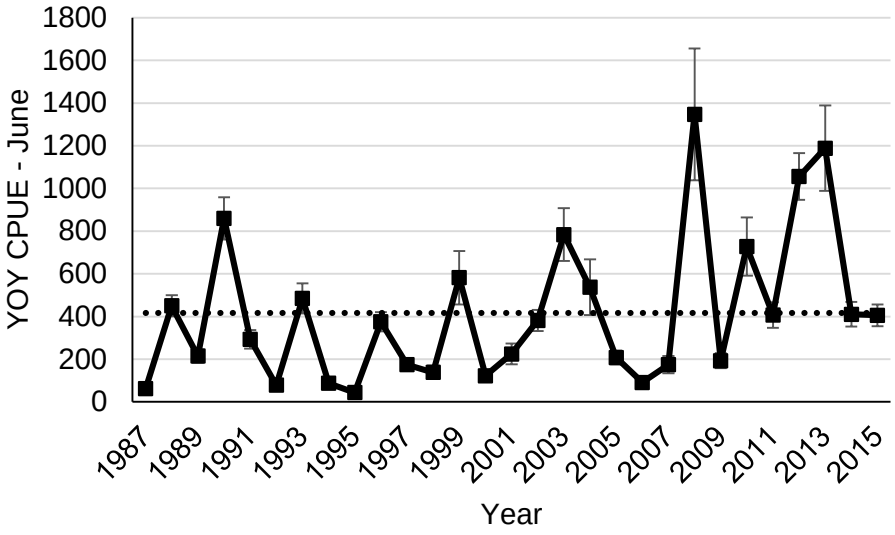

Figure 5. Juvenile spot CPUE from the June portion of the Pamlico Sound Survey from 1987-2015. Solid line represents annual CPUE, dashed line represents time series average.

FISHERY MANAGEMENT PLAN UPDATE
ATLANTIC STRIPED BASS
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	1981
Amendments:	Amendment 1 – 1984 Amendment 2 – 1984 Amendment 3 – 1985 Amendment 4 – 1989; Addendum I – 1991, Addendum II – 1992, Addendum III – 1993, Addendum IV – 1994 Amendment 5 – 1995; Addendum I – 1997, Addendum II – 1997, Addendum III – 1998, Addendum IV – 1999, Addendum V - 2000 Amendment 6 – 2003; Addendum I – 2007, Addendum II – 2010, Addendum III – 2012, Addendum IV – 2014
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	2018

The Atlantic States Marine Fisheries Commission (Commission) developed a fisheries management plan (FMP) for Atlantic Striped Bass in 1981 in response to declining juvenile recruitment and landings. The FMP recommended increased restrictions on commercial and recreational fisheries, such as minimum size limits and harvest closures on spawning grounds. Two amendments were passed in 1984 recommending additional management measures to reduce fishing mortality. To strengthen the management response and improve compliance and enforcement, the Atlantic Striped Bass Conservation Act (P.L. 98-613) was passed in late 1984, which mandated the implementation of Striped Bass regulations passed by the Commission, and gave the Commission authority to recommend to the Secretaries of Commerce and Interior that states be found out of compliance when they failed to implemented management measures consistent with the FMP.

The first enforceable plan, Amendment 3, was approved in 1985, and required size regulations to protect the 1982-year class, which was the first modest size cohort since the previous decade. The objective was to increase size limits to allow at least 95% of the females in the cohort to spawn at least once. Smaller size limits were permitted in producer areas than along the coast. Several states, beginning with Maryland in 1985, opted for a more conservative approach and

imposed a total moratorium on Striped Bass landings for several years. The amendment contained a trigger mechanism to reopen the fisheries when the 3-year moving average of the Maryland juvenile abundance index (JAI) exceeded an arithmetic mean of 8.0. That level was attained with the recruitment of the 1989-year class.

Consequently, Amendment 4 was adopted to allow state fisheries to reopen in 1990 under a target fishing mortality (F) of 0.25, which was half the estimated F needed to achieve maximum sustainable yield (MSY). The amendment allowed an increase in the target F once spawning stock biomass (SSB) was restored to levels estimated during the late 1960s and early 1970s. The dual size limit concept was maintained, and a recreational trip limit and commercial season implemented to reduce the harvest to 20% of that in the historic period of 1972-1979. The amendment and its four addenda aimed to rebuild the resource, rather than maximize yield.

In 1995, coastal Striped Bass were declared restored by the Commission, and Amendment 5 was adopted to increase the target F to 0.33, midway between the existing F target (0.25) and F_{MSY}, which was revised to 0.40. Regulations were developed to allow 70% of the historic harvest and achieve the target F, although states were allowed to submit proposals for alternative regulations that were conservationally equivalent. From 1997-2000, a series of five addenda were implemented to respond to the latest stock status information. The Albemarle/Roanoke stock of Striped Bass, currently assessed independently by the State of North Carolina, is managed, with ASMFC Striped Bass Management Board approval, through a separate North Carolina Estuarine Striped Bass Fishery Management Plan, was declared restored in 1997.

In 2003, Amendment 6 was adopted to address five limitations within the management program: 1) potential inability to prevent the Amendment 5 exploitation target from being exceeded; 2) perceived decrease in availability or abundance of large Striped Bass in the coastal migratory population; 3) a lack of management direction with respect to target and threshold biomass levels; 4) inequitable effects of regulations on the recreational and commercial fisheries, and coastal and producer area sectors; 5) and excessively frequent changes to the management program. Amendment 6 was fully implemented by January 1, 2004, and completely replaced all previous Commission plans for Atlantic Striped Bass (ASMFC 2003).

Amendment 6 modified the F targets and thresholds, and introduced a new set of biological reference points (BRPs) based on females spawning stock biomass (SSB), as well as a list of management triggers based on the BRPs. The coastal commercial quotas for Striped Bass were restored to 100% of the states' average landings during the 1972-1979 historical period, except for Delaware's coastal commercial quota, which remained at the level allocated in 2002. In the recreational fisheries, all states were required to implement a two fish bag limit with a minimum size limit of 28-in, except for the Chesapeake Bay fisheries, fisheries that operate in the Albemarle Sound and Roanoke River, and states with approved alternative regulations. The Chesapeake Bay and Albemarle/Roanoke regulatory programs were predicated on a more conservative F target than the coastal migratory stock, which allowed these jurisdictions to implement separate seasons, harvest caps, and size and bag limits as long as they remain under that F target. No minimum size limit can be less than 18-in under Amendment 6. The same minimum size standards regulate the commercial fisheries as the recreational fisheries, except for a minimum 20-in size limit in the Delaware Bay spring gillnet fishery.

States are permitted the flexibility to deviate from these standards by submitting proposals for review by the Striped Bass Technical Committee, Advisory Panel, and Plan Review Team and

contingent upon the approval of the Management Board. A state may request a change only if it can demonstrate that the action is “conservationally equivalent” to the management standards or will not contribute to the overfishing of the resource. This practice has resulted in a variety of regulations among states.

In 2007, Addendum I was implemented to establish a bycatch monitoring and research program to increase the accuracy of data on Striped Bass discards and also recommend development of a web- based angler education program.

In May 2009, the Management Board initiated the development of an addendum to consider options to roll over unused coastal commercial quota up to fifty percent, and approved sending the draft addendum out for public comment in August 2009. In November 2009, the Board voted for status quo management in regards to unused quota rollover.

In February 2010, the Management Board initiated the development of an addendum to consider options to increase the coastal commercial quota. The Board approved the draft addendum for public comment in May 2010, with the addition of an option to consider adopting a Technical Committee recommendation to revise the JAI management trigger. Adopting the Technical Committee recommendation would modify the definition of recruitment failure, such that each index would have a fixed numerical value indicating failure, rather than one that changes from year to year. The Board approved Addendum II, and the revised JAI management triggers, in November 2010. The new definition of recruitment failure is a value that is below 75% of all values in a fixed time series appropriate to each juvenile abundance index.

In 2012, Addendum III was approved by the Board. This addendum requires all states and jurisdictions with a commercial fishery to implement a commercial harvest tagging program. The addendum was initiated in response to significant poaching events in the Chesapeake Bay and aims to limit illegal commercial harvest of Striped Bass.

The Board approved Addendum IV in 2014 in response to the 2013 benchmark assessment which indicated a steady decline in spawning stock biomass since the mid-2000s. The Addendum established new fishing mortality reference points (F target and threshold), and required coastal states to reduce removals in order to reduce F to a level at or below the new target (i.e., 25% reduction from 2013 removals for the coastal fishery and 20.5% reduction from 2012 removals for Chesapeake Bay fishery). Additionally, since the Albemarle/Roanoke stock is thought to contribute minimally to the coastwide complex, Addendum IV differs management of the Albemarle/Roanoke stock to the State of North Carolina using stock-specific BRPs approved by the Management Board. The 18-in minimum size limit still applies.

The Exclusive Economic Zone (EEZ) has been closed to the harvest and possession of Striped Bass since 1990, with the exception of a defined route to and from Block Island in Rhode Island. A recommendation was made in Amendment 6, and submitted to the Secretary of Commerce, to re-open federal waters to commercial and recreational fisheries. Starting in July 2003 and continuing for several years, NOAA Fisheries took steps in the rulemaking process to consider the proposal. In September 2006, NMFS concluded that it would be imprudent to open the EEZ to Striped Bass fishing and chose not to proceed further in its rulemaking. Specifically, NMFS concluded that: 1) it could not be certain, especially after taking into account the overwhelming public perception that large trophy sized fish congregate in the EEZ, that opening the EEZ would not increase effort and lead to an increase in mortality that would exceed the threshold, and 2) both the Commission’s and NMFS’ ability to immediately respond to an overfishing and/or overfished

situation is a potential issue, particularly given the timeframe within which Amendment 6 was created, and given the lag time in which a given year's data is available to management (71 FR 54261-54262). Additionally, in October 2007, President George W. Bush issued an Executive Order (E.O. 13449) prohibiting the sale of Striped Bass (and Red Drum) caught within the EEZ. The Order also requires the Secretary of Commerce to encourage management for conservation of the resources, including State designation as gamefish where the State determines appropriate under applicable law, and to periodically review the status of the populations within US jurisdictional waters. The 2011 report (submitted in 2012) is the most recent report to Congress on the status of the Striped Bass population (NOAA 2012). The 2015 Striped Bass Report to Congress is scheduled for completion at the end of August.

Management Unit

Migratory stocks of Atlantic Striped Bass from Maine through North Carolina.

Goals and Objectives

The goal of Amendment 6 is to perpetuate, through cooperative interstate management, migratory stocks of Striped Bass; to allow commercial and recreational fisheries consistent with the long-term maintenance of a broad age structure, a self-sustaining spawning stock; and also to provide for the restoration and maintenance of their essential habitat. In support of this goal, the following objectives are included:

1. Manage Striped Bass fisheries under a control rule designed to maintain stock size at or above the target female spawning stock biomass level and a level of fishing mortality at or below the target exploitation rate.

2. Manage fishing mortality to maintain an age structure that provides adequate spawning potential to sustain long-term abundance of Striped Bass populations.

3. Provide a management plan that strives, to the extent practical, to maintain coastwide consistency of implemented measures, while allowing the States defined flexibility to implement alternative strategies that accomplish the objectives of the FMP.

4. Foster quality and economically viable recreational, for-hire, and commercial fisheries.

5. Maximize cost effectiveness of current information gathering and prioritize state obligations in order to minimize costs of monitoring and management.

6. Adopt a long-term management regime that minimizes or eliminates the need to make annual changes or modifications to management measures.

7. Establish a fishing mortality target that will result in a net increase in the abundance (pounds) of age 15 and older Striped Bass in the population, relative to the 2000 estimate.

STATUS OF THE STOCK

Stock Status

The 2015 Atlantic striped bass stock assessment update indicates the resource is not overfished or experiencing overfishing. Although the stock is not overfished, female SSB has continued to decline since 2006 and is estimated at 141 million pounds, just above the SSB threshold of 128 million pounds, and below the SSB target of 159 million pounds. Additionally, total fishing mortality is estimated at 0.205, a value that is between the fishing mortality threshold (0.22) and fishing mortality target (0.18).

Stock Assessment

The 2013 benchmark stock assessment was completed by the 57th Stock Assessment Workshop (SAW) and peer reviewed by the Stock Assessment Review Committee (SARC) in July 2013 (NEFSC 2013 a and b). Based on recommendations by the 47th SAW/SARC in 2007, the statistical catch-at-age (SCA) model in the benchmark assessment was generalized to allow specification of multiple fleets, different stock-recruitment relationships, and year- and age-specific natural mortality rates, among other things. For this assessment, new fishing mortality (F) reference points were chosen to link the target and threshold F with the target and threshold female spawning stock biomass (SSB). The 2013 assessment, and the new F reference points, were approved by the Board for management use at its October 2013 meeting. The 2013 SCA model was used to estimate fishing mortality, abundance, and spawning stock biomass of Striped Bass during 1982-2012. The 2013 SCA model benchmark was updated in 2015 with data through 2014. Based on results of the 2015 SCA assessment update, and comparison to the biological reference points below, Atlantic Striped Bass are not overfished and are not experiencing overfishing (ASMFC 2015).

	Female Spawning Stock Biomass	***Fully-Recruited Fishing Mortality***
Threshold	SSB_{1995} = 127,043,432 lb	F_{msy} = 0.219
Target	$SSB_{threshold}$ x 1.25 = 158,803,188 lb	0.180

The SCA model estimated female spawning stock biomass (SSB) at 140.9 million pounds in 2014 which is above the SSB threshold of 127.0 million pounds but below the target of 158.8 million pounds (Figure 1). Female SSB peaked in 2003 at 173.2 million pounds and has been gradually declining since. Recruitment estimated in the SCA model as age-1 abundance in 2014 was 76.2 million fish, below the long term average of 85.1 million fish. Atlantic striped bass experienced a strong period of recruitment with several very large year classes during the period 1994-2004, when recruitment averaged 123 million fish each year. For the years 2005-2014 recruitment averaged 80 million fish a year. (Figure 1). Total fishing mortality in 2014 was estimated at 0.205, below the threshold of 0.219 but above the target of 0.1180. Fishing mortality has varied between the target and threshold since 2009, exceeding it once in 2012. Fishing mortality exceeded the threshold for five consecutive years, from 2004 to 2008 (Figure 2). Total stock abundance varies more greatly than spawning stock biomass, due to the highly variable nature of annual spawning success and high mortality at very young ages. Total abundance in 2014 was estimated at 134 million fish, up from the previous year's estimate of 114 million fish. The most recent peak in abundance occurred in 2004 and was estimated at 250 million fish (Figure 2).

STATUS OF THE FISHERY

Current Regulations

Striped bass regulations in the coastal waters (0-3 miles) of the Atlantic Ocean are under the jurisdiction of ASMFC, while striped bass regulations in the inshore coastal, joint, and inland waters are under the jurisdiction of the Division of Marine Fisheries and Wildlife Resources Commission. Striped bass regulations in the EEZ are under the jurisdiction of the NOAA Fisheries. Commercial and recreational harvest of striped bass is not allowed in the Exclusive Economic Zone (EEZ), which is from 3 to 200 miles offshore. Striped bass cannot even be targeted for hook-and-release fishing in the EEZ. Commercial harvest is constrained by a 360,360 lb annual quota and a 28-in minimum total length limit while the recreational harvest is constrained by a one fish per person daily possession limit and a 28-in minimum total length limit.

The Atlantic Ocean waters from about Oregon Inlet to the N.C./V.A. state line are the southernmost extension of the overwintering grounds for Atlantic striped bass. Therefore, annual landings are completely dependent on how far down and offshore striped bass stocks migrate each winter. Since 2011 the majority of striped bass have been farther North and offshore than normal. In recent years large schools of striped bass have been up to 30 miles offshore. Since 2012 there has been no commercial or recreational harvest of striped bass in North Carolina's coastal ocean waters during the winter months. Overall stock abundance is still at high levels however.

Commercial Landings

Commercial landings of striped bass in the Atlantic Ocean have been controlled by a quota since 1991. The quota is usually harvested during the winter months, from December through February, therefore the quota year is prosecuted from December through November. Landings reached the quota in most years until the 2007/2008 fishing year. Landings from the 2005/2006 quota year to the 2010/2011 quota year averaged almost 300,000 lb. Since 2012/2013 there haven't been any striped bass landed in the Atlantic Ocean because striped bass have stayed outside of three miles and in southern Virginia waters while overwintering (Table 1, Figure 3).

Recreational Landings

Recreational landings were fairly low through the early 2000s. As the Atlantic Striped Bass stock recovered and abundance increased, recreational landings increased as well, with peak landings of 5.5 million pounds in 2004 (Figure 4). Although the winter was very cold that year, the wind was very mild meaning that there were many fishing days available. There were also very large schools of striped bass very near the beach from Oregon Inlet to Corolla. In situations like that a very large number of striped bass may be harvested, with many times more released. Landings have fluctuated since, often due to winter weather conditions and the migratory behavior in the near shore ocean during January and February. From 2006 to 2011 landings averaged about 1 million pounds. Due to the stocks being offshore and not migrating down into North Carolina in recent years, there haven't been any recreational landings since 2012 (Table 1 Figure 4.)

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

The length, weight, sex, and age composition of the commercial harvest has been consistently monitored through sampling at fish houses conducted by the division since 1982. The annual harvest quota is split equally between three gear types, beach seine, gill net, and trawl. Any overages from one year are deducted from next year's quota. Because of the 28-in TL minimum size limit and gear regulations, the majority of fish harvested average about 38-in total length and are between nine and 15 years old (Tables 2 and 3). North Carolina also augments NOAA Fisheries Marine Recreational Information Program, which estimates the annual harvest and releases of marine recreational fisheries. Mean fork length is usually around 36-in, with fish as large as 51-in measured. Total number of fish measured for 2006-2011 ranged from 67 to 609. There has been no estimated harvest (and therefore no fish measured) since 2012 (Table 4)

Fishery-Independent Monitoring

North Carolina has no fishery independent sampling indices for Atlantic striped bass. However, we do participate in the coastwide striped bass tagging program administered through the United States Fish and Wildlife Service (USFWS). In 2011, the DMF started contracting charter trips to collect striped bass using hook-and-line gear in order to tag striped bass on their overwintering grounds, usually in the vicinity of the VA/NC border. Tagging takes place in January and/or February. Dates and actual location of tagging are dependent on striped bass annual migration patterns. Tags used are USFWS tags and all tagging information is housed in the USFWS tagging database. The Striped Bass Winter Cooperative Tagging Program is a critical component of overall coastwide striped bass management, as it is the only tagging program that tags the mixed, migratory stock on their overwintering grounds (off the VA/NC coast, from the mouth of the Chesapeake Bay down to Oregon Inlet). This means that fish from all producer areas, including Chesapeake Bay, Delaware River, Hudson River, and Albemarle/Roanoke stocks are available for tagging. Tag returns provide managers with an estimate of the percent contribution of the individual producer areas to the migratory portion of the stock. Length frequencies average about 37-in total length, and we about 1,000 fish are collected each year (Table 5). The majority of these fish are the large, mature females that are staging on their overwintering grounds in preparation for the spring spawning run to their respective spawning grounds.

MANAGEMENT STRATEGY

Atlantic striped bass are managed under Amendment 6 (and subsequent addenda) to ASMFC's Interstate FMP for Atlantic Striped Bass. The plan identifies spawning stock biomass and fishing mortality reference points in order to maintain adequate stock size and age structure, and to prevent overfishing. Stock status is determined by a formal, peer reviewed statistical catch-at-age stock assessment. The FMP requires several independent and dependent monitoring programs to be in place in each state, although these programs vary by state. States have the flexibility to implement different size limits, bag limits, and commercial quotas, as long as they are deemed to meet conservation equivalency by the Technical Committee and are approved by the Management Board.

MANAGEMENT AND RESEARCH NEEDS

The following management issues and research needs are identified in Amendment 6 and from the peer reviewed stock assessment.

Fishery Dependent Priorities

High

- Continue collection of paired scale and otolith samples, particularly from larger Striped Bass, to facilitate the development of otolith-based age-length keys for scale-otolith conversion matrices.

Moderate

- Develop studies to provide information on gear specific discard mortality rates and to determine the magnitude of bycatch mortality.
- Improve estimates of Striped Bass harvest removals in coastal areas during wave 1 and in inland waters of all jurisdictions year round.
- Evaluate the percentage of fishermen using circle hooks.

Fishery Independent Priorities

Moderate

- Develop a refined and cost-efficient, fisheries-independent coastal population index for Striped Bass stocks.
    - The PRT recommends the SBTC be tasked with exploring whether the Cooperative Winter Tagging Cruise, NEAMAP, and/or NMFS Trawl Survey datasets would prove useful in this respect.

Modeling/Quantitative Priorities

High

- Develop a method to integrate catch-at-age and tagging models to produce a single estimate of F and stock status.
- Develop a spatially and temporally explicit catch-at-age model incorporating tag based movement information.
    - The PRT recommends that the SAS be tasked with reviewing recent published literature examining tag-based movement information to see if they would contribute to the development of such a model (e.g., Callihan et al., 2014).
- Review model averaging approach to estimate annual fishing mortality with tag based models. Review validity and sensitivity to year groupings.
- Develop methods for combining tag results from programs releasing fish from different areas on different dates.
- Examine potential biases associated with the number of tagged individuals, such as gear specific mortality (associated with trawls, pound nets, gill nets, and electrofishing), tag induced mortality, and tag loss.
- Develop field or modeling studies to aid in estimation of natural mortality or other factors affecting the tag return rate.

Moderate

- Develop maturity ogives applicable to coastal migratory stocks.
- Examine methods to estimate annual variation in natural mortality.
- Develop reliable estimates of poaching loss from Striped Bass fisheries.
- Improve methods for determining population sex ratio for use in estimates of SSB and biological reference points.

- Evaluate truncated matrices and covariate based tagging models.

Low

- Examine issues with time saturated tagging models for the 18-in length group.
- Develop tag based reference points

Life History, Biological, and Habitat Priorities

High

- Continue in-depth analysis of migrations, stock compositions, etc. using mark-recapture data.
- Continue evaluation of Striped Bass dietary needs in relation to health condition.
- Continue analysis to determine linkages between the mycobacteriosis outbreak in Chesapeake Bay and sex ration of Chesapeake spawning stock, Chesapeake juvenile production, and recruitment success into coastal fisheries.

Moderate

- Examine causes of different tag based survival estimates among programs estimating similar segments of the population.
- Continue to conduct research to determine limiting factors affecting recruitment and possible density implications.
- Conduct study to calculate the emigration rates from producer areas now that population levels are high and conduct multi-year study to determine inter-annual variation in emigration rates.

Low

- Determine inherent viability of eggs and larvae.
- Conduct additional research to determine the pathogenicity of the IPN virus isolatred from Striped Bass to other warm water marine species, such as flounder, menhaden, shad, and largemouth bass.

Management, Law Enforcement, and Socioeconomic Priorities

Moderate

- Examine the potential public health trade-offs between the continued reliance on the use of high minimum size limits (28-in) on coastal recreational anglers and its long-term effects on enhanced PCB contamination among recreational stakeholders.
- Evaluate Striped Bass angler preferences for size of harvested fish and trade-offs with bag limits.

Habitat Recommendations

- Passage facilities should be designed specifically for passing striped bass for optimum efficiency at passing this species.
- Conduct studies to determine whether passing migrating adults upstream earlier in the year in some rivers would increase Striped Bass production and larval survival, and opening downstream bypass facilities sooner would reduce mortality of early emigrants (both adult and early-hatched juveniles).
- All state and federal agencies responsible for reviewing impact statements and permit applications for projects or facilities proposed for Striped Bass spawning and nursery areas shall ensure that those projects will have no or only minimal impact on local stocks, especially natal rivers of stocks considered depressed or undergoing restoration.

- Federal and state fishery management agencies should take steps to limit the introduction of compounds which are known to be accumulated in “Striped Bass tissues and which pose a threat to human health or Striped Bass health.
- Water quality criteria for Striped Bass spawning and nursery areas should be established, or existing criteria should be upgraded to levels that are sufficient to ensure successful Striped Bass reproduction.
- Each state should implement protection for the Striped Bass habitat within its jurisdiction to ensure the sustainability of that portion of the migratory stock. Such a program should include inventory of historical habitats. Identification of habitats presently used, specification areas targeted for restoration, and imposition or encouragement of measures to retain or increase the quantity and quality of Striped Bass essential habitats.
- States in which Striped Bass spawning occurs should make every effort to declare Striped Bass spawning and nursery areas to be in need of special protection, such as declaration should be accompanied by requirements of non-degradation of habitat quality, including minimization of non-point source runoff, prevention of significant increases in contaminant loadings, and prevention of the introduction of any new categories of contaminants into an area. For those agencies without water quality regulatory authority, protocols and schedules for providing input on water quality needs of Striped Bass stocks are met.
- ASMFC should designate important habitats for Striped Bass spawning and nursery areas as HAPC.
- Each state should survey existing literature and data to determine the historical extent of Striped Bass occurrence and use within its jurisdiction. An assessment should be conducted of those areas not presently used for which restoration is feasible.

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NEFSC. 2013b. 57th Northeast Regional Stock Assessment Workshop (57th SAW) Assessment Report. U.S. Department of Commerce Northeast Fish Science Center Reference Document. 13-16; 967 pp. Available from: National Marine Fisheries Service, 166 Water Street, Woods Hole, MA 02543-1026.

TABLES

Table 1. North Carolina's striped bass landings and releases (recreational only) in numbers and pounds in the Atlantic Ocean, 2006-2015.

	Recreational			Commercial		
Year	Landings (N)	Releases (N)	Landings (lb)	Quota Year*	Landings (N)	Landings (lb)
2006	79,023	24,262	1,759,796	2005/2006	15,524	352,036
2007	37,376	13,838	876,206	2006/2007	18,396	424,723
2008	25,750	10,776	525,891	2007/2008	13,803	299,162
2009	5,650	5,407	160,922	2008/2009	8,585	189,995
2010	23,778	20,365	435,756	2009/2010	14,627	272,418
2011	94,182	110,150	2,042,981	2010/2011	13,532	250,383
2012	0	1,615	0	2011/2012	333	7,282
2013	0	1,057	0	2012/2013	0	0
2014	0	626	0	2013/2014	0	0
2015	0	0	0	2014/2015	0	0

* Quota year is December 1 through November 30.

Table 2. Striped bass total length (inches) data from commercial fish house samples, 2005/2006-2014/2015.

Year	Mean Total Length	Minimum Total Length	Maximum Total Length	Total Number Measured
2005/2006	38	32	46	415
2006/2007	38	28	48	843
2007/2008	39	29	49	317
2008/2009	39	30	49	175
2009/2010	37	28	50	456
2010/2011	36	28	48	388
2011/2012	38	34	47	21
2012/2013				0
2013/2014				0
2014/2015				0

Table 3. Summary of striped bass age samples collected from dependent (commercial ocean fishery) sampling, 2006-2015.

Year	Modal Age	Minimum Age	Maximum Age	Total Number Aged
2005/2006	12	8	17	279
2006/2007	10	6	16	427
2007/2008	11	7	17	191
2008/2009	11	7	17	179
2009/2010	9	6	18	292
2010/2011	8	6	17	226
2011/2012	9	8	15	21
2012/2013				0
2013/2014				0
2014/2015				0

Table 4. Striped bass fork length(inches) data from MRIP recreational samples, Atlantic Ocean only, 2006-2015.

Year	Mean Fork Length	Minimum Fork Length	Maximum Fork Length	Total Number Measured
2006	36	27	49	493
2007	36	28	46	375
2008	36	26	47	304
2009	38	28	49	67
2010	35	27	51	95
2011	36	26	48	609
2012				0
2013				0
2014				0
2015				0

Table 5. Striped bass total length (inches) data from the Cooperative Winter Tagging Program, Hook and Line portion, 2011-2015.

Year	Number of Trips	Number Caught	Number Tagged	Mean Total Length	Minimum Total Length	Maximum Total Length
2011	1	109	108	32	26	43
2012	1	6	6	36	25	46
2013	10	1,129	1,121	37	26	49
2014	10	925	921	37	27	53
2015	10	1,057	1,042	38	29	52

FIGURES

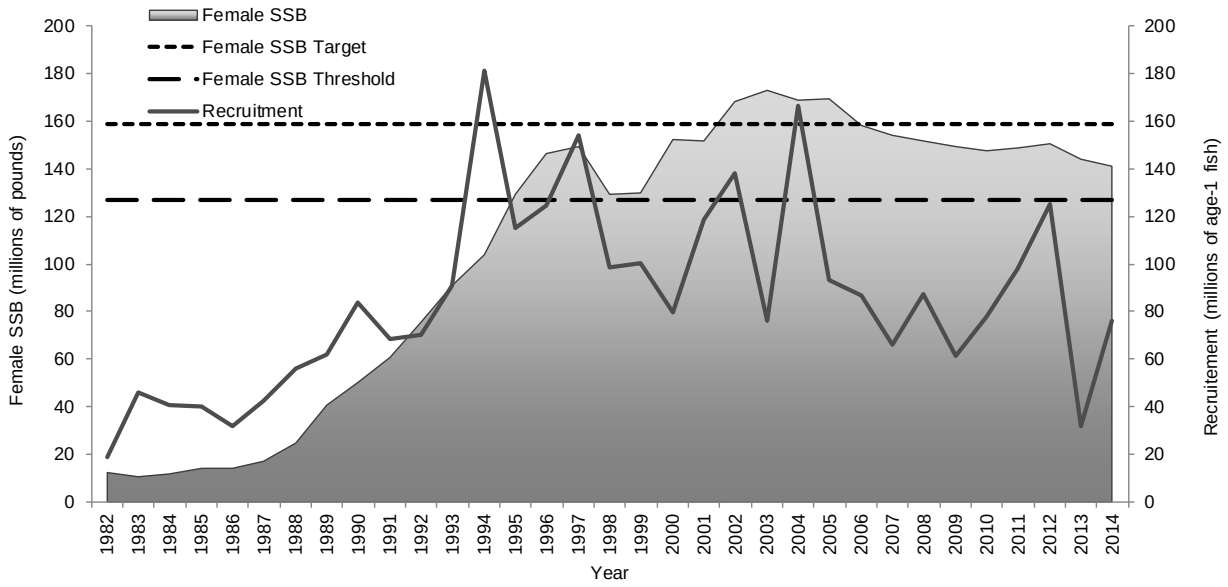

Figure 1. Atlantic striped bass female spawning stock biomass and recruitment (abundance of age-1). Source: Atlantic Striped Bass Stock Assessment Update 2015.

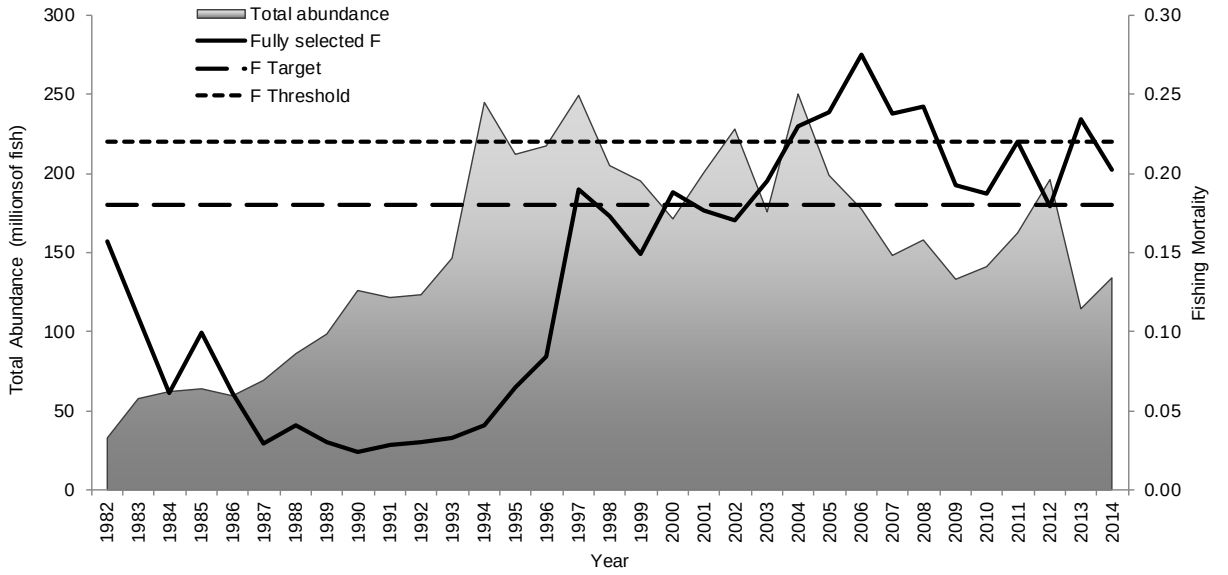

Figure 2. Atlantic striped bass total stock abundance and Fishing mortality (F). Source: Atlantic Striped Bass Stock Assessment Update 2015.

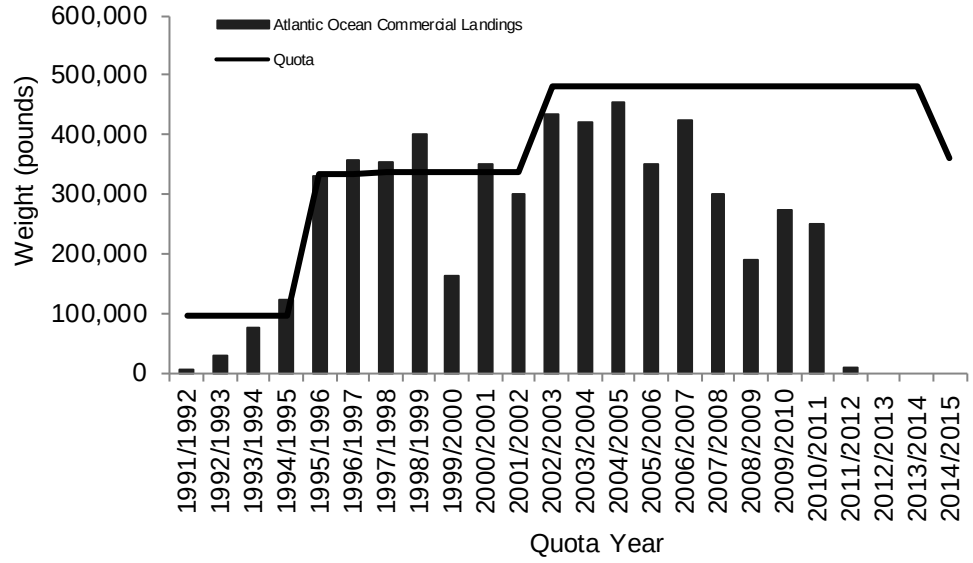

Figure 3. North Carolina's commercial striped bass landings in the Atlantic Ocean, 1991-2015.

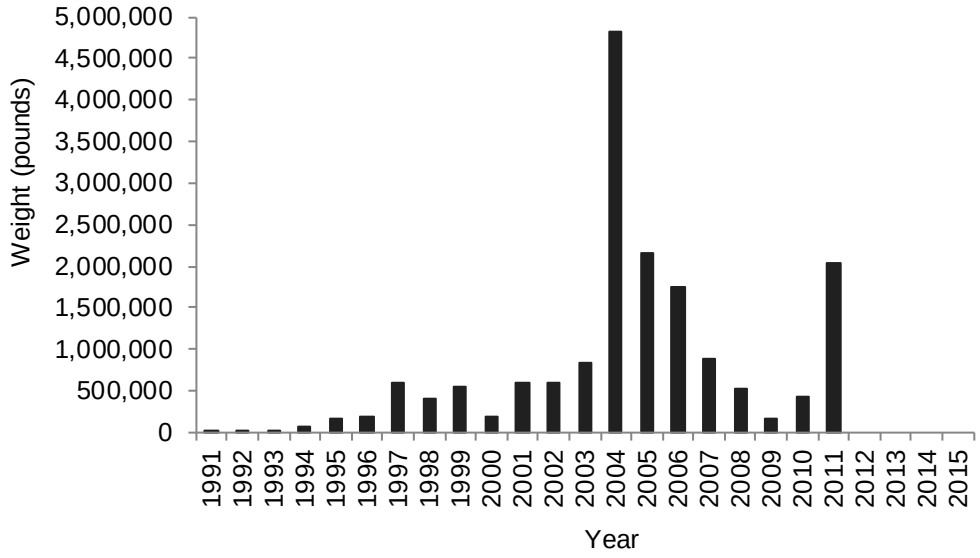

Figure 4. North Carolina's recreational striped bass landings in the Atlantic Ocean, 1991-2015.

FISHERY MANAGEMENT PLAN UPDATE
SUMMER FLOUNDER
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	Adopted by the ASMFC in 1982 and the MAFMC in 1988
Amendments:	Amendment 1 in 1991 Amendment 2 in 1993 Amendment 3 in 1993 Amendment 4 in 1993 Amendment 5 in 1993 Amendment 6 in 1994 Amendment 7 in 1995 Amendment 8 in 1996 Amendment 9 in 1996 Amendment 10 in 1997 Amendment 11 in 1998 Amendment 12 in 1999 Amendment 13 in 2003 Amendment 15 in 2011 Amendment 16 in 2007
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	A new comprehensive amendment is underway and scheduled to be completed in 2017.

Because of their presence in, and movement between, state waters (0-3 miles) and federal waters (3-200 miles), the Mid Atlantic Fisheries Management Council manages summer flounder cooperatively with the Atlantic States Marine Fisheries Commission (ASMFC). The two management entities work in conjunction with the National Marine Fisheries Service (NMFS) as the federal implementation and enforcement entity. The Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP) and amendments use output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial and recreational fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries. Recreational bag/size limits and seasons are determined on a state-by-state basis using conservation equivalency. The commercial quota is divided into state-by-state quotas based on historical landings. Specific details for each Amendment include:

Amendment 1 - Established an overfishing definition for summer flounder.

Amendment 2 - Established rebuilding schedule, commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements for summer flounder; created the Summer Flounder Monitoring Committee.

Amendment 3 - Revised the exempted fishery line for summer flounder; increased the large mesh net threshold for summer flounder; established otter trawl retention requirements for large mesh use in the summer flounder fishery.

Amendment 4 - Revised state-specific shares for summer flounder commercial quota allocation.

Amendment 5 - Allowed states to combine or transfer summer flounder commercial quota.

Amendment 6 - Set criteria for allowance of multiple nets on board commercial vessels for summer flounder; established deadline for publishing catch limits; established commercial management measures for summer flounder.

Amendment 7 - Revised the fishing mortality rate reduction schedule for summer flounder.

Amendment 8 - Incorporated Scup FMP into Summer Flounder FMP; established scup management measures, including commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements.

Amendment 9 - Incorporated Black Sea Bass into Summer Flounder FMP; established black sea bass measures, including commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements.

Amendment 10 - Modified commercial minimum mesh requirements; continued commercial vessel moratorium; prohibited transfer of summer flounder at sea; established special permit for party/charter sector for summer flounder.

Amendment 11 - Modified certain provisions related to vessel replacement and upgrading, permit history transfer, splitting, and permit renewal regulations.

Amendment 12 - Revised FMP to comply with the Sustainable Fisheries Act and established framework adjustment process; established quota set-aside for research for summer flounder, scup, and black sea bass; established state-specific conservation equivalency measures; allowed the rollover of winter scup quota; revised the start date for summer quota period for scup fishery; established a system to transfer scup at sea.

Amendment 13 - Revised black sea bass commercial quota system; addressed other black sea bass mgmt. measures; Established multi-year specification setting of quota for all three species; Established region-specific conservation equivalency measures for summer flounder; built flexibility into process to define and update status determination criteria for each plan species.

Amendment 15 - Established Annual Catch Limits (ACLs) and Accountability Measures.

Amendment 16 - Standardized bycatch reporting methodology.

Management Unit

U.S. waters in the western Atlantic Ocean from the southern border of North Carolina northward to the U.S.-Canadian border.

Goal and Objectives

The objectives of the Summer Flounder, Black Sea Bass and Scup FMP are to:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fisheries to assure that overfishing does not occur;

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass (SSB);

3. Improve the yield from these fisheries;

4. Promote compatible management regulations between state and federal jurisdictions;

5. Promote uniform and effective enforcement of regulations;

6. Minimize regulations to achieve the management objectives stated above.

The 2011 Omnibus Amendment contains Amendment 15 to the Summer Flounder, Black Sea Bass and Scup FMP (the most recent Amendment that impacts the summer flounder fishery). The amendment is intended to formalize the process of addressing scientific and management uncertainty when setting catch limits for the upcoming fishing year(s) and to establish a comprehensive system of accountability for catch (including both landings and discards) relative to those limits, for each of the managed resources subject to this requirement. Specifically: (1) Establish Allowable Biological Catch (ABC) control rules, (2) Establish a Council risk policy, which is one variable needed for the ABC control rules, (3) Establish ACL(s), (4) Establish a system of comprehensive accountability, which addresses all components of the catch, (5) Describe the process by which the performance of the annual catch limit and comprehensive accountability system will be reviewed, (6) Describe the process to modify the measures above in 1-5 in the future.

Addendum XXVI to the Summer Flounder, Black Sea Bass and Scup Fishery Management Plan, established regional management of the summer flounder and black sea bass recreational fisheries for the 2015 fishing year.

STATUS OF THE STOCK

Stock Status

The stock is considered viable. The 2013 National Marine Fisheries Service's Northeast Fisheries Science Center benchmark stock assessment for U.S. waters north of Cape Hatteras indicated the stock was not overfished and overfishing was not occurring. The 2015 Stock Assessment Update (released in July 2015) found the stock was not overfished but overfishing was occurring in 2014.

Stock Assessment

In the 2013 benchmark assessment, fishing mortality rates and stock sizes were estimated using a statistical catch at age model calculated using the Age Structured Assessment Program (ASAP). Fishing mortality was below the threshold fishing mortality reference point (F35%) and spawning stock biomass (SSB) was above the threshold biomass reference point (one-half SSB_{MSY}) so the stock was not overfished and overfishing was not occurring (although SSB was below the SSB target in 2012). The 2015 Stock Assessment Update included data through 2014 and indicated overfishing was occurring in 2014 relative to the biological reference points established in 2013. Fishing mortality estimates were higher in recent years than previously projected and poor recruitment persisted from 2010 to 2013. However, SSB was above the threshold biomass reference point so the stock was not overfished in 2014.

STATUS OF THE FISHERY

Current Regulations

Commercial
There is a 14-in total length (TL) minimum size limit as well as harvest seasons and minimum mesh size for the flounder trawl fishery. Trip limits are set for landings windows established by proclamation to constrain harvest to the quota allocation (see most recent NCDMF proclamation on commercial summer flounder fishery). A bycatch trip limit of 100 lb. is in place during the closed trawl season. A license to land flounder from the Atlantic Ocean is required to land more than 100 lb. per trip.

Recreational
There is a 15-in TL minimum size limit and 6-fish creel limit for all joint and coastal waters.

Commercial Landings

Any landings reported as caught in the ocean are considered to be summer flounder by North Carolina Trip Ticket Program. Most summer flounder landings were from trawls although gill nets and other gears (e.g. spears, gigs, hook and line) catch small numbers of flounder in the ocean. Landings are constrained by the coastwide quota and North Carolina's allocation of the total quota (27.4%). Landings peaked in 2004 and have been generally stable since 2007 aside from the lowest landings in the time-series in 2012 and 2013 (Figure 1). The low landings in 2012-2013 were primarily due to closure of Oregon Inlet to large vessels (such as trawlers) and the consequent transfer of most of North Carolina's quota allocation to Virginia and other states. In 2014, more winter trawl vessels returned to North Carolina to land catches rather than transferring quota to Virginia and other states. Trends in commercial trips have generally followed landings trends (Figure 1). Trips include the number of trip ticket records with landings reported. Trips typically represent more than one day of fishing, especially for trawling.

Recreational Landings

Recreational harvest of summer flounder varied annually but remained relatively high 1992-2002 (Figure 2). After that time harvest declined and remained consistently low. Trends in recreational trips are somewhat difficult to interpret because they represent all paralichthid flounder species commonly caught in North Carolina (southern, summer and Gulf). This is because anglers simply report targeting 'flounder' rather than a particular species of flounder.

Trips can be defined in several ways but in this document all trips that harvested or released paralichthid flounder were included. Trends in trips and harvest are roughly similar in 1992-2007 but in 2008-2014 harvest remained consistently low while trips were variable but remained relatively high (Figure 2).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Several NCDMF sampling programs collect biological data on commercial and recreational fisheries that catch summer flounder. Program 433 (winter trawl fishery) is the primary program that collects length and age data for harvested summer flounder. Other programs that collect information include: 461 (estuarine gill net and seine), 476 (gig and spear), 432 (flounder pound net), 434 (ocean gill net) and 437 (long haul seine). Programs 466 (sea turtle bycatch monitoring) and 570 (commercial shrimp trawl fishery characterization**)**collect length data on harvested and discarded flounder. Other commercial sampling programs focusing on fisheries that do not target summer flounder rarely collect biological data. NCDMF sampling of the recreational fishery through the Marine Recreational Information Program (MRIP) collects length data on summer flounder. The NCDMF mail-based gigging survey collects harvest data for the recreational gig fishery but does not collect length or age data or identify flounder species (and summer flounder are rarely caught by this fishery). Age data from the recreational fishery are collected mainly via voluntary angler donations.

There were no clear trends in commercial length data (Table 1). Annual mean lengths were fairly consistent. The 2015 maximum length was the third largest in the time-series. The number of fish measured in 2014 and 2015 was considerably higher than in 2012 and 2013 (due to low landings 2012-2013) but similar to prior years. The modal age in 2015 was the highest relative to previous years. The maximum age in 2015 was also the oldest in the time-series. Maximum ages since 2010 were higher than previous years, suggesting expansion of the stock age structure. The number of age samples collected and aged in 2015 was the second highest in the time-series.

There were no clear trends in recreational length data in 2006 to 2015 (Table 2). The mean length in 2015 was higher than 2014 but similar to prior years. The 2015 maximum length was larger than in the previous year. A relatively low number of fish were measured in 2015. The only year in which recreational ages were collected in was 2014, so no trends can be discussed.

Fishery-Independent Monitoring

Several NCDMF independent sampling programs collect biological data on southern flounder (Table 3). However, most surveys do not catch summer flounder regularly enough to provide consistent length, age or abundance data. The main exception is Program 195 (the Pamlico Sound Survey), which conducts trawls using a random stratified survey design in waters of Pamlico Sound and major river tributaries. Stations are randomly selected from strata based upon depth and geographic location. Randomly selected stations are optimally allocated among the strata based upon all previous sampling in order to provide the most accurate abundance estimates (PSE <20). Tow duration is 20 minutes; using double rigged demersal mongoose trawls (9.1m headrope, 1.0m X 0.6m doors, 2.2-cm bar mesh body, 1.9-cm bar mesh cod end and a 100-mesh tailbag extension. The survey takes place in June and September with the samples collected in June serving as a juvenile abundance index (JAI) for summer flounder in

North Carolina. A total of 500 summer flounder were caught in the survey in 2015 and the JAI value was 3.4 fish per tow. The 1987-2015 average JAI value was 9.3 (Table 4, Figure 3). The summer flounder JAI from the Pamlico Sound Survey is one of the recruitment indices provided for the annual coastwide stock assessment of summer flounder, although it was not used in the 2013 benchmark stock assessment or the 2015 stock assessment update. It is unclear whether the JAI includes only summer flounder from the stock unit north of Cape Hatteras or if it also includes fish from the population south of Cape Hatteras. Until this question is answered it will be difficult to use the JAI in an assessment. Genetic research on this topic is underway.

MANAGEMENT STRATEGY

An update of the summer flounder stock assessment is completed each year by the Northeast Fishery Science Center (NEFSC 2015). Data are analyzed from the previous year based on decisions made for the previous benchmark assessment. Projections based on stock assessments are used to set the coastwide quota level each year. Amendments to the FMP are undertaken as issues arise that require action. North Carolina has several specific management strategies for summer flounder (Table 5).

MANAGEMENT AND RESEARCH NEEDS

The following research needs were reviewed (existing needs) or developed (new) during the 2013 Stock Assessment Workshop (SAW) by the Southern Demersal Working Group (SDWG) and the Scientific and Statistical Committee (SSC). Text in parenthesis for each number indicates known progress made to address needs.

- Develop a program to annually sample the length and age frequency of summer flounder discards from the recreational fishery (progress has been made in some states outside NC, but more synoptic data and potentially less biased data are needed including the length, age, and sex-frequency of discards).
- A comprehensive collection of otoliths, for all components of the catch-at-age matrix, needs to be collected on a continuing basis for fish larger than 60 cm (~7 years). The collection of otoliths and the proportion at sex for all of the catch components could provide a better indicator of stock productivity (ongoing through NEFSC, NCDMF and other organizations).
- A reference collection of summer flounder scales and otoliths should be developed to facilitate future quality control of summer flounder production aging. In addition, a comparison study between scales and otoliths as aging structures for summer flounder should be completed (an ageing workshop was held in 2014 to compare scales and otoliths, research in ongoing).
- Collect information on overall fecundity for the stock, as both egg condition and production may be a better indicator of stock productivity than weight (ongoing research by NEFSC Sandy Hook Laboratory to address, may require additional data collection).
- Investigate trends in sex ratios and mean lengths and weights of summer flounder in state agency and federal surveys catches (analyzed for the federal survey, state agency data may still need to be analyzed).
- Use NEFSC fishery observer age-length keys for 1994 and later years (as they become available) to supplement NEFSC survey data in aging the commercial fishery discard (progress unknown - age data may not yet be available).
- Consider use of management strategy evaluation techniques to address the

implications of harvest policies that incorporate consideration of retrospective patterns (retrospective pattern has changed since this recommendation was developed - i.e., smaller and less problematic – so this recommendation is no longer considered relevant).

- Consider treating scallop closed areas as separate strata in calculations of summer flounder discards in the commercial fisheries (has not been addressed but may not be an issue in the current discard estimation methods).
- Examine the sensitivity of the summer flounder assessment to the various unit stock hypotheses and evaluate spatial aspects of the stock to facilitate sex and spatially-explicit modeling of summer flounder (progress has been made on aspects of this recommendation, detailed in working papers for 2013 stock assessment).
- Conduct further research to examine the predator-prey interactions of summer flounder and other species, including food habitat studies, to better understand the influence of these other factors on the summer flounder population (research needed).
- Collect and evaluate information on the reporting accuracy of recreational discards estimates in the recreational fishery (Some research has been conducted in the recreational for-hire fishery, but comprehensive work across all fishing modes has not been completed).
- Examine male female ratio at age-0 and potential factors (e.g., environmental) that may influence determination of that ratio (sex ratio was updated, some research completed but more may be needed).
- Evaluate potential changes in fishery selectivity relative to the spawning potential of the stock; analysis should consider the potential influence of the recreational and commercial fisheries (some progress has been made on this topic in a report prepared for the MAFMC SSC describing a MSE for the recreational fishery).
- Collect data to determine the sex ratio for all of the catch components (through a PMAFS study, 2 years of data collection has occurred to determine sex ratios in the commercial and recreational landings).
- Determine the appropriate level for the steepness of the S-R relationship and investigate how that influences the biological reference points (some research completed)
- 16.) Evaluate uncertainties in biomass to determine potential modifications to default OFL CV (progress unknown).
- Evaluate the size distribution of landed and discarded fish, by sex, in the summer flounder fisheries (progress unknown).
- Evaluate past and possible future changes to size regulations on retention and selectivity in stock assessments and projections (progress unknown).
- Incorporate sex -specific differences in size at age into the stock assessment (progress unknown).
- Evaluate range expansion and change in distribution and their implications for stock assessment and management (research ongoing).
- Continued evaluation of natural mortality and the differences between males and females. This should include efforts to estimate natural mortality, such as through mark-recapture programs, telemetry (tagging studies ongoing).
- Further work examining aspects that create greater realism to the summer flounder assessment (e.g., sexually dimorphic growth, sex-specific F, differences in spatial structure [or distribution by size?] should be conducted (progress unknown)
  This could include:
  - Simulation studies to determine the critical data and model components that are necessary to provide reliable advice, and need to determine how simple a model can be while still providing reliable advice on stock status for management use, and should evaluate both simple and most complex model configurations.
  - Development of models incorporating these factors that would create greater

realism.
    - These first steps (a or b) can be used to prioritize data collection, and determine if additional investment in data streams (e.g., collection of sex at age and sex at length and maturity data from the catch, additional information on spatial structure and movement, etc.) are worthwhile in terms of providing more reliable assessment results.
    - The modeling infrastructure should be simultaneously developed to support these types of modeling approaches (flexibility in model framework, MCMC/bootstrap framework, projection framework).
- Develop comprehensive study to determine the contribution of summer flounder nursery area to the overall summer flounder population, based off approaches similar to those developed in WPA12 (otolith microchemistry research ongoing)
- Develop an ongoing sampling program for the recreational fishery landings and discards (i.e., collect age, length, sex) to develop appropriate age-length keys for ageing the recreational catch (progress unknown).
- Apply standardization techniques to all of the state and academic-run surveys, to be evaluated for potential inclusion in the assessment (some progress made).
- Continue efforts to improve understanding of sexually dimorphic mortality and growth patterns. This should include monitoring sex ratios and associated biological information in the fisheries and all ongoing surveys to allow development of sex structured models in the future (progress unknown).
- Conduct sensitivity analyses to identify potential causes of the recent retrospective pattern. Efforts should focus on identifying factors in both survey and catch data that could contribute to the decrease in cohort abundance between initial estimates based largely on survey observations and subsequent estimates influenced by fishery dependent data as the cohort recruits to the fishery (progress unknown).
- Develop methods that more fully characterize uncertainty and ensure coherence between assessments, reference point calculation and projections (progress unknown)

LITERATURE CITED

NMFS NEFSC. 2015. Stock Assessment Update of Summer Flounder for 2015. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

TABLES

Table 1. Summary of length (TL, mm) and age data for NCDMF commercial fishery sampling programs (includes harvest and some discard information)

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	497	123	848	21,093	4	1	11	682
2007	492	110	766	26,488	3	1	11	697
2008	502	77	792	28,550	4	1	11	751
2009	488	83	788	20,311	5	1	11	723
2010	499	217	846	23,492	3	1	14	783
2011	491	87	1095	17,405	4	2	12	417
2012	494	113	846	7,909	3	1	13	541
2013	503	78	794	7,082	4	1	13	575
2014	505	85	900	21,318	5	1	16	1113
2015	497	72	888	28,523	6	1	17	899

Table 2. Summary of length and age data for NCDMF recreational fishery sampling

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	394	303	537	217	ND	ND	ND	ND
2007	403	338	538	286	ND	ND	ND	ND
2008	399	331	485	88	ND	ND	ND	ND
2009	400	330	518	136	ND	ND	ND	ND
2010	395	310	550	259	ND	ND	ND	ND
2011	412	336	608	213	ND	ND	ND	ND
2012	410	283	608	228	ND	ND	ND	ND
2013	408	345	584	114	ND	ND	ND	ND
2014	398	338	476	137	2	2	5	8
2015	413	351	514	136	ND	ND	ND	0

Table 3. Summary of length (TL, mm) and age data for NCDMF fishery-independent sampling programs

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	182	18	454	399	ND	ND	ND	ND
2007	167	40	418	449	ND	ND	ND	ND
2008	159	35	426	1,256	ND	ND	ND	ND
2009	179	37	490	716	ND	ND	ND	ND
2010	156	46	422	770	ND	ND	ND	ND
2011	163	39	431	789	ND	ND	ND	ND
2012	168	38	456	836	ND	ND	ND	ND
2013	153	30	405	1,412	1	0	1	35
2014	151	33	484	698	1	1	2	6
2015	168	37	442	526	ND	ND	ND	0

Table 4. Catch per unit effort (arithmetic mean) for summer flounder in Program 195 1987-2015.

Year	CPUE (number of fish per tow)	Standard error
1987	19.86	2.70
1988	2.61	0.89
1989	6.63	1.15
1990	4.27	0.77
1991	5.85	1.41
1992	9.14	1.71
1993	5.13	1.22
1994	8.17	1.94
1995	6.65	1.65
1996	30.67	5.61
1997	14.14	3.00
1998	10.44	4.32
1999*	3.24	0.58
2000	3.94	0.81
2001	22.03	3.31
2002	18.28	3.22
2003	7.23	1.73
2004	5.90	1.32
2005	9.79	1.76
2006	1.96	0.47
2007	3.62	0.67
2008	14.40	3.53
2009	4.53	1.22
2010	14.28	3.72
2011	6.64	1.11
2012	9.26	2.39
2013	9.80	1.92
2014	6.55	1.61
2015	3.40	0.74
1987-2015 avg.	9.26	
2006-2015 avg.	8.05	

*Sampling occurred in July instead of June

Table 5. Summary of management strategies by North Carolina for summer flounder.

Management Strategy	Objectives	Outcome
14” minimum size limit for the commercial fishery	1,2,3,4,5,6	Size limit accomplished by rule 3M.0503(a)
Minimum trawl stretched mesh size of 5 ½” (diamond) or 6” (square) throughout the body, extensions and tailbag in order to possess more than 100 lb of flounder (exception for flynets)	1,2,3,4,5,6	Rules 3M.0503(b) 3M.0503(f) 3M.0503(g) 3M.0503(h)(1-3)
Licenses to land flounder in Atlantic Ocean and to purchase or offload flounder from the Atlantic Ocean required to possess >100 lb	1	Rules 3M.0503(c)(1,3,4) 3M.0503(c)(2)
Commercial seasons that allocate 80% of the quota to the winter season (starting January 1), a bycatch trip limit of 100 lb during the closed season and the remaining quota allocated to the fall season (starting no earlier than November 1)	1,2	Rules 3M.0503(i)(1-3). Rule suspended for 2013 and 2014 fishing seasons.
Trip limits established for the open seasons	1	Rule 3M.0503(j) Specific trip limits by Proclamation Authority
15” minimum size and 6 fish creel limit for recreational fishery in all joint and coastal waters	1,2,3	Proclamation FF-29-2011

FIGURES

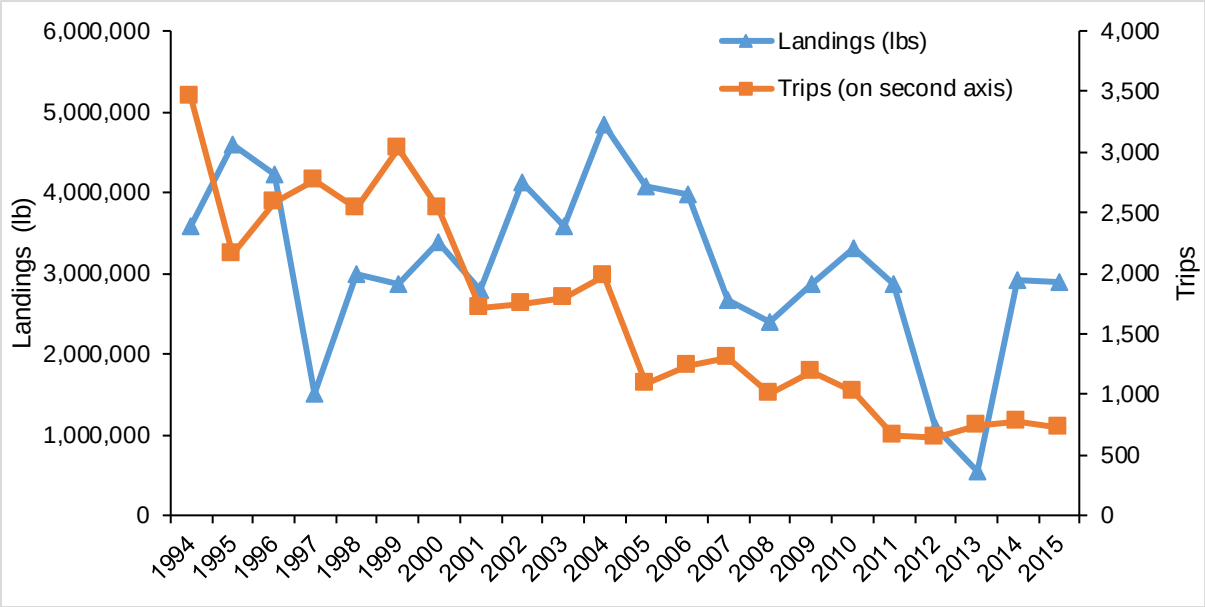

Figure 1. North Carolina commercial landings (lb) and trips for summer flounder 1994-2015.

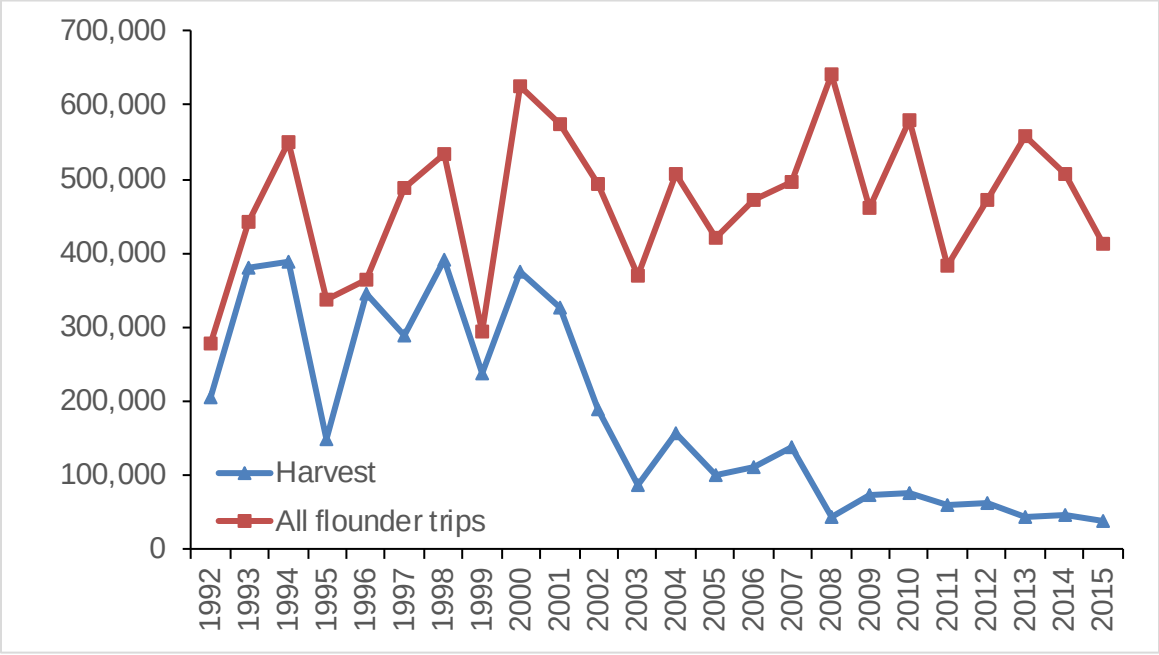

Figure 2. Recreational hook and line harvest (in numbers of fish) and all trips that harvested or released any paralichthid flounder species, from MRIP data 1992-2015.

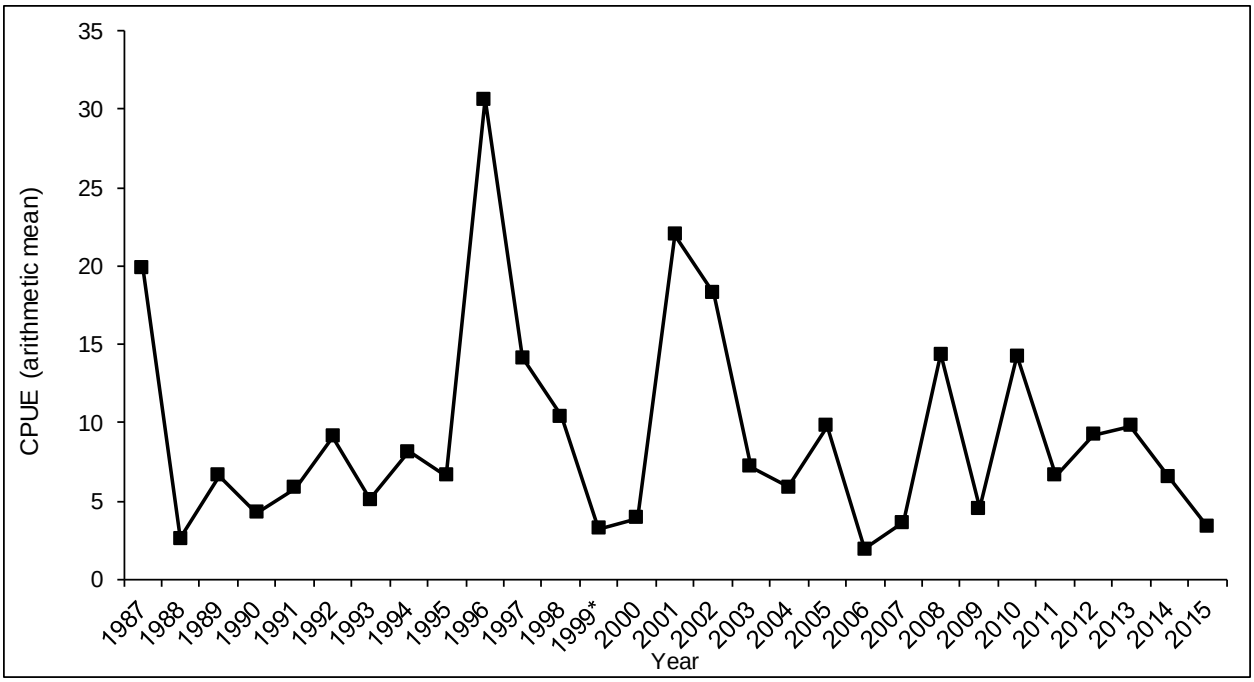

Figure 3. Catch per unit effort for juvenile summer flounder in Program 195 (Pamlico Sound Survey) 1987-2015.

FISHERY MANAGEMENT PLAN UPDATE
WEAKFISH
August 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	NCDMF IJ FMP 2002; ASMFC October 1985
Amendments:	Amendment 1 March 1992 Amendment 2 October 1994 Amendment 3 May 1996 Amendment 4 November 2002
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	ASMFC scheduled 2016

Weakfish *(Cynoscion regalis)* are managed under the authority of two interstate fisheries management plans (FMP); Amendment 4 (ASMFC 2002) to the Atlantic States Fishery Management Plan for Weakfish (ASMFC 1985) and the North Carolina Interjurisdictional Fisheries Management Plan (NCDMF 2015). The goal of the North Carolina Interjurisdictional Fisheries Management Plan (IJ FMP) is to adopt FMPs, consistent with N.C. law, approved by the Councils or the Atlantic States Marine Fisheries Commission by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved Federal and council FMPs and amendments.

The Atlantic States Marine Fisheries Commission (ASMFC) adopted its first FMP for weakfish in 1985. Amendment 1 to the FMP (ASMFC 1992) unsuccessfully aimed to improve the status of weakfish. Amendment 2 (ASMFC 1994) resulted in some improvement to the stock, but several signs indicated that further improvement was necessary. Thus, Amendment 3 (ASMFC 1996) was implemented to increase the sustainability of the fishery. Addendum I to Amendment 3 was approved in 2000 in order to extend the existing management program until the Weakfish Management Board could approve Amendment 4.

Weakfish are currently managed under the guidelines contained in Amendment 4 (ASMFC 2002) and its subsequent addenda. The ASMFC adopted Addendum I to Amendment 4 (ASMFC 2005) to replace the biological sampling program. In response to a significant decline in stock abundance and increasing total mortality since 1999, the Board approved Addendum II to Amendment 4 (ASMFC 2007a) to reduce the recreational creel limit and commercial bycatch limit, and set landings levels that, when met, will trigger the Board to re-evaluate management measures. Addendum III to Amendment 4 (ASMFC 2007b) altered the bycatch reduction device

certification requirements in Section 4.2.8 of Amendment 4 for consistency with the South Atlantic Fishery Management Council's Shrimp FMP.

The fishery is currently managed based off of the weakfish stock assessment conducted in 2009. The findings of the assessment indicated that weakfish are currently in a severely depleted state with natural mortality (M) rather than fishing mortality (F) believed to be the primary culprit in the decline. In response to the continued decline in the weakfish population, the ASMFC Weakfish Management Board passed Addendum IV to Amendment 4 (2009). This Addendum requires all states along the east coast to implement severe harvest restrictions on weakfish.

Harvest restrictions include a one fish daily recreational bag limit and a 100 lb daily commercial trip limit. North Carolina made a request that was approved by the Weakfish Management Board to implement a 10% bycatch allowance for weakfish in lieu of the 100 lb daily trip limit. This request was considered to be conservationally equivalent to the 100 lb daily trip limit. The alternate management action allowed weakfish to be landed provided they make up less than 10% of the weight of all finfish landed up to 1,000 lb per trip or day, whichever is longer and was implemented in August of 2010. In November of 2012, based on the recommendation of the North Carolina Marine Fisheires Commission (NCMFC), the 100 lb daily trip limit consistent with Addendum IV was implemented and replaced the alternate management strategy. It was noted by the Weakfish Management Board that reductions in harvest will not rebuild the depleted stocks until other factors (i.e. natural mortality) become more favorable for weakfish survival. The Board's actions are intended to reduce harvest and poise weakfish for a recovery.

A new benchmark stock assessment for weakfish was completed in 2016 and approved for management by the Weakfish Management Board at the 2016 Spring Meeting of the ASMFC. Results from the current assessment still indicate that weakfish are overfished and that continued high levels of natural mortality (M) are the cause of the decline. Fishing mortality (F) has decreased substantially since 2010 and overfishing on the stock is not occuring. The Board is now considering the implications of and potential management response to the continued low abundance, high natural mortality, and depleted status of weakfish.

Management Unit

Weakfish are managed under this plan as a single stock throughout their coastal range. All Atlantic coast states from Massachusetts through Florida and the Potomac River Fisheries Commission have a declared interest in weakfish. Responsibility for the FMP is assigned to the ASMFC Weakfish Management Board, Plan Review Team, Technical Committee, Stock Assessment Sub-Committee, and Advisory Panel.

Goal and Objectives

The goal of Amendment 4 is to utilize interstate management so that Atlantic coastal weakfish recover to healthy levels that will maintain commercial and recreational harvest consistent with a self-sustaining spawning stock and to provide for restoration and maintenance of essential habitat (ASMFC 2002). The management objectives are to:

1. Establish and maintain an overfishing definition that includes target and threshold fishing mortality rates and a threshold spawning stock biomass to prevent overfishing and maintain a sustainable weakfish population;
2. Restore the weakfish age and size structure to that necessary for the restoration of the fishery;

3. Return weakfish to their previous geographic range;
4. Achieve compatible and equitable management measures among jurisdictions throughout the fishery management unit, including states' waters and the federal EEZ;
5. Promote cooperative interstate research, monitoring and law enforcement necessary to support management of weakfish;
6. Promote identification and conservation of habitat essential for the long term stability in the population of weakfish; and
7. Establish standards and procedures for both the implementation of Amendment 4 and for determination of states' compliance with provisions of the management plan.

STATUS OF THE STOCK

Stock Status

The current stock assessment used for managemnt indicates that the weakfish stock is depleted and overfishing is not occurring (NEFSC 2009a; NEFSC 2009b). Amendment 4 defines overfishing through the use of target and threshold F rates (F30%=F=0.31 and F20%=F=0.50, respectively) and a threshold spawning stock biomass (SSB) (SSB20%=31.8 million lb).

In general, weakfish biomass has declined to an all time low, total mortality is currently high, and non-fishing mortality has increased in recent years. Given this situation, recent fishery removals (landings and dead discards combined) represent a significant proportion of the remaining biomass and further exacerbate the stock decline. While overfishing has not occurred in recent years, harvest was reduced by an estimated 60% in Addendum IV to reduce additional mortality from fishing and poise the stock for a quicker recovery should natural mortality decline.

Based off of the 2009 assessment, the stock's spawning potential is considered to be at only 4% of an unfished stock, well below the 20% spawning potential threshold and 30% spawning potential target adopted in Addendum IV. Trends in F are stable and modest. Thus, while the stock biomass is depleted, overfishing is not occurring.

The new assessment continues to show low overall abundance of weakfish (5.62 million lb in 2014), well below the 30% spawning stock biomass (SSB) threshold (15.17 million lb) but an increase in recruitment for the terminal year of the assessment (2014; Figure 1). Natural mortality continues to outpace fishing mortality and it is the recommendation of the Stock Assessment Subcommittee of the Weakfish Technical Committee to the Weakfish Management Board that weakfish management be based on total mortality (Z) targets and thresholds of 0.93 and 1.11, respectively (Figure 2).

Stock Assessment

Between 1982 and 1990, age 1+ weakfish biomass declined drastically. Overfishing was the main cause of this decline, with F accounting for about 60-90% of total mortality (fishing plus natural mortality) during the period. Fishing mortality peaked at 1.01 in 1989, but with the implementation of management measures in the early to mid-1990s, F declined to 0.24 in 1995 and biomass responded favorably by increasing to a peak of 62.1 million lb in 1996. While F remained relatively stable (between 0.26 and 0.58) after that time, the stock began another drastic decline in 2001 to the time-series low of 10.8 million lb in 2008. However, the contribution of fishing mortality to total mortality was substantially reduced during this period; from 2004-2007 only 10-20% of total mortality is attributed to F. Conversely, natural mortality

has risen substantially since 1995, and factors such as predation, competition, and changes in the environment are thus believed to be having a stronger influence on recent weakfish stock dynamics than F. Bycatch and under-reported catches would have to be much greater than those estimated, growing from about 3-4 times the estimates in 1996 to 15-20 times in the most recent years, to account for the biomass decline. Thus far, there is no evidence available of an Atlantic coast fishery capable of generating additional unreported weakfish discards of this magnitude.

These estimates of age 1+ biomass are roughly comparable to spawning stock biomass due to the biology of weakfish (most fish are mature at age one). The 2008 estimate of age 1+ biomass is below the Amendment 4 SSB threshold of 31.8 million lb (and the stock's spawning potential – 4% of an unfished stock – is also below the 20% spawning potential threshold adopted in Addendum IV). While the F estimates above are not comparable to the target and threshold rates in Amendment 4, the trend indicates a stable and modest fishing mortality. Thus, while the stock biomass is depleted, overfishing is not occurring.

The new assessment completed in 2016 employed a new spatially structured forward projecting statistical catch at age model with time-varying natural mortality. This model accounts for varying population spatial distribution and changing natural mortality through time. Results of the assessment show that the weakfish stock is depleted and has been for the past 13 years. Under the new reference points proposed in the assessment, the stock is considered depleted when the stock is below a spawning stock biomass (SSB) threshold of 30% (15.17 million lb), equivalent to 30% of the projected total weight of fish in a stock that are old enough to spawn under average natural mortality and no fishing (Figure 1). In 2014, SSB was 5.62 million lb (Figure 1). The model indicated natural mortality has been increasing since the mid-1990s, from approximately 0.16 at the beginning of the time-series to an average of 0.93 from 2007-2014 (Figure 2). Even though fishing mortality has been at low levels in recent years, the weakfish population has been experiencing very high levels of total mortality which has prevented the stock from recovering. The preferred model does indicate some positive signs in the weakfish stock in the most recent years, with a slight increase in SSB and total abundance; however, the stock is still well below the SSB threshold (Figure 1).

STATUS OF THE FISHERY

Current Regulations

The NCDMF allows for the recreational harvest of weakfish seven (7) days a week with a 12-in total length (TL) minimum size and a one (1) fish per day bag limit. The commercial harvest of weakfish is limited to an 100 lb daily limit and 12-in TL with the following exceptions: from April 1 through November 15, weakfish 10 in TL or more may lawfully be taken in North Carolina internal waters by use of long haul seines or pound nets only and commercial flounder trawl and flynet operations are allowed to land a tolerance of no more than 100 undersized (less than 12 in TL) weakfish per day or trip, whichever is longer and it is unlawful to sell undersized weakfish.

Commercial Landings

Commercial landings of weakfish peaked in 1980 at 20,343,952 lb. Landings have since steadily dropped and reached their lowest point in 2011 (65,897 lb; Table 1; Figure 3). Recent years have shown little increase, due to low abundance and commercial harvest restrictions. Total commercial landings for 2015 were 80,235 lb, a decrease of 24% from the previous year (Table

1). The number of trips commercial fisherman took in 2015 that landed weakfish also declined from 5,878 in 2014 to 4,476 in 2015. Addendum IV reduced commercial harvest to 100 lb per trip thus estimating a reduction of 61% from the 2005-2008 harvest levels.

Recreational Landings

Recreational landings have been variable since 1994 with a peak in 2004 at 244,023 lb. Landings since 2009 have decreased considerably due to the implementation of a 1-fish bag limit in November 2009 as part of the harvest reductions from Addendum IV, which was estimated to reduce recreational harvest by 53% for North Carolina. Average landings since 2010 are 35,669 lb and have varied from a high of 46,081 in 2012 to a low of 17,621 in 2011 (Table 1). Landings in 2015 exceeded the average at 50,903 lb with the highest number of estimated releases in the last 10-year period at 520,782 fish (Table 1).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Commercial fish houses are sampled on a monthly basis to provide length, weight, and age data to describe the commercial fisheries. The number of weakfish samples has declined in the last 10 years following a similar trend to the commercial landings (Tables 1 & 2; Figure 3). Samples are collected from the ocean fisheries as well as the estuarine fisheries. The ocean sink net fishery and estuarine gill net fishery dominate the catches of weakfish accounting for 93% of the overall commercial catch. The pound net fishery and the historically dominant long haul seine fishery account for about 5% of the remaining commercial harvest with various gears including trawls, crab pots, and rod-n-reels making up the rest. Minimum and average lengths of fish harvested in the commercial fishery have remained consistent over the last 10 years with a slight increase in average length after 2009 with the implementation of a 12-in minimum size limit (Table 2).

Fishery-Independent Monitoring

Fishery independent data are collected through both the Program 195 Pamlico Sound Survey and Program 915 Independent Gill Net Survey. The Program 195 survey provides an age-0 index calculated from the September stations and an age-1+ index calculated from the June stations. Both Program 195 indices have been used in the ASMFC stock assessments and show a variable trend over the years (Figures 4 & 5). Program 915 collects information in the Pamlico Sound, Pamlico, Pungo, and Neuse rivers, and the Cape Fear and New rivers. The Pamlico Sound portion is used in the ASMFC stock assessment and has shown a declining trend since 2006 (Figure 6). The Pamlico, Pungo, and Neuse rivers survey is not used in the assessment as there are minimal catches of weakfish. The Cape Fear and New rivers survey has not been used to date as the survey only dates back to 2008 and does not provide a sufficient time series to evaluate trends in the fishery.

Age samples are collected through both dependent and independent sampling. Age samples are collected from all gears possible and during all months. Target sample numbers are set on a monthly basis and the number of samples collected has ranged from 263 to 1,695. Ages have ranged from 0 to 15 years with an average modal age of 2 years (Figure 7; Table 4).

MANAGEMENT STRATEGY

Addendum IV removes the existing F target and threshold and replaces the existing SSB threshold with percentage-based SSB reference points. The SSB target and threshold are SSB30% and SSB20%, respectively. These reference points represent a level of SSB that is either 30% or 20% of an unfished stock, and reflect the stock's spawning potential. To determine stock status, estimates of spawning stock biomass are divided by estimates of unfished spawning stock biomass, multiplied by 100 to be in the form of a percent, and then compared to the 30% target and 20% threshold. Figure 5 illustrates this approach. A spawning stock biomass reduced to less than 20% of an unfished stock equals an overfished or depleted stock (overfished when fishing mortality is the primary cause of the biomass decline, and depleted when causes other than fishing mortality have resulted in the biomass decline). Under this definition, weakfish are currently considered depleted. As a consequence of this modification to the management plan, the F target and threshold triggers in Amendment 4, and part of the Stock Rebuilding Program are no longer applicable; however, the spawning stock biomass threshold trigger remains relevant and in effect.

MANAGEMENT AND RESEARCH NEEDS

Biological

High

- Collect catch and effort data including size and age composition of the catch, determine stock mortality throughout the range, and define gear characteristics. In particular, increase length-frequency sampling in fisheries from Maryland north.
- Derive estimates of discard mortality rates and the magnitude of discards for all commercial gear types from both directed and non-directed fisheries. In particular, quantify trawl bycatch, refine estimates of mortality for below minimum size fish, and focus on factors such as distance from shore and geographical differences.
- Conduct an age validation study.
- Identify stocks and determine coastal movements and the extent of stock mixing, including characterization of stocks in over-wintering grounds (e.g., tagging).
- Conduct spatial and temporal analysis of the fishery independent survey data. The analysis should assess the impact of the variability of the surveys in regards to gear, time of year, and geographic coverage on their (survey) use as stock indicators.
- Analyze the spawner recruit relationship and examine the relationships between parental stock size and environmental factors on year-class strength.

Medium

- Biological studies should be conducted to better understand migratory aspects and how this relates to observed trends in weight at age. Test for individual growth difference and the geospatial pattern, as well as the geospatial pattern of the catch rate surveys.
- Define reproductive biology of weakfish, including size at sexual maturity, maturity
- schedules, fecundity, and spawning periodicity. Continue research on female spawning patterns: what is the seasonal and geographical extent of "batch" spawning; do females exhibit spawning site fidelity?
- Continue studies on mesh-size selectivity, particularly for trawl fisheries.
- Continue studies on recreational hook-and-release mortality rates, including factors such as depth, warmer water temperatures, and fish size in the analysis. Studies are needed in deep

and warm water conditions. Further consideration of release mortality in both the recreational and commercial fisheries is needed, and methods investigated to improve survival among released fish.

Low

- Develop a coastwide tagging database.

Social/Economic

- Assemble socio-demographic-economic data as it becomes available from ACCSP.
- Detailed information on production activities (e.g., fishing effort and labor used by gear, vessel characteristics, areas fished, etc.) and costs and earnings for the harvesting and processing sectors.
- Information on retail sales and demand for weakfish in order to estimate the demand and economic benefits of at-home and away-from home consumption of weakfish.
- Development of bio-economic models that link the underlying population dynamics to the economic aspects of the commercial and recreational fisheries.
- Distribution of weakfish to the various markets and across states.
- Information on the margins of various stages of processing and marketing also need to be obtained; this information is necessary to construct mathematical models that can be used to estimate the economic impacts of management and regulation.
- A directed data collection program for weakfish including the same variables presently collected by NMFS in support of MRFSS and by the economic add-on. Data collected includes information on travel distance, mode of angling, expenditures, area fished, catch on previous trips, and other information.
- Development of commercial decision-making or behavioral models to explain how fishers might respond to various regulations.
- Estimation and assessment of consumer (net economic benefits to consumers) and producer (net economic benefits or profits to producers) surplus; the sum of consumer and producer surplus is a measure of the net economic value to society of a good or service.
- Development of input/output models for all states having commercial weakfish activity, or alternatively, full-blown economic impact models, which might consist of input/output models or General Equilibrium models.
- Determination of the economic value derived from recreational angling including the economic value of a catch and release fishery

Habitat

- Conduct hydrophonic studies to delineate weakfish spawning habitat locations and environmental preferences (temperature, depth, substrate, etc.) and enable quantification of spawning habitat.
- Compile existing data on larval and juvenile distribution from existing databases in order to obtain preliminary indications of spawning and nursery habitat location and extent.
- Document the impact of power plants and other water intakes on larval, post larval and juvenile weakfish mortality in spawning and nursery areas, and calculate the resulting impacts on adult stock size.
- Define restrictions necessary for implementation of projects in spawning and over-wintering areas and develop policies on limiting development projects seasonally or spatially.

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TABLES

Table 1. Recreational harvest (number of fish released and weight) and releases (number of fish) and commercial harvest (weight in pounds) and value (USD) of weakfish from North Carolina for the time period 2006-2015.

	Recreational			Commercial		
	Number of fish		Weight (lb)			
Year	Released	Harvested	Harvested	Harvested (lb)	Value	Total Weight Harvested (lb)
2006	395,893	151,502	143,525	363,078	$310,697	506,603
2007	226,601	94,398	111,754	175,589	$149,202	287,343
2008	195,776	108,389	114,192	162,516	$142,545	276,708
2009	220,121	68,553	89,652	163,146	$163,210	252,798
2010	225,246	41,598	38,721	106,328	$105,293	145,049
2011	111,574	13,464	17,621	65,897	$ 78,522	83,518
2012	173,843	40,299	46,081	91,383	$111,461	137,464
2013	111,524	33,851	34,731	120,188	$150,725	154,919
2014	281,335	26,308	25,961	105,115	$140,430	131,076
2015	520,782	39,842	50,903	80,235	$114,942	123,376

Table 2. Mean, minimum, and maximum lengths (total length, mm) of weakfish sampled from the commercial and recreational fisheries from North for the time period 2006-2015.

	Commercial				Recreational			
Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	324	142	826	8,657	352	249	510	240
2007	324	121	662	4,569	369	267	525	76
2008	322	127	668	3,185	355	297	519	145
2009	333	160	857	2,631	383	247	555	132
2010	322	130	880	2,074	345	235	440	96
2011	333	97	637	1,701	375	294	780	41
2012	350	127	591	2,623	367	259	529	81
2013	360	202	718	3,323	356	192	580	74
2014	358	127	620	3,322	352	277	515	71
2015	356	137	704	2,371	373	311	482	34

Table 3. Total number of awarded citations for weakfish (>24-in total length for release or > 5lb landed) from the North Carolina Saltwater Fishing Tournament for the time period 2006-2015.

Year	Total Citations*	Release Citations+	% Release+
2006	1	-	-
2007	2	-	-
2008	4	0	0
2009	3	0	0
2010	1	0	0
2011	1	0	0
2012	2	1	50
2013	4	0	0
2014	3	0	0
2015	2	0	0

*Minimum qualifying weight increased from 4 lb to 5 lb in 2008
+Release citations were not offered prior to 2008

Table 4. Modal age, minimum age, maximum age, and number aged for weakfish collected through NCDMF sampling programs from 1988 through 2014.

Year	Modal Age	Min Age	Max Age	Number Aged
1988	2	0	6	419
1989	2	0	7	356
1990	2	1	11	272
1991	2	0	5	481
1992	2	0	6	597
1993	2	0	6	710
1994	2	0	7	689
1995	3	0	6	1,408
1996	4	0	6	1,695
1997	3	0	7	1,101
1998	3	0	7	703
1999	3	0	8	659
2000	1	0	9	616
2001	2	0	10	630
2002	3	0	10	512
2003	4	0	8	491
2004	2	0	11	589
2005	2	0	12	561
2006	3	0	7	752
2007	2	0	6	560
2008	1	0	5	480
2009	1	0	15	263
2010	2	0	5	507
2011	2	0	4	378
2012	3	0	4	497
2013	2	0	5	546
2014	1	0	4	508
2015	2	0	4	326

FIGURES

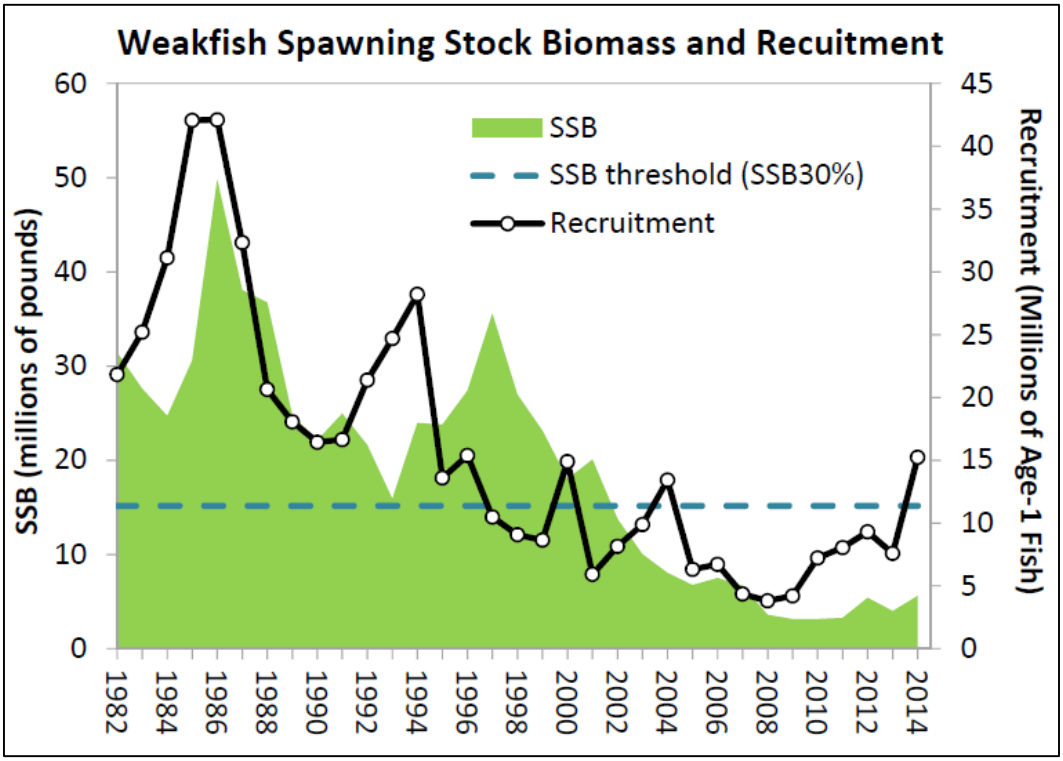


Figure 1. Spawning stock biomass (SSB) and recruitment of age-1 weakfish estimated for the time series 1982 to 2014. Dashed line represents the 30% spawning stock biomass (SSB) threshold of 15.17 million lb.

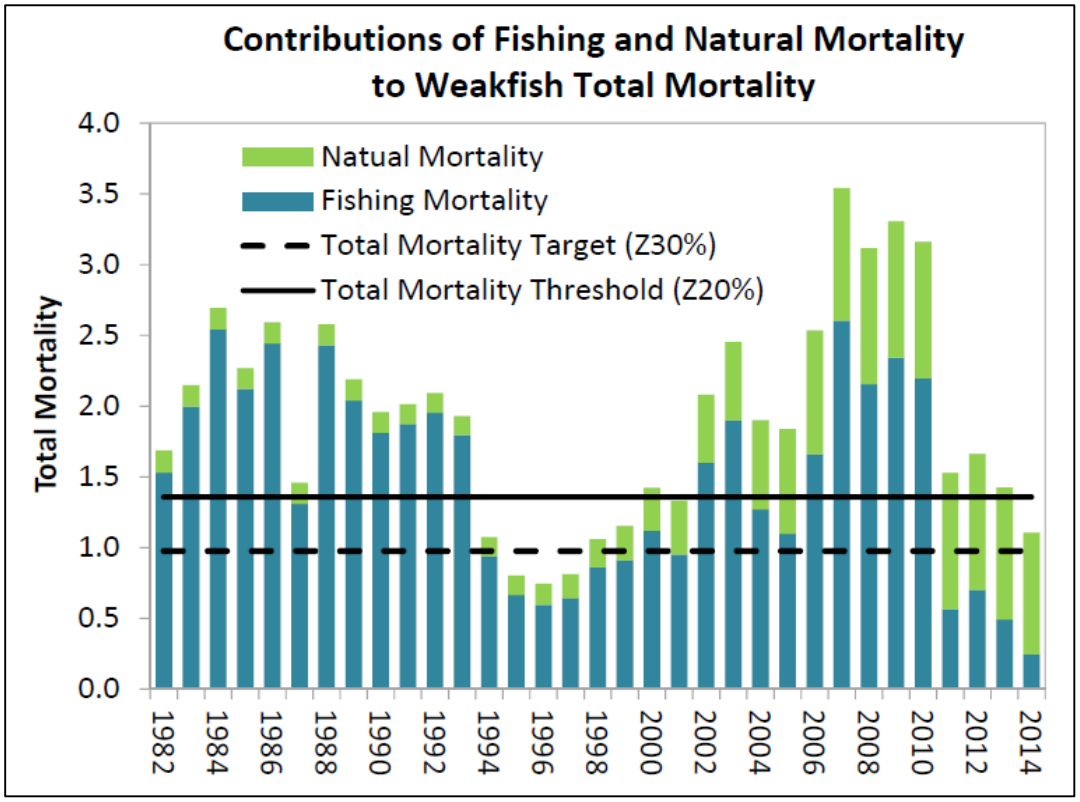


Figure 2. Natural mortality (M) and fishing mortality (F) estimated for the time series 1982 to 2014. Solid and dashed lines represent total mortality targets (Z30% = 0.93) and thresholds (Z20% = 1.36) used to determine if the stock is being overfished.

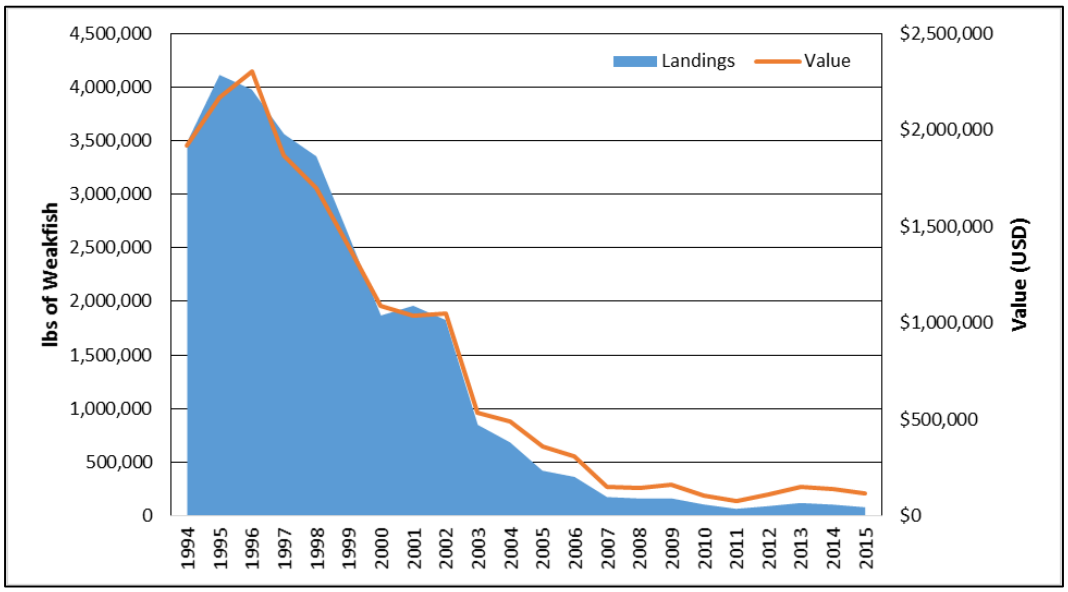


Figure 3. Commercial landings of weakfish (all gears combined) and total dockside value (USD) collected through the North Carolina Trip Ticket Program for the time period 1994-2015.

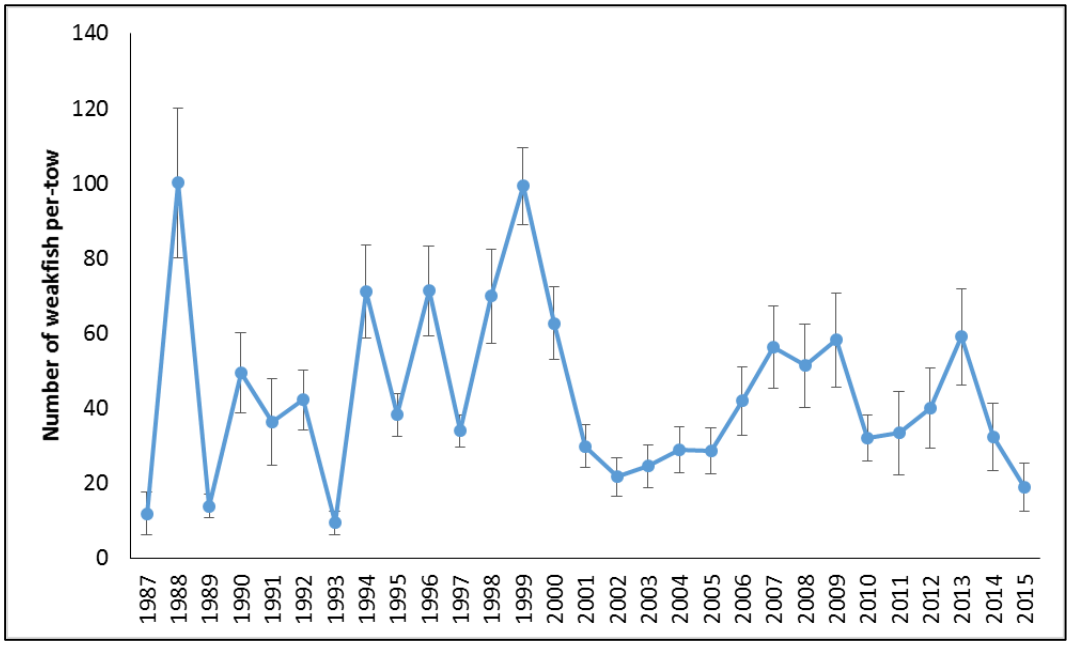


Figure 4. Catch Per Unit Effort (fish per tow) from the Pamlico Sound Survey (Program 195) of Age 0 weakfish collected during September with a total length less than 200 mm from 1987 through 2015. Error bars represent ± one standard error (SE).

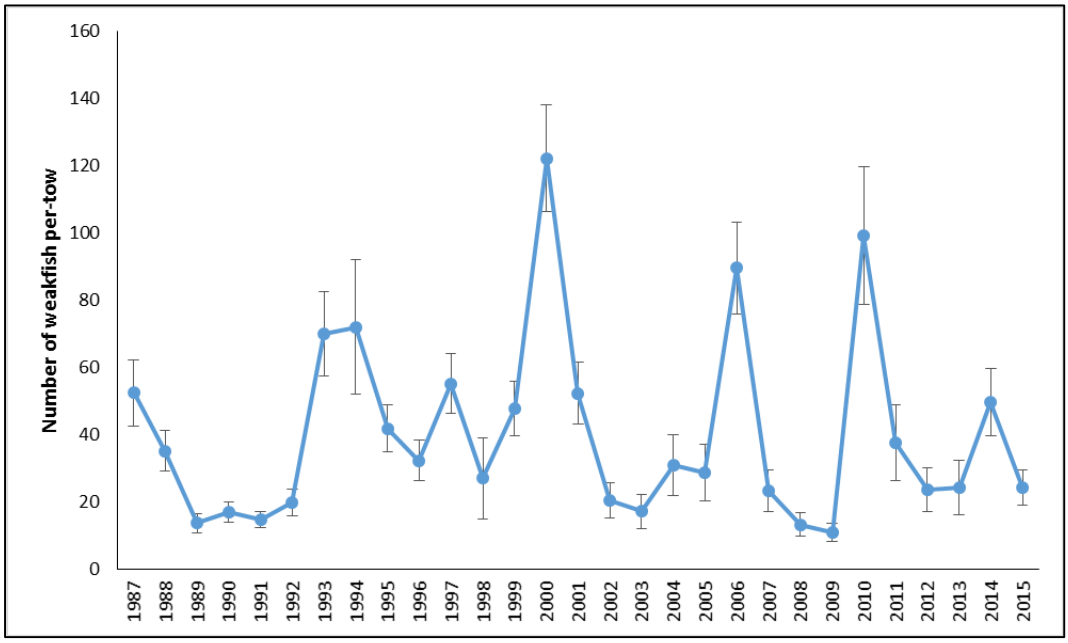


Figure 5. Catch Per Unit Effort (fish per tow) from the Pamlico Sound Survey (Program 195) of Age 1+ weakfish collected during September with a total length greater than 140 mm from 1987 through 2015. Error bars represent ± one standard error (SE).

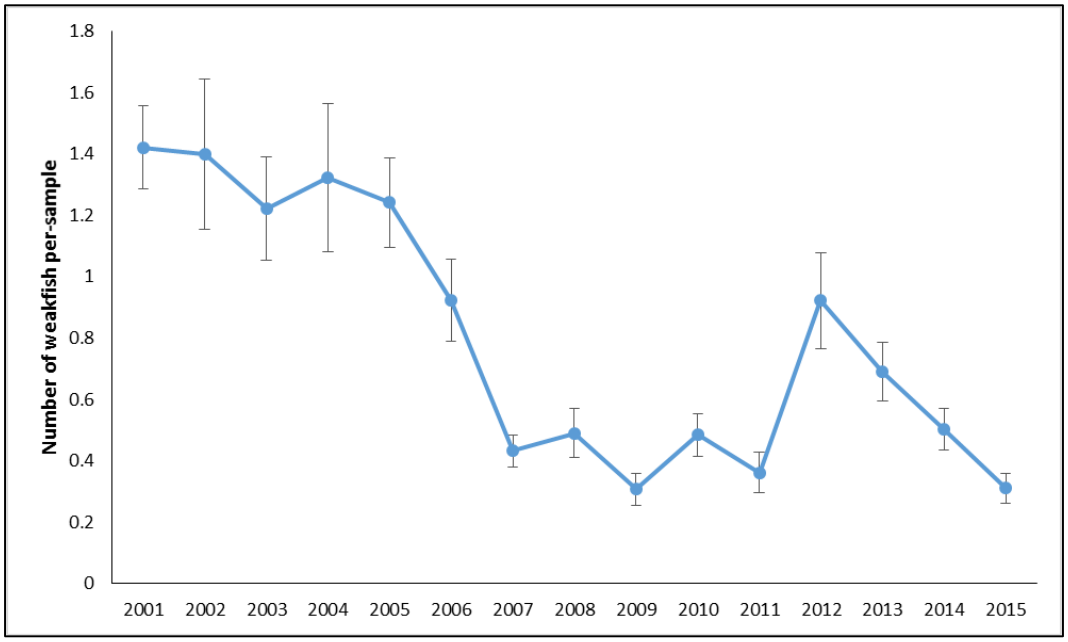


Figure 6. Catch Per Unit Effort (fish per sample) from the Pamlico Sound portion of the Independent Gill Net Survey (Program 915) from 2001 through 2015. Error bars represent ± one standard error (SE).

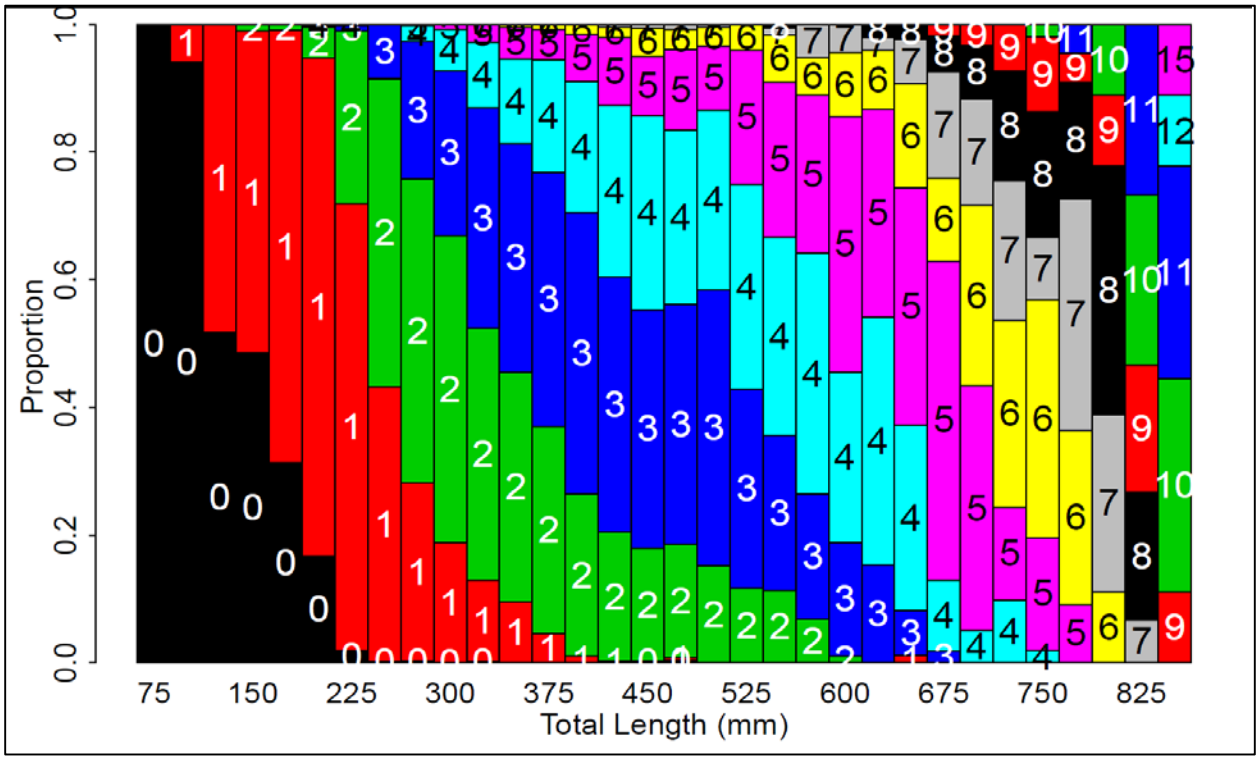


Figure 7. Proportion of ages by size class (25mm size bins) of all weakfish aged by NCDMF since 1988.

FISHERY MANAGEMENT PLAN UPDATE
AMERICAN EEL
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 1999 Addendum I (February 2006) Addendum II (October 2008) Addendum III (August 2013) Addendum IV (October 2014)
Amendments:	None
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	A benchmark stock assessment was completed in May 2012; the next benchmark review would be at a minimum 5 years from the 2012 benchmark (2017). In May 2016, the American eel Technical Committee (TC) and Stock Assessment Subcommittee (SAS) determined that there are not enough new data sets or program developments since the last benchmark assessment and therefore recommend doing an update in 2017 and continuing to make progress on the research recommendations to support a benchmark stock assessment in the future.

American eel is included in the N.C. Interjurisdictional Fisheries Management Plan (FMP), which defers to Atlantic States Marine Fisheries Commission (ASMFC) Interstate FMP for American Eel. The initial FMP was approved in 1999, reviewed and updated in 2006 and 2008. In May 2012, the benchmark American eel stock assessment was completed and accepted for use in management. In 2013 and again in 2014, the FMP was reviewed and updated. The FMP implements management measures to protect and enhance the abundance of American eel, while allowing commercial and recreational fisheries to continue. Addendum I, approved November 2006, required states to establish a mandatory trip-level catch and effort monitoring program, including the documentation of the amount of gear fished and soak time (ASMFC 2006). Addendum II, approved in October 2008, maintained status quo on state management measures and placed increased emphasis on improving the upstream and downstream passage of American eel (ASMFC 2008). In August 2013, Addendum III to the ASMFC Interstate FMP for American Eel was approved for management. This addendum predominately focused on commercial yellow eel and recreational fishery management measures. Addendum III implemented new size and possession limits as well as new pot mesh

size requirements and seasonal gear closures (Table 1). Following approval of Addendum III, the ASMFC American eel Management Board initiated the development of Addendum IV, which was approved and adopted in October 2014. This addendum addressed concerns and issues in the commercial glass and silver eel fisheries, domestic eel aquaculture, and established a coast-wide catch cap that set up an automatic implementation of a state-by-state commercial yellow eel quota if the catch cap is exceeded. As the second phase of management in response to the 2012 stock assessment, the goal of Addendum IV is to continue to reduce overall mortality and increase overall conservation of American eel stocks. Information about abundance and status at all life stages, as well as habitat requirements, is very limited. The life history of the species, such as late age of maturity and a tendency for certain life stages to aggregate, can make this species particularly vulnerable to overharvest.

Management Unit

The American eel is managed as a coast wide stock under the ASMFC Interstate FMP for American Eel (ASMFC 2000). The American eel's range extends beyond U.S. borders and more specifically ASMFC member states territorial waters. However, the management unit is limited to ASMFC member states territorial waters.

Goal and Objectives

The goal of the ASMFC American Eel FMP is to protect and enhance the abundance of American eel in inland and territorial waters of the Atlantic states and jurisdictions, and contribute to the viability of the American eel spawning population; and provide for sustainable commercial, subsistence, and recreational fisheries by preventing over-harvest of any eel life stage. The following objectives will be used to achieve this goal:

1. Improve knowledge of eel utilization at all life stages through mandatory reporting of harvest and effort by commercial fishers and dealers, and enhanced recreational fisheries monitoring.

2. Increase understanding of factors affecting eel population dynamics and life history through increased research and monitoring.

3. Protect and enhance American eel abundance in all watersheds where eel now occur.

4. Where practical, restore American eel to those waters where they had historical abundance but may now be absent by providing access to inland waters for glass eel, elvers, and yellow eel and adequate escapement to the ocean for pre-spawning adult eel.

5. Investigate the abundance level of eel at the various life stages necessary to provide adequate forage for natural predators and support ecosystem health and food chain structure.

STATUS OF THE STOCK

Stock Status

The 2012 ASMFC benchmark stock assessment found the stock status of the American eel population to be depleted in U.S. waters. Although no determination of overfishing could be

made, the assessment found the stock is at or near historically low levels due to a combination of historical overfishing, habitat loss and alteration, productivity and food web alterations, predation, turbine mortality, changing climatic and oceanic conditions, toxins and contaminants, and disease (ASMFC 2013).

In 2010, the Center for Environmental Science, Accuracy, and Reliability petitioned the US Fish and Wildlife Service (USFWS) to list American eel under the Endangered Species Act (ESA). In September 2011, USFWS concluded the petition may be warranted and initiated a status review to assess the health of the population and the magnitude of threats facing the species. In October 2015, After examining the best scientific and commercial information available, the Service determined the American eel population is stable and not in danger of extinction (endangered) or likely to become endangered within the foreseeable future (threatened).

Stock Assessment

A depletion-based stock reduction analysis (DB-SRA) was conducted by the Stock Assessment Subcommittee; results suggested overfishing has been occurring since the 1980s. However, while it is highly likely the American eel stock is depleted; the overfishing and overfished status in relation to the biomass and fishing mortality reference points cannot be stated with confidence.

STATUS OF THE FISHERY

Current Regulations

New management measures for yellow eels went into effect on January 1, 2014 under North Carolina Marine Fisheries Commission (NCMFC) Rule 15A NCAC 03M .0510. These measures included a 9-in total length (TL) minimum size limit for both the commercial and recreational fisheries, a new bag limit for the recreational fishery (25 eels / person / day), and crew members involved in for-hire employment are allowed to maintain the current 50 eels / day bag limit for bait purposes. The rule also made the possession of American eels illegal from September1 through December 31 except when taken by baited pots. NCMFC Rule 15A NCAC 03J .0301 established a ½ by ½ in minimum mesh requirement for the commercial eel pot fishery. Eel pots with an escape panel consisting of a 1 by ½ in mesh are allowed until January 1, 2017.

Commercial Landings

The average commercial landings and value over a ten-year period (2006 – 2015) was 56,153 lb / $138,454, in 2015 the commercial landings and value was 57,791 lb / $142,826. Commercial American eel landings have fluctuated over the years; in 1979 and 1980 over 900,000 lb of eels were landed, however, since the late 1980's American eel landings have averaged less than 100,000 lb (Figure 1).

Recreational Landings

There are no recreational landings data available for American eels, which are not typically a targeted species. Due to the fact that eels are caught incidentally in the estuarine environment by recreational fishermen by hook and line, the Marine Recreational Information Program (MRIP) does not provide reliable harvest data. Also, the survey design of MRIP does not provide information on the recreational harvest of American eel in inland waters. North Carolina

does not require a permit or mandatory reporting for recreational fishermen that catch American eels.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Not Available

Fishery-Independent Monitoring

Currently, the National Oceanic and Atmospheric Administration (NOAA) conducts the Beaufort Bridgenet Ichthyoplankton Sampling Program (BBISP), a year round ichthyoplankton survey at Beaufort Inlet, which is used to develop a North Carolina young-of-year relative abundance index for American eel. Because the BBISP is a generally unfunded program, a backlog of unsorted larval fish samples had arisen, and larval fish data were only available from 1985-2010. A N.C Coastal Recreational Fishing License (CRFL) grant was used to process the backlog, and the resulting data were incorporated into the recently revised and error-checked BBISP database, furthering the BBISP time series to 1985-2013. BBISP sampling continues to occur, and additional funds will be sought to process the newly generated backlog of post-2013 samples so the most up-to-date data are available for use by resource managers.

MANAGEMENT STRATEGY

The commercial yellow eel fishery is regulated through an annual coast wide catch cap set at 907,671 lb (1998 – 2010 harvest level; ASMFC 2014). Contained within Addendum IV are two management triggers (see below), which, if either trigger is exceeded, there would be automatic implementation of a state-by-state commercial yellow eel quota. The annual coast wide quota is set at 907,669 lb, with allocations to each state. North Carolina would receive an 11.8% allocation (107,054 lbs.).

Management Triggers

1. The coastwide catch cap is exceeded by more than 10% in a given year (998,438 lbs.)

2. The coastwide catch cap is exceeded for two consecutive years, regardless of percent over.

MANAGEMENT AND RESEARCH NEEDS

At this time there are no critical data or management needs from North Carolina Division of Marine Fisheries or the ASMFC. Table 2 identifies research needs as identified in Addendum III to the American Eel FMP and lists progress made towards accomplishing those objectives.

LITERATURE CITED

ASMFC. 2000. Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Arlington, VA. 93 pp.

ASMFC. 2006. Atlantic States Marine Fisheries Commission Addendum I to the Interstate Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Arlington, VA. 8 pp.

ASMFC. 2008. Atlantic States Marine Fisheries Commission Addendum II to the Interstate Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Arlington, VA. 8 pp.

ASMFC. 2013. Atlantic States Marine Fisheries Commission Addendum III to the Interstate Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Arlington, VA. 22 pp.

ASMFC. 2014. Atlantic States Marine Fisheries Commission Addendum IV to the Interstate Fishery Management Plan for American Eel. Atlantic States Marine Fisheries Commission. Arlington, VA. 26 pp.

TABLES

Table 1. Summary of management strategies and outcomes from Addendum IV and previous Addendums.

Issue	Management Strategy	Objectives	Outcome
Maintain commercial harvest level	Establish a Coastwide cap (907,671lbs.)	3	Accomplished with Addendum IV
Increased protection for small yellow eels	Nine (9) in minimum size limit for both commercial and recreational fisheries.	3	Accomplished by N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0510
	Minimum eel pot mesh size of one-half by one-half in.	3	Accomplished by N.C. Marine Fisheries Commission Rule 15A NCAC 03J .0301
Reduce the recreational harvest	Recreational possession limit of 25 eels / person / day.	3	Accomplished by N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0510
Protect out-migrating silver eels	No possession of American eels from September 1 to December 31 unless they are taken with baited pots	3	Accomplished by N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0510
Collect commercial catch and effort information	Mandatory trip level reporting by life stage, including number of units fished and unit soak time.	1, 2, 5	Accomplished by N.C.G.S. 113-170.3 and the American eel log book reporting program where fishermen are notified by letter of the monthly reporting requirement

Table 2. Summary of research needs and outcomes from Addendum IV and monitoring requirements from previous plans Addendums.

Management Strategy	Objectives	Outcome
Mandatory trip level reporting by life stage, including number or units fished and unit soak time	1, 2	Ongoing through the American eel Logbook Reporting Program
Mandatory young-of-year survey in two river systems over a six week period	1, 2	In 2009, funding was cut for the NCDMF YOY survey; however, the NOAA BBISP is currently used for the YOY survey, as approved by the ASMFC American Eel Management Board
Mandatory cross-referencing between dealer and fishery reported harvest	1	Ongoing through the NC Trip Ticket Program and the American Eel Logbook Reporting Program
Development of quantifiable eel habitat enhancement goals through the creation of a coast-wide eel habitat GIS database. The goal of the database would be the generation of coast-wide, regional, state, and watershed maps that would quantify the amount of available habitat relative to historical habitat and identify major barriers to eel migration. This information would allow the ASMFC to prioritize eel habitat enhancement programs at coast-wide, regional, and state scales. Efforts should be coordinated with existing GIS efforts already underway in Canada (see: http://www.dfompo.gc.ca/Library/345546.pdf). Potential funding and coordination with the Atlantic Fish Habitat Partnership should be considered. This project is considered a high priority item and should be completed either prior to the start of the next benchmark stock assessment or in conjunction with the stock assessment	2, 3, 4	No Action
Work with other appropriate ASMFC committees to develop materials to support states of jurisdictions interested in making recommendations to the Federal Energy Regulatory Commission (FERC) for upstream and downstream fish passage provisions for American eels in the hydropower licensing and relicensing process.	3, 4	No Action
Work with states and jurisdictions to develop a list of non-FERC licensed dams and other impoundments which impact eel movements and migration. The Nature	2, 3, 4	No Action

Management Strategy	Objectives	Outcome
Conservancy recently completed an online, interactive inventory of dams from Maine to Virginia (see: The Northeast Aquatic Connectivity and Assessment of Dams) which could be adapted to meet this goal. An evaluation should be conducted on each general type of impoundment to assess the potential for eel passage without assistance (i.e. no eel passage constructed) or determine what type of eel passage for each type of impoundment would be most beneficial for all, or specific, life stages. The recommendations from the workshop proceedings (in preparation) from the ASMFC American Eel Passage Workshop held in Gloucester, MA, (March 2011) should be a useful document to assist in the completion of this task.		
Develop a timeline and target for 1) the amount of habitat to open up through creation of fish passage or dam removal, where feasible and/or 2) the amount of habitat to enhance to increase survival for all, or specific, life stages.	2, 3, 4	No Action
Assess and provide recommendations related to other potential impacts caused by water supply and withdrawal operations, water diversions, and agricultural water use.	2, 3, 4	No Action
Increase coordination with the ASMFC Fish Passage, Habitat, and FERC Guidance Committees. The state marine fisheries agencies should also encourage increased communication and collaboration with their inland fisheries agencies counterparts where applicable. The Commission should also continue the development of a Memorandum of Understanding between the Great Lakes Fisheries Commission, U.S. Fish and Wildlife Service, and NOAA Fisheries in order to reduce mortality on eels throughout their range, as well as improving access to suitable habitat.	2, 3, 4	No Action
Collect biological information by life stage including length, weight, age, and sex of eels caught in fishery-independent sampling programs; at a minimum, length samples should be routinely collected from fishery-independent or fisheries-dependent surveys.	2, 4,	Collecting length of eels caught in independent sampling programs.
Implement surveys that directly target and measure abundance of yellow- and silver-stage American eels, especially in states where few targeted eel surveys are conducted.	2	No Action
Coast-wide sampling program for yellow and silver American eels should be developed using standardized and statistically robust methodologies.	1, 2	No Action
State marine agencies work with their state inland counterparts, where applicable, to standardize reporting of trip-level landings and effort data that occur in inland waters on diadromous populations of eels	1, 2	No Action

FIGURES

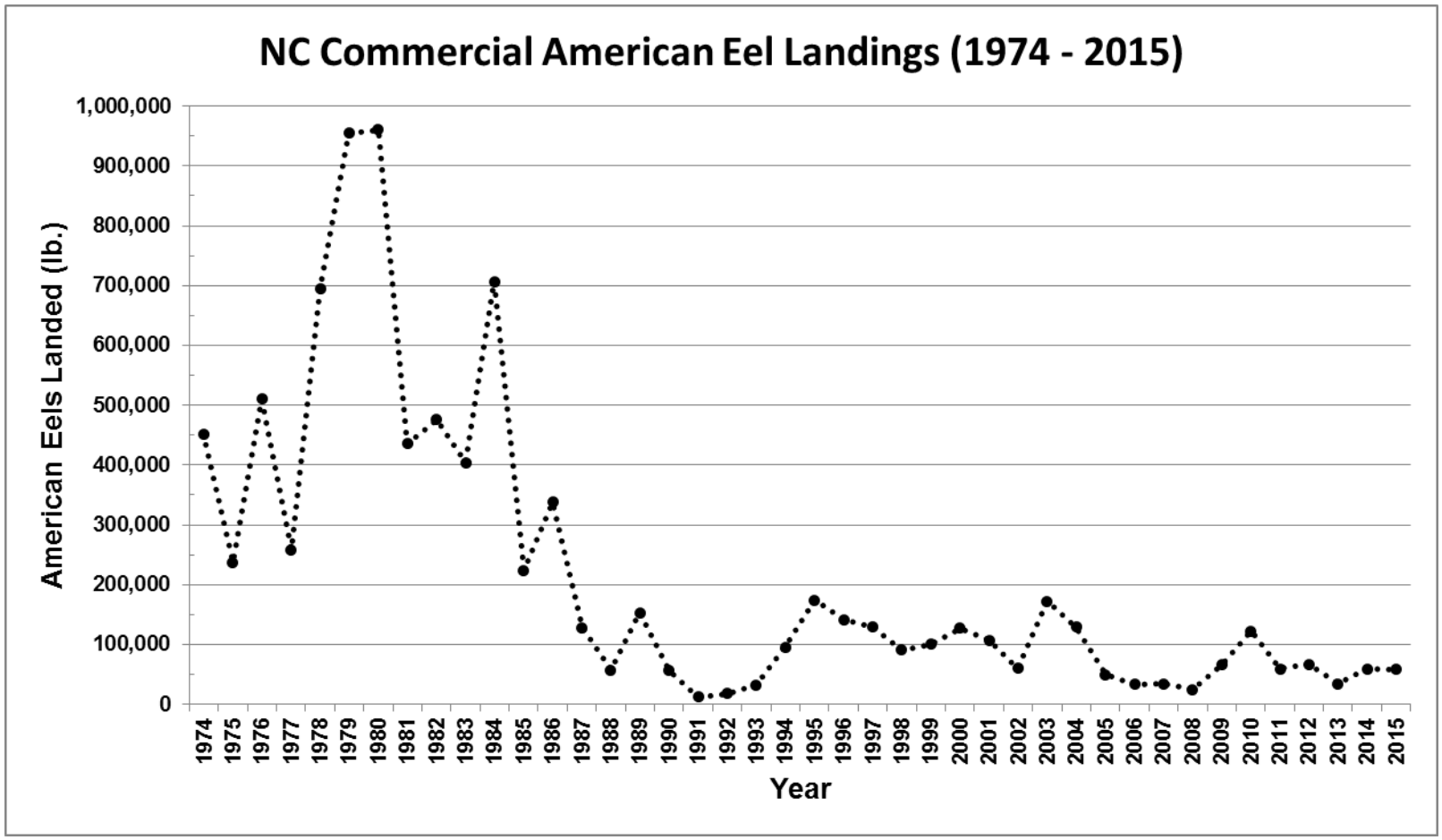


Figure 1. American eel landings in N.C. from 1974 to 2015.

FISHERY MANAGEMENT PLAN UPDATE
DOLPHIN
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	December 2003
Amendments:	Amendment 1 – July 2010 Amendment 2 – April 2012 Amendment 3 – In Progress Amendment 4 – In Progress Amendment 5 – July 2013 Amendment 6 – December 2013 Amendment 7 – December 2015 Amendment 8 – January 2016
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	None

The South Atlantic Fisheries Management Council (SAFMC), in cooperation with the Mid-Atlantic and New England Councils, developed a Dolphin/Wahoo Fishery Management Plan (FMP) for the Atlantic in 2004. While dolphin was not overfished, the Council adopted a precautionary and risk-averse approach to management for this fishery and to maintain status quo over the years 1993 through 1997. Amendment 1 (2010) provided spatial information of Council-designated Essential Fish Habitat and Essential Fish Habitat-Habitat Areas of Particular Concern relative to the dolphin wahoo fishery. Amendment 2 (2012) established ABCs, ACLs, AMs, and allocations for both commercial and recreational sectors; established ACTs for the recreational sector; prohibited bag limit sales of dolphin from "for-hire" vessels; and established a minimum size limit of 20" FL for South Carolina. Amendment 3 (in progress) requires federal dealer permits, and changes the method and frequency of reporting harvest. Amendment 4 (in progress) changes the method of reporting commercial harvest of dolphinfish. In 2013, Amendment 5 was approved and adopted by the SAMFC and was the most comprehensive amendment to the Dolphin/Wahoo FMP, in terms of management measures and process updates. Amendment 5 updated the annual catch limits (ACLs) and accountability measures (AM) for both sectors as well as the acceptable biological catch (ABC) values and ACT for the recreational fishery in an effort to achieve optimum yield (OY) of the stock. This amendment also sets up an abbreviated framework procedure whereby modifications to the ACLs, ACTs, and AMs can be implemented by National Marine Fisheries Service (NMFS) without a full FMP

supplement. Amendment 6 (2013) would modify the required logbook reporting for headboat vessels with dolphinfish landings. Amendment 7 (2015) allows for dolphin and wahoo fillets to enter the U.S. EEZ after lawful harvest in the Bahamas. Amendment 8 (2016) revises commercial and recreational sector allocations for dolphin in the Atlantic.

Management Unit

The management unit for dolphin encompasses all U.S. waters of the Atlantic in the 3 – 200 mile Exclusive Economic Zone (EEZ).

Goals and Objectives

1. Address localized reduction in fish abundance. The Councils remain concerned over the potential shift of effort by longline vessels to traditional recreational fishing grounds and the resulting reduction in local availability if commercial harvest intensifies.

2. Minimize market disruption. Commercial markets (mainly local) may be disrupted if large quantities of dolphin are landed from intense commercial harvest or unregulated catch and landing by charter or other components of the recreational sector.

3. Minimize conflict and/or competition between recreational and commercial user groups. If commercial longlining effort increases, either directing on dolphin and wahoo or targeting these species as a significant bycatch, conflict and/or competition may arise if effort shifts to areas traditionally used by recreational fishermen.

4. Optimize the social and economic benefits of the dolphin and wahoo fishery. Given the significant importance of dolphin and wahoo to the recreational sector throughout the range of these species and management unit, manage the resources to achieve optimum yield on a continuing basis.

5. Reduce bycatch of the dolphin fishery. Bycatch is a problem in the pelagic longline fishery for highly migratory species. Any increase in overall effort, and more specifically shifts of effort into nearer shore, non-traditional fishing grounds by swordfish and tuna vessels, may result in increased bycatch of non-target species. In addition, National Standard 9 requires that: “Conservation and management measures shall, to the extent practicable, (A) minimize bycatch and (B) to the extent bycatch cannot be avoided, minimize the mortality of such bycatch.” Therefore bycatch of the directed dolphin fishery must be addressed. Appendix C (FSEIS for HMS Regulatory Amendment 1) contains data on dolphin-wahoo pelagic longline fishery analysis. The data presented on page C-66 and in Table C-4 indicate that pelagic longlines targeting dolphin do in fact result in a bycatch of HMS species.

6. Direct research to evaluate the role of dolphin and wahoo as predator and prey in the pelagic ecosystem.

7. Direct research to enhance collection of biological, habitat, social, and economic data on dolphin and wahoo stocks and fisheries.

STATUS OF THE STOCK

Stock Status

A surplus production model was fit to abundance indices estimated from long line catches and total landings of the fisheries from years 1985 – 1997. It was concluded that the stock status, as of 1998, is above B_{MSY} and that the species is able to withstand a relatively high rate of exploitation.

Stock Assessment

No formal assessment has been conducted on dolphin in the Atlantic due to uncertainties in the extent of the North Atlantic stock and the jurisdictional cooperation necessary to characterize catch across the range of the species.

STATUS OF THE FISHERY

Current Regulations

There is a 10 fish/day bag limit with a 60 fish per boat/day trip limit (headboats excluded from daily trip limit) for recreationally harvested dolphin North Carolina. No trip limit exists for commercial harvest.

Commercial Landings

In 2015, the commercial dolphin fishery was closed in federal waters on June 30 after the annual catch limit was projected to be met. Amendment 8 increased the allocation for the commercial dolphin fishery to 10% of the total annual catch limit (ACL). Commercial landings have fluctuated over the last 10 years with a high of 610,932 lb valued at $1,028,309 in 2009 and a low of 94,210 lb valued at $244,752 in 2011 (Fig. 1). Over 75% of dolphin landings were harvested using surface longlines with the remainder of the harvests coming from the pelagic troll and greenstick fisheries.

Recreational Landings

Recreational landings of dolphin have declined over the last 10 years with a high of 4,960,343 lb in 2007 and a low of 1,388,209 lb in 2014 (Figure. 2). This trend is likely due to a decline in effort within the recreational fishery related to the economic downturn in 2008, and likely not due to affects related to over harvest (Figure. 3), as recreational landings increased to 3,157,964 lb in 2015.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Fishery dependent length-frequency information for the commercial dolphin fishery in North Carolina is collected by port agents through the trip ticket program, specifically programs 438 and 439. Size trends in landed fish appear to correspond with varying levels of commercial

harvest (Table 1; Figure. 1). There was a drastic increase in the number of fish sampled in 2015 (6381 fish).

Fishery-Independent Monitoring

Currently, the division does not have any fishery-independent sampling programs that target or catch dolphin in great numbers.

MANAGEMENT STRATEGY

Dolphin is currently included in the North Carolina Interjurisdictional Fishery Management Plan, which defers to South Atlantic Fishery Management Council Fishery Management Plan compliance requirements. The South Atlantic Fishery Management Council approved a Fishery Management Plan for dolphin in 2004 and is currently managed under recent Amendment 8 (2016). Amendment 8 revises commercial and recreational sector allocations for dolphin in the Atlantic.
(2014). Current regulations for dolphin are as follows:

15A NCAC 03M .0515 DOLPHIN

(a) It is unlawful to possess more than 10 dolphin per person per day taken by hook and line for recreational purposes.

(b) It is unlawful to possess more than 60 dolphin per day per vessel regardless of the number of people on board, except headboat vessels with a valid U.S. Coast Guard Certificate of Inspection may possess 10 dolphin per paying customer.

(c) It is unlawful to take or possess more than 10 dolphin per person per day, or sell dolphin without a valid Federal Commercial Dolphin/Wahoo vessel permit and either a Standard Commercial Fishing License, a Retired Standard Commercial Fishing License, or a Land or Sell License.

MANAGEMENT AND RESEARCH NEEDS

Prioritized EFH Research Needs for Dolphin and Wahoo

1. What is the areal and seasonal abundance of pelagic *Sargassum* off the southeast U.S.?
2. Develop methodologies to assess remotely assess *Sargassum* using aerial or satellite technologies (e.g., Synthetic Aperture Radar)
4. What is the relative importance of pelagic *Sargassum* weedlines and oceanic fronts for early life stages of dolphin and wahoo?
5. Are there differences in abundance, growth rate, and mortality?
6. What is the age structure of all fishes that utilize pelagic *Sargassum* habitat as a nursery and how does it compare to the age structure of recruits to pelagic and benthic habitats?
7. Is pelagic *Sargassum* mariculture feasible?
8. Determine the species composition and age structure of species associated with pelagic *Sargassum* when it occurs deeper in the water column?
9. Additional research on the dependencies of pelagic *Sargassum* productivity on the marine species using it as habitat.
10. Quantify the contribution of nutrients to deepwater benthic habitat by pelagic *Sargassum*.
11. Studies should be performed on the abundance, seasonality, life cycle, and reproductive strategies of Sargassum and the role this species plays in the marine environment, not only as an essential fish habitat, but as a unique pelagic algae.

12. Research to determine impacts on the *Sargassum* community, as well as the individual species of this community that are associated with, and/or dependent on, pelagic *Sargassum*. Human induced (tanker oil discharge; trash) and natural threats (storm events) to *Sargassum* need to be researched for the purpose of protecting and conserving this natural resource.
13. Develop cooperative research partnerships between the Council, NMFS Protected Resources Division, and state agencies since many of the needs to a) research pelagic *Sargassum*, and b) protect and conserve pelagic *Sargassum* habitat, are the same for both managed fish species and listed sea turtles.
14. Direct specific research to further address the association between pelagic *Sargassum* habitat and post-hatchling sea turtles

Prioritized Biological Research Needs for Dolphin and Wahoo.

1. In the short-term effort should be directed at examining all existing seasonality (effort and landings), mean size, and life history data for dolphin from the northern area.
2. Additional data are needed to develop and/or improve estimates of growth, fecundity, etc. Research in this area is encouraged.
3. There are limited social and economic data available. Additional data need to be obtained and evaluated to better understand the implications of fishery management options.
4. Trophic data should be considered in support of an ecosystem management approach.
5. Essential fish habitats for dolphin and wahoo need to be identified.
6. An overall design should be developed for future tagging work. This could be done by the Working Group. In addition, existing tagging databases should be examined.
7. Long-term work should continue and expand on current research investigating genetic variability of dolphin populations in the western central Atlantic.
8. Observer programs should place observers on longline trips directed on dolphin. Catch and bycatch characterization, condition released (alive or dead), etc. should be collected. Observers could also be used to collect bioprofile data (size, sex, hard parts for aging, etc.).
9. High levels of uncertainty in inter-annual variation in abundance of dolphin should be investigated through an examination of oceanographic and other environmental factors.
10. Release mortality should be investigated as a part of the evaluation of the effectiveness of current minimum size limits in the dolphin fishery.
11. Establish a list serve for dolphin and wahoo which would facilitate research and the exchange of information.

LITERATURE CITED

SAFMC 2003. Fishery management plan for the dolphin and wahoo fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 308 pp.

SAFMC 2003. Amendment 5 to the fishery management plan for the dolphin and wahoo fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 106 pp.

TABLES

Table 1. Mean, minimum and maximum fork lengths (mm) and total number sampled of dolphin from commercial fish house sampling.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	707	426	1342	172
2007	758	348	1097	228
2008	665	413	1135	231
2009	815	140	1295	555
2010	628	345	1115	451
2011	665	410	1120	269
2012	756	430	1245	579
2013	700	478	1440	176
2014	788	390	1352	339
2015	821	497	1360	80

FIGURES

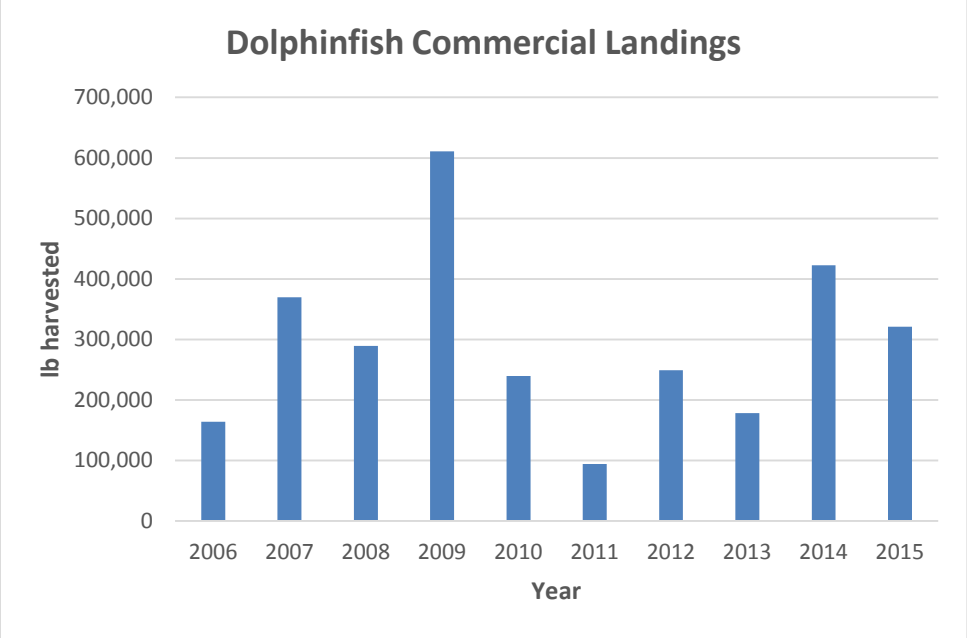


Figure 1. Commercial landings (lb) of dolphin from 2006-2015.

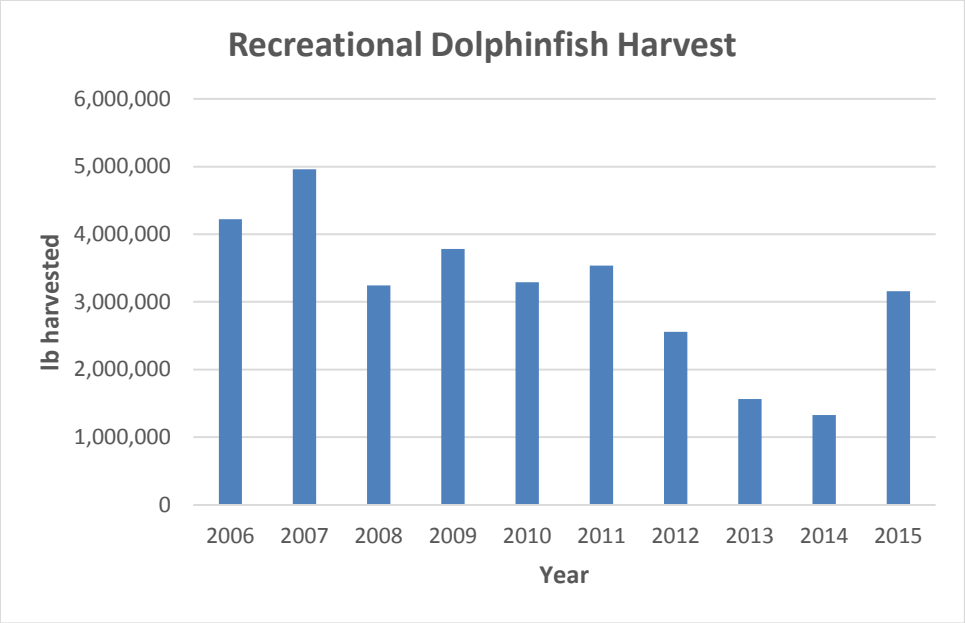


Figure 2. Recreational landings (lb) of dolphin from 2006-2015.

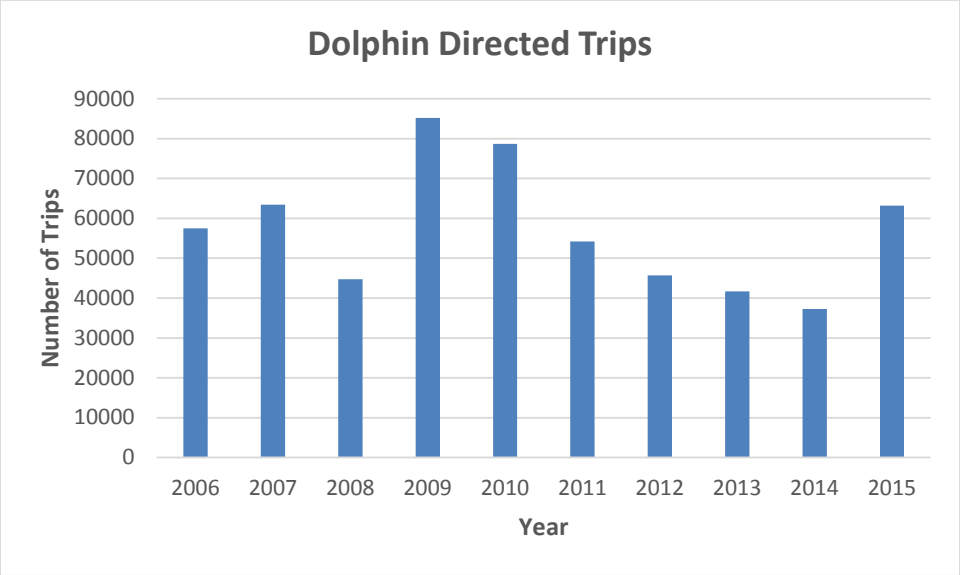


Figure 3. Number of directed recreational trips for dolphin by year.

FISHERY MANAGEMENT PLAN UPDATE
KING MACKEREL
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	February 1983
Amendments:	Amendment 1 – September 1985 Amendment 3 – August 1989 Amendment 5 – August 1990 Amendment 6 – November 1992 Amendment 7 – November 1994 Amendment 8 – March 1998 Amendment 9 – April 2000 Amendment 10 – June 1999 Amendment 11 – December 1999 Amendment 12 – October 2000 Amendment 13 – August 1992 Amendment 14 – July 2002 Amendment 15 – February 2004 Amendment 18 – December 2011 Amendment 20a – July 2014 Amendment 20b – March 2015 Framework action – December 2014 Framework Amendment 1 – December 2014 Amendment 26 – in progress
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	A benchmark stock assessment was completed for king mackerel in the South Atlantic in 2014. The next assessment has not been scheduled.

The original Gulf and South Atlantic Fisheries Management Councils (GSAFMCs) fishery management plan (FMP) for Coastal Migratory Pelagic Resources (mackerels) was approved in 1983. This plan treated king mackerel as one U.S. stock. Allocations were established for recreational and commercial fisheries, and the commercial allocation was divided between net and hook–and–line fishermen; Established procedures for the Secretary to take action by regulatory amendment to resolve possible future conflicts in the fishery, such as establish fishing zones and local quotas to each gear or user group. Numerous amendments have been implemented since the first FMP and are described below:

Amendment 1, established in 1985, provided a framework for pre–season adjustment of total allowable catch (TAC), revised king mackerel maximum sustainable yield (MSY) downward, recognized separate Atlantic and Gulf migratory groups of king mackerel, and established fishing permits and bag limits for king mackerel. Commercial allocations among gear users were eliminated.

Amendment 3 (1998) prohibited drift gill nets for coastal pelagics and purse seines and run-around gillnets for the overfished groups of mackerels. The habitat section of the FMP was updated and vessel safety considerations were included in the plan. A new objective to minimize waste and bycatch in the fishery was added to the plan.

Amendment 5, established in 1990, extended the management area for the Atlantic groups of mackerels through Mid-Atlantic Fishery Management Council (MAFMC) jurisdiction. It revised problems in the fishery and plan objectives, revised the definition of "overfishing", added cobia to the annual stock assessment procedure, provided that the SAFMC will be responsible for pre–season adjustments of TACs and bag limits for the Atlantic migratory groups of mackerels, redefined recreational bag limits as daily limits; created a provision specifying that the bag limit catch of mackerel may be sold, provided guidelines for corporate commercial vessel permits, imposed a bag limit of two cobia per person per day for all fishermen, established a minimum size of 12–in (30.5 cm.) fork length or 14–in total length for king mackerel and included a definition of "conflict" to provide guidance to the Secretary.

Amendment 6 (1992) identified additional problems and an objective in the fishery, provided for rebuilding overfished stocks of mackerels within specific periods, provided for biennial assessments and adjustments, provided for more seasonal adjustment actions, including size limits, vessel trip limits, closed seasons or areas, and gear restrictions, provided for commercial Atlantic Spanish mackerel possession limits, changed commercial permit requirements to allow qualification in one of three preceding years, discontinued the reversion of the bag limit to zero when the recreational quota is filled, modified the recreational fishing year to the calendar year; and changed minimum size limit for king mackerel to 20 in fork length, and changed all size limit measures to fork length only.

Amendment 7 (1994) equally divided the Gulf commercial allocation in the Eastern Zone at the Dade–Monroe County line in Florida. The sub-allocation for the area from Monroe County through Western Florida is equally divided between commercial hook–and–line and net gear users.

Amendment 8 (1996) identified additional problems in the fishery, specified allowable gear, established a moratorium on new commercial king mackerel permits and provided for transferability of permits during the moratorium, revised qualifications for a commercial permit, extended the management area of cobia through New York, allowed retention of up to 5 damaged king mackerel on vessels with commercial trip limits, revised the seasonal framework procedures to a). delete a procedure for subdividing the Gulf migratory group of king mackerel, b). request that the stock assessment panel provide additional information on spawning potential ratios and mixing of king mackerel migratory groups, c). provide for consideration of public comment, d). redefine overfishing and allow for adjustment by framework procedure, e). allow changes in allocation ratio of Atlantic Spanish mackerel, f). allow setting zero bag limits, g). allow gear regulation including prohibition.

Amendment 9 (2000) changed the percentage of the commercial allocation of TAC for the Florida east coast (North Area) and Florida west coast (South/West Area) of the Eastern Zone to 46.15 percent North and 53.85 percent South/West (previously, this allocation was

50%/50%); and allowed possession of cut-off (damaged) king or Spanish mackerel that comply with the minimum size limits and the trip limits in the Gulf, Mid-Atlantic, or South Atlantic EEZ (sale of such cut-off fish is allowed and is in addition to the existing allowance for possession and retention of a maximum of 5 cut-off (damaged) king mackerel that are not subject to the size limits or trip limits, but that cannot be sold or purchased, nor counted against the trip limit). (Note: Several other changes were made involving allocation and gear restrictions that affected the Florida west coast and Gulf fisheries).

Amendment 10 (1998) designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concerns for coastal migratory pelagics.

Amendment 11 (1998) amended the FMP as required to make definitions of MSY, optimal yield (OY), overfishing and overfished consistent with "National Standard Guidelines"; identified and defined fishing communities and addressed bycatch management measures.

Amendment 12 (1999) extended the commercial king mackerel permit moratorium from October 15, 2000 to October 15, 2005, or until replaced with a license limitation, limited access, and/or individual fishing quota or individual transferable quota system (ITQ), whichever occurs earlier.

Amendment 13 (2002) established two marine reserves in the exclusive economic zone (EEZ) of the Gulf of Mexico in the vicinity of the Dry Tortugas, Florida known as Tortugas North and Tortugas South, in which fishing for coastal migratory pelagic species is prohibited. This action complements previous actions taken under the National Marine Sanctuaries Act.

Amendment 14 (2002) established a 3-year moratorium on the issuance of charter vessel and headboat Gulf group king mackerel permits in the Gulf unless sooner replaced by a comprehensive effort limitation system. The control date for eligibility was established as March 29, 2001. The amendment also includes other provisions for eligibility, application, appeals, and transferability of permits.

Amendment 15 (2005) established an indefinite limited access program for king mackerel in the EEZ under the jurisdiction of the Gulf of Mexico, South Atlantic, and Mid-Atlantic Fishery Management Councils; Changed the fishing year to March 1 through February 28/29 for Atlantic group king and Spanish mackerels.

Amendment 18 established Annual Catch Limits and Accountability Measures for king and Spanish mackerel, as well as cobia.

Amendment 20a prohibited the sale of king mackerel caught under the bag limit unless the fish are caught as part of a state-permitted tournament and the proceeds from the sale are donated to charity. In addition, the rule removes the income qualification requirement for king mackerel commercial vessel permits.

Amendment 20b eliminated the 500-pound trip limit that is effective when 75 percent of the respective quotas are landed for king mackerel in the Florida west coast Northern and Southern Subzones, allows transit of commercial vessels with king mackerel through areas closed to king mackerel fishing, if gear is appropriately stowed, creates Northern and Southern Zones for Atlantic migratory group king and Spanish mackerel, each with separate quotas. NOAA Fisheries will close each zone when the respective quota is met or expected to be met. The dividing line between the zones is at the North Carolina/South Carolina state line.

Amendment 26 updates the Atlantic king mackerel annual catch limits and adjusts the mixing zone based on the results of the 2014 stock assessment and provides an incidental catch allowance of Atlantic king mackerel in the small coastal shark gillnet fishery.

A stock assessment (SEDAR 38) was completed for king mackerel in the South Atlantic in 2014, concluding that the stock was not overfished and overfishing was not occurring.

Management Unit

King mackerel are managed under the jurisdiction of The Coastal Migratory Pelagic FMP jointly with the Gulf of Mexico Fishery Management Council. The management unit is defined as King mackerel within US waters of the South Atlantic and Gulf of Mexico. Current management defines two migratory units: Gulf Migratory Group and Atlantic Migratory Group.

Goals and Objectives

Amendment 12 to the Gulf and South Atlantic Fishery Management Councils FMP for Coastal Migratory Pelagics lists eight plan objectives:

1. The primary objective of the FMP is to stabilized yield at MSY, allow recovery of overfished populations, and maintain population levels sufficient to ensure adequate recruitment.

2. To provide a flexible management system for the resource which minimizes regulatory delay while retaining substantial Council and public input in management decisions and which can rapidly adapt to changes in resource abundance, new scientific information, and changes in fishing patterns among user groups or by areas.

3. To provide necessary information for effective management and establish a mandatory reporting system.

4. To minimize gear and user group conflicts.

5. To distribute the TAC of Atlantic migratory group Spanish mackerel between recreational and commercial user groups based on the catches that occurred during the early to mid-1970s, which is prior to the development of the deep water run-around gill net fishery and when the resource was not overfished.

6. To minimize waste and bycatch in the fishery.

7. To provide appropriate management to address specific migratory groups of king mackerel.

8. To optimize the social and economic benefits of the coastal migratory pelagic fisheries.

STATUS OF THE STOCK

Stock Status

An integrated Stock Synthesis approach was used assess the stock (SEDAR 38) in a benchmark assessment in 2014 and predicts that Atlantic king mackerel are not overfished and overfishing is not occurring.

Stock Assessment

Fishery independent data from the SEAMAP Trawl Survey for the Atlantic and fishery dependent information collected from NMFS MRFSS, Headboat and Logbook survey as well as NCDMF Trip Ticket landings information was used in constructing the assessment model. A Stock Synthesis approach was used which integrated fishery and life history indices into a statistical catch-at-age model to produce observed catch, size and age composition and CPUE indices. Overall, stock biomass and SSB show little depletion until the 1950s when a slow decline started and then accelerated around 1980 reaching its lowest level in the late 1990s from which it increased until 2010. Since 2010 there has been a slight decrease in SSB (Figure. 1). Key biological reference points and associated benchmarks (SSB_{MSY} and F_{MSY}) were successfully derived and the overall consensus derived from sensitivity analysis of the model predict that the Atlantic stock of king mackerel is not overfished and overfishing is not occurring.

STATUS OF THE FISHERY

Current Regulations

Commercial: 3,500 lb trip limit

Recreational: 24 in FL minimum size; 3 fish/day

Commercial Landings

Since 2006, commercial landings of king mackerel have declined from a high of 1,012,676 lb to < 500,000 lb since 2012 (Figure 2.)

Recreational Landings

During the time series (2006 – 2015), estimated MRIP landings of king mackerel peaked in 2007 at 2,530,097 lb and declined sharply over the next 4 years to a low of 180,014 lb in 2011and stayed below 400,000 lb for the remainder of the series (Figure 3.)

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Length-frequency information for the commercial king mackerel fishery in North Carolina is collected by port agents through the trip ticket program, specifically programs 438 and 439. Ageing structures are collected from the commercial and recreational fishery as well as king mackerel fishing tournaments statewide and sent to the Southeast Fisheries Science Center in Panama City, Florida for processing and aging (Table 1). Maximum sizes of king mackerel sampled over the last 10 years have remained steady at ~1400 mm while mean annual sizes varied from 730 mm in 2008 to 990 mm in 2013 (Table 2).

Fishery-Independent Monitoring

Currently, the division does not have any fishery-independent sampling programs that target or catch king mackerel in great numbers.

MANAGEMENT STRATEGY

In North Carolina, king mackerel are currently included in the Interjurisdictional Fishery Management Plan, which defers to the South Atlantic Fishery Management Council management measures compliance requirements and is currently managed under recent Amendments 20A (2014) and 20B (2015) to the Coastal Migratory Pelagics Fishery Management Plan. Amendment 20A prohibits the sale of all bag-limit-caught king mackerel, except those harvested during a state-permitted tournament. Amendment 20B establishes separate commercial quotas of Atlantic king mackerel for a Northern Zone (north of North Carolina/South Carolina line) and Southern Zone (south of North Carolina/South Carolina line NC/SC line). The South Atlantic Fishery Management Council is currently developing Amendment 26 to update the Atlantic king mackerel annual catch limits and adjust the mixing zone based on the results of the 2014 stock assessment, and to provide an incidental catch allowance of Atlantic king mackerel in the small coastal shark gillnet fishery. Current management strategies for king mackerel in South Atlantic waters are summarized in Table 3.

MANAGEMENT AND RESEARCH NEEDS

From SEDAR 38 report:

Develop a survey to obtain reliable age/size composition data and relative abundance of adult fish. This could be done using gillnets or handlines. The review panel recommends that the design of a scientific survey be peer reviewed.

Determine most appropriate methods to deal with changing selectivity in fisheries over time, particularly changing selectivity related to management actions or targeting of specific cohorts. The review panel suggests that historical mark-recapture data available from NMFS SEFSC and FWRI could be used to compare size composition of recaptures for different fishing gears to evaluate selectivity for historic periods.

Determine stock mixing rates using otolith microchemistry and/or otolith shape analysis on a routine basis that would allow future stock assessments to capture the dynamic spatial and temporal nature of mixing of the Atlantic and Gulf of Mexico stocks, and consider evaluating stock mixing within integrated modeling approaches.

More accurately characterize juvenile growth by increasing samples of age-0 and 1 fish. Further investigate 2-phase growth models including different breakpoints and different growth models to better model size and age. Consider if there is temporal (annual and seasonal) variability in growth rates. Results of this analysis in terms of the best model will need to be implementable in SS3 to continue with the integrated modeling approach.

Determine if female spawning periodicity varies by size or age.

Expand the SEAMAP trawl survey below the Cape Canaveral area and potentially into deeper continental shelf waters.

Consider conducting an extensive tagging program to: a) better understand migration patterns; b) provide additional and individual growth rate information; c) better understand fishery selectivity; d) provide fishery exploitation rates; and e) provide information about natural

mortality rates. Fishery independent recapture information (i.e., use acoustic and satellite tags) will assist with a). Age at capture information of tagged animals will assist with b). A multi-year tagging program will be required for e). The review panel recommends that a specific workshop be held to consider in detail the design of a tagging program.

LITERATURE CITED

SAFMC Amendment 20a to the fishery management plan for the coastal migratory pelagic resources of the Gulf of Mexico and the South Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 157 pp.

SEDAR 38 Stock Assessment report South Atlantic king mackerel. SEDAR Charleston, SC. 502 pp.

TABLES

Table 1. Mean, minimum and maximum fork lengths (mm) and total number sampled of king mackerel aged through Program 930.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	956.4	433	1375	435
2007	961.8	488	1390	507
2008	872.1	595	1365	450
2009	914.3	615	1400	415
2010	961.7	589	1452	386
2011	948.9	595	1448	429
2012	955.8	588	1421	597
2013	1021.3	612	1430	413
2014	1016.3	118	1500	388
2015	992.6	113	1383	446

Table 2. Mean, minimum and maximum fork lengths (mm) and total number sampled of king mackerel from fishery dependent sampling programs.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	894.5	433	1375	725
2007	731.9	70	1390	1047
2008	730.8	43	1365	2179
2009	784.4	383	1405	1477
2010	928.2	589	1452	583
2011	884.4	595	1929	1079
2012	933.7	588	1421	1125
2013	990.4	144	1430	506
2014	881.4	118	1500	826
2015	938.8	113	1383	679

Table 3. Management strategies and rules for king mackerel in the South Atlantic.

Management Strategy	Outcome
24” minimum size limit	Rule 3M.0301(b)(1)
3 fish creel limit	Rule 3M.0301(b)(2)
NMFS Commercial Vessel Permit requirements	Rule 3M.0301(b)(3)(A) Rule 3M.0301(b)(3)(B)
Unlawful to use gill nets south of Cape Lookout for more than 3 king mackerel	Rules 3M.0501(b)(4)
Charter vessels or head boats with NMFS Commercial Vessel Permit must comply with possession limits when fishing with more than 3 persons	Rules 3M.0501(c)
Commercial trip limit of 3,500 lb of King, Spanish or aggregate	Rule 3M.0501(d)
Prohibits Purse Gill Nets when taking king or Spanish mackerel	Rule 3M.0302

FIGURES

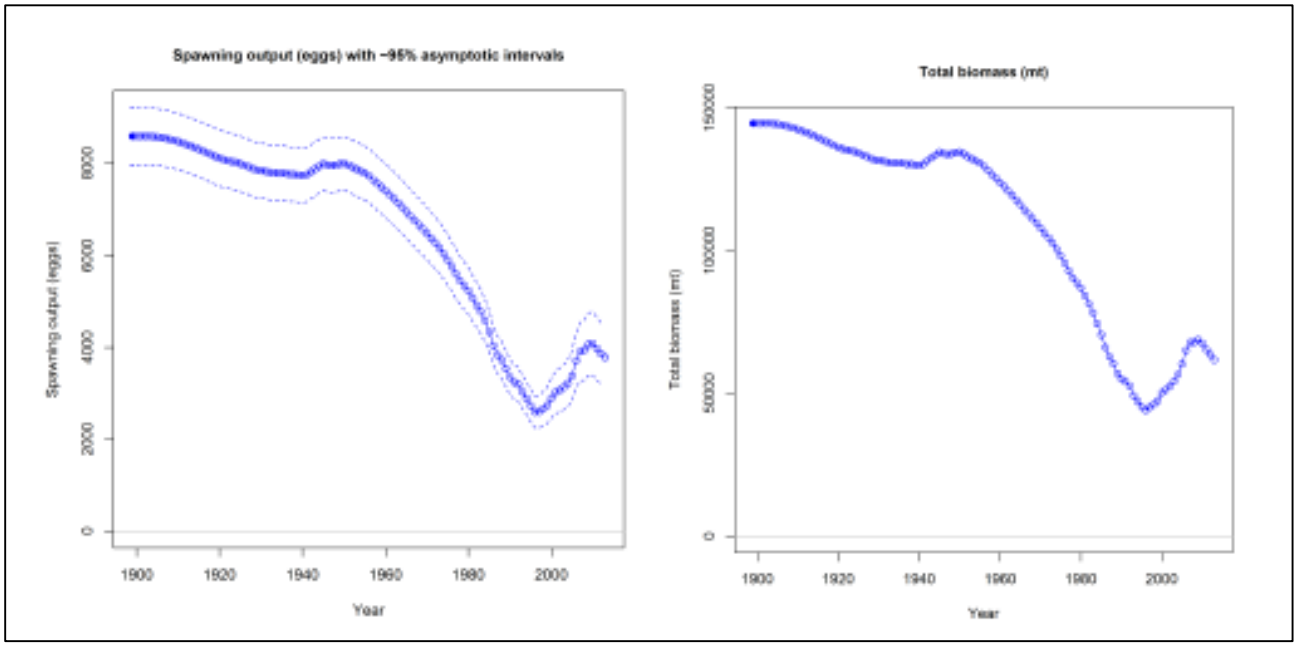


Figure 1. Predicted spawning biomass with 95% CI and total biomass in whole metric tons for king mackerel in Atlantic waters. Figure taken from SEDAR 38.

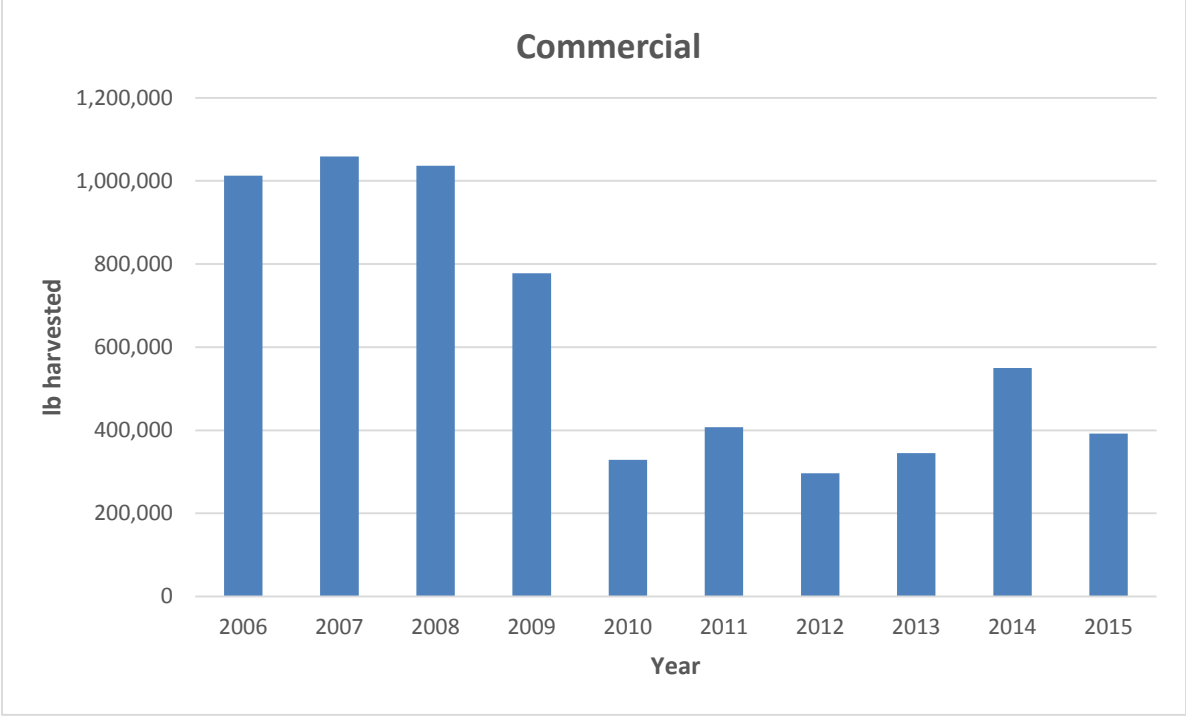


Figure 2. Commercial landings of king mackerel in North Carolina from 2006 - 2015.

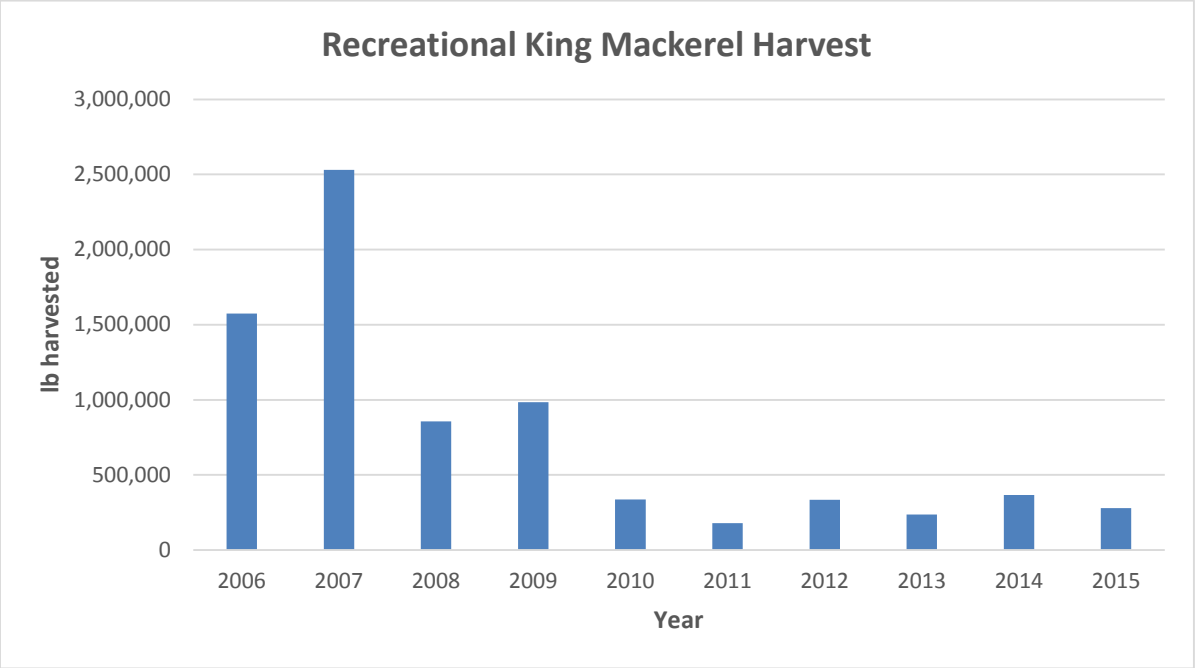


Figure 3. Estimated recreational harvest of King Mackerel in North Carolina from 2006 – 2015.

FISHERY MANAGEMENT PLAN UPDATE
MONKFISH
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 1999
Amendments:	Amendment 1 (April 1999) Amendment 2 (May 2005) Amendment 3 (February 2008) Amendment 4 (Under Development) Amendment 5 (March 2011)
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	Fall 2016

The New England Fishery Management Council (NEFMC) and Mid-Atlantic Fishery Management Councils (MAFMC) adopted a rebuilding plan for monkfish in November 1999. NEFMC has the administrative lead. The Monkfish Fishery Management Plan (FMP) is designed to stop overfishing and rebuild the stocks through a number of measures, including: limiting the number of vessels with access to the fishery and allocating days-at-sea for those vessels; setting limits for vessels fishing for monkfish; minimum fish size limits; gear restrictions; mandatory time out of the fishery during spawning season; and a framework adjustment process. The Councils manage the fishery as two stocks, Southern Fishery Management Area (SFMA) and Northern Fishery Management Area (NFMA). North Carolina is in the SFMA (SFMA) that ranges from the southern flank of Georges Bank through the Mid-Atlantic Bight to North Carolina.

In 2006, North Carolina and NOAA Fisheries Southeast Regional Office (SERO) entered into an agreement enabling limited large mesh gill net fisheries for striped bass and monkfish in state waters. The large mesh monkfish fishery, for gill nets with a stretched mesh greater than 7 in, is open by proclamation from March 16 through April 14 unless closed sooner by proclamation. The Atlantic Ocean is closed to the use of gill nets greater than 7 in stretched mesh from December 22 through April 14 by proclamation, with the exception of the monkfish and striped bass fisheries. The agreement allows the state to implement Atlantic sturgeon, sea turtle and marine mammal conservation measures under its proclamation authority as well as gear restrictions on large mesh gillnets. Participants in this fishery must confine their fishing efforts to waters from the NC/VA state line to Wimble Shoals (out 2 miles but not more than 3), and report any sea turtle or marine mammal interactions. Each year, North Carolina contacts the NOAA Fisheries SERO to ensure that they have enough days-at-sea observer coverage for the

opening of the fishery. Once NOAA Fisheries has confirmed observer coverage a proclamation is issued opening the large mesh fishery to gill nets greater than 7 in in the Atlantic Ocean. Large mesh gill nets were required to be fished every 48 hours, weather permitting. The area could be closed if reliable sea surface temperature data indicated water temperatures greater than 11° C or if an interaction occurred between large mesh gill nets and marine mammals or sea turtles. Masters of vessels that fish for monkfish in the specified area are required to possess a current year monkfish large mesh gill net permit issued by North Carolina Division of Marine Fisheries (NCDMF) to valid commercial license holders. The permit requires holders to report weekly trip information to NCDMF and mandated participation in the NOAA Fisheries observer program, in order to monitor interactions with protected species.

The original FMP was modified and amended to include an annual measure of the status of the stocks and adjustment to management measures as needed to maintain a 10-year rebuilding schedule. In April 1999, the councils adopted Amendment 1 to the monkfish FMP, which described and identified the essential fish habitat (EFH) for the monkfish fishery, compliant with provisions of the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act). Framework Adjustment 1 to the FMP, effective June 1999, implemented management measures for FY 2002, provided for a one-year delay in default measures for Year 4, and adjusted trip limits to account for court decision on differential gear-based limits.

Framework Adjustment 2 to the FMP, effective May 2004, established a process to determine an annual total allowable catch (TAC) and appropriate fishing measures for each management area. This method is based upon the relationship between the 3-year running average of National Marine Fisheries Service's (NOAA FISHERIES) fall trawl survey biomass index and established biomass index targets. The data indicated that the biomass indices were less than the current targets for both management areas. Due to concern about the ability of the stocks to rebuild to target levels by the end of the 10 year rebuilding period under this process, the Councils modified the management measures in the NMFA and changed the annual adjustment process.

Amendment 2 to the FMP, effective May 2005, included measures to address Essential Fish Habitat (EFH) and bycatch issues, as well as other issues raised during the public scoping process. Amendment 2 did not modify the stock-rebuilding program established in Framework Adjustment 2. Amendment 2 implemented the following measures: a new limited access permit for qualified vessels fishing south of 38°20'00.00 N latitude (south of Ocean City, MD); an offshore monkfish fishery in the Southern Fishery Management Area (SFMA); a maximum roller-gear disc diameter of 6 in in the SFMA; closure of two deep-sea canyon areas to all gears when fishing under monkfish days at sea (DAS); establishment of a research DAS set-aside program and a DAS exemption program; a North Atlantic Fisheries Organization Regulated Area Exemptions Program; adjustments to the monkfish incidental catch limits (from 50 lb/trip to 50 lb/day not to exceed 150 lb/trip or, for qualified vessels, no more than 5% of the total weight of fish on board, not to exceed 450 lb tail weight); a decrease in the monkfish minimum size in the SFMA (from 14 in to 11 in tail length or 21 in to 17 in total length) to correspond to the size limits in the Northern Fishery Management Area (NFMA); removal of the 20-day block requirement; and new additions to the list of actions that can be taken under the framework adjustment process contained in the FMP.

A stock assessment (40th Northeast Regional Stock Assessment Workshop (SAW 40)) from November of 2004 showed that monkfish were not overfished in either the NFMA or the SFMA based on existing reference points. Overfishing could not be determined as fishing mortality rates estimated from NEFSC and Cooperative survey data were not reliable.

Despite several years of increase in biomass in both stocks, by the fall of 2006 both stocks were considered to be in decline with approximately 50% of the biomass being below the annual biomass index targets. Framework Adjustment 3 to the FMP, effective November 2006, prohibited targeting monkfish on Multispecies permit B-regular days-at-sea (DAS). In 2007, Framework Adjustment 4 to the FMP was proposed by the Council to revise the monkfish management program so that the goals of the rebuilding plan could be met. Framework Adjustment 4 included, among other measures, a backstop provision that would adjust and potentially close, the directed monkfish fishery in 2009 if the landings in the 2007 fishing year exceeded the target total allowable catch by more than 30%.

Amendment 3 to the FMP, effective February 2008, included monkfish in part of the standardized bycatch reporting methodology omnibus amendment. The omnibus amendment was applied to FMPs of the MAFMC and NEFMC and was developed to address the requirements of the Magnuson-Stevens Act to include, in all FMPs, a standardized bycatch reporting methodology.

In July 2007, the Northeast Data Poor Stocks Working Group (DPWG) completed a new stock assessment which indicated that the monkfish stocks were not overfished and overfishing was no longer occurring. The council adopted new revised reference points recommended by the DPWG in May 2008, as Framework Adjustment 5 to the FMP. Framework Adjustment 6 to the FMP was also implemented in 2008, eliminating the backstop provision adopted in Framework Adjustment 4. The backstop provision would have adjusted and possibly closed the monkfish fishery in FY 2009 if landings exceeded the target total allowable catch (TAC) by more than 30%. Given that both stocks were rebuilt, the backstop provision was no longer deemed necessary.

Amendment 5 to the FMP, effective May 2011, was issued to bring the Monkfish FMP into compliance with the 2007 re-authorization of the Magnuson-Stevens Act. The Magnuson-Stevens Act was reauthorized and revised; it included the requirement that all FMPs establish Annual Catch Limits (ACLs) and measures to ensure accountability (AMs). For stocks not subject to overfishing, such as monkfish, the Act set a deadline of 2011 for the implementation of ACLs and AMs. Amendment 5 established the mechanism for specifying ACLs, AMs, annual catch target (ACT) and associated measures for DAS. Amendment 5 also brought the biological and management reference points in the FMP into compliance with the revised 2009 National Standard 1 (NS1) Guidelines.

In June 2010, another stock assessment, Stock Assessment Review Committee (SARC) 50, concluded that both stocks were above their respective biomass thresholds, and also above newly established biomass thresholds recommended during the assessment, indicating that both stocks are not overfished. The estimated fishing mortality rate for each stock was below its respective fishing mortality threshold, therefore overfishing was not occurring on either stock. The SARC 50 Report did however emphasize the continuing high degree of uncertainty in the assessment.

As a result of SARC 50, the NEFMC's Scientific and Statistical Committee (SSC) revised the estimate of ACLs for both stocks. The revised ACL for the NFMA is below the proactive AM annual catch target (ACT) for that area proposed in Amendment 5. Framework Adjustment 7, effective October 2011, adjusted the ACT for the NFMA to be consistent with the most recent scientific advice regarding the acceptable biological catch (ABC) for monkfish. Framework Adjustment 7 also specifies a new DAS allocation and trip limits for the NFMA consistent with

the new ACT. As well as, established revised biomass reference points for the NFMA and SFMA. A benchmark stock assessment for monkfish is scheduled to begin in 2016 under SARC 61.

Management Unit

In North Carolina, monkfish are included in the Interjurisdictional Fisheries Management Plan, which defers to the New England Fishery Management Council (NEFMC)/ Mid-Atlantic Fishery Management Council (MAFMC) FMP compliance requirements in federal waters (3–200 miles). Figure 1 illustrates the northern and southern fishery management areas and the boundary between the NEFMC and MAFMC.

Goal and Objectives

The FMP is intended to manage the monkfish fishery pursuant to the Magnuson-Stevens Fishery Conservation Management Act (MSFCMA) of 1976, as amended by the Sustainable Fisheries Act (SFA). The purpose of the amendment is to bring this FMP into compliance with the new and revised National Standards and other required provisions of the SFA by implementing the following:

- Reduce fishing mortality in the monkfish fishery to assure that overfishing does not occur;
- Improve the yield from this fishery;
- Promote compatible management regulations between state and federal jurisdictions;
- Promote uniform and effective enforcement of regulations; and
- Minimize regulations to achieve the management objectives stated above.

STATUS OF THE STOCK

Stock Status

Both the North and South monkfish stocks are not overfished and overfishing is not occurring. Monkfish was removed from the N.C. Stock Status Report due to the limited fishery in North Carolina. In 2015, commercial landings of monkfish were low and there were no reported recreational landings.

Stock Assessment

The NEFSC conducted a monkfish operational stock assessment in 2013. The purpose of the operational stock assessment was to update the 2010 assessment with additional data from 2010 and 2011. The model configuration has not changed substantively since the last peer-review by the SARC 50 in 2010. The model was updated with two years of data and revisions of discard estimates for 1980-2011 based on new methodology (SBRM approach). Changes in the discard estimates resulted in a minor reduction in the number of selectivity blocks in the southern stock model. Model results from the operational stock assessment indicate that the North and South monkfish stocks are not over-fished and overfishing is not occurring. The review panel summary, included in the NEFSC 2013 operational stock assessment, recommended a new benchmark assessment not proceed until new information on age, growth, longevity and natural mortality is obtained. The review panel noted that a number of key uncertainties in landings, discards, commercial length frequencies, aging methods, life history,

growth and natural mortality remain unresolved since the 2010 stock assessment. Despite these uncertainties, the work of the 2013 operational stock assessment is accepted as the best available scientific information by the review panel for assessing the status of monkfish. Projections for initial conditions of population sizes illustrated a negligible probability of the stocks becoming overfished in the short term. Based on the assessment results, the Monkfish PDT updated the OFL and ABC calculations using the default ABC control rule recommended by the SSC in 2010. The NEFSC submitted these findings in an assessment update reference document to the Council in May 2013.

This latest assessment (SARC 50) 1980-2009 placed new reference points to the existing data based on revised yield-per-recruit analysis and results of a length-tuned model that incorporates multiple survey indices and catch data. This new assessment indicates that monkfish stocks in both the Northern and Southern Management areas are not overfished and that overfishing is not taking place. To support current harvest levels and the FMP rebuilding plan for the stock, the Bthreshold is 37,245 mt for the SFMA and 26,465 mt for the NFMA. The Btarget is 74,490 mt for the SFMA and 52,930 mt for the NFMA. The 2010 estimates of total biomass are 131,218 mt for the SFMA and 66,062 mt for the NFMA. The Total Allowable Catch (TAC) remains at 15,279 mt in the SFMA and 10,745 mt in the NFMA. The assessment results continue to be uncertain due to cumulative effects of under-reported landings, unknown discards during the 1980's, uncertainty in survey indices, and incomplete understanding of key biological parameters such as age and growth, longevity, natural morality and stock structure.

Estimates (2010-2011) and projected biomass (2012-2016) were updated using the SCALE models in the 2013 assessment update. In the SFMA 2012-2016 the projected biomass ranges from 108,100 mt in 2012 to 106,600 mt in 2016, with a low of 104,200 mt in 2015. For the NFMA the projected biomass ranges from 66,600 mt in 2012 to 82,600 mt in 2016, with a low of 72,400 mt in 2013. Updated estimates of Bthreshold are 35,834 mt in the SFMA and 23,037 mt in the NFMA. Updated estimates of Btarget are 71,667 mt in the SFMA and 46,074 in the NFMA. Total updated estimates of catch are 14,328 mt SFMA and 9,383 NFMA.

STATUS OF THE FISHERY

Current Regulations

In North Carolina, a directed monkfish commercial fishery occurs from March 16 through April 14 in the Atlantic Ocean. During this time, fishermen harvesting monkfish in the Atlantic Ocean using gill nets greater than 7 in stretched mesh, must hold a valid N.C. Monkfish Large Mesh Gill Net Permit and limit fishing activity to a one-mile-wide area extending from two miles seaward of the coastline to three miles seaward of the coastline from the North Carolina/Virginia state line southward to Wimble Shoals (Latitude 35°30'N). The minimum size length for monkfish is 17 in total length or 11 in tail length for both commercial and recreational anglers. North Carolina does not set trip or possession limits for monkfish.

Commercial Landings

Annual landings of monkfish were up in 2015 compared to previous years. Monkfish landings in North Carolina predominately occur as marketable by-catch from the summer flounder trawl fishery. In 2012 and 2013, shoaling of Oregon Inlet prevented flounder trawlers from landing in Wanchese, NC, the closest NC port to the monkfish fishing grounds. During these years, North Carolina transferred summer flounder quota to Virginia to allow vessels to land summer flounder

at Virginia fish houses when Oregon Inlet was impassible for larger vessels. In 2014, the transfer of quota between North Carolina and Virginia was not allowed; boats landed further south accessing ports through Beaufort Inlet or attempted entering Oregon Inlet when inlet conditions allowed. Tables 1 and 2 illustrate the magnitude of landings in pounds by year from each gear in both estuarine and ocean waters. For 2013, 2014, and 2015 the Atlantic Ocean large mesh gill net fishery had no reported trips and participation in the fishery has been declining. Landings from large mesh and small mesh gill nets are assumed to be as marketable by-catch and not from the targeted fishery. Prior to 2013, the landings from large mesh gill nets were significant. In recent years, weather conditions, water temperature, fish availability and activity in other fisheries have kept participation and landings low.

Recreational Landings

Not available due to low recreational activity.

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

North Carolina does not have a fishery dependent monitoring program for monkfish.

Fishery-Independent Monitoring

North Carolina does not have a fishery independent monitoring program for monkfish.

MANAGEMENT STRATEGY

The monkfish fishery is managed in federal waters primarily with a days-at-sea (DAS) management system with corresponding trip limits per DAS. Every three years the biological objectives and reference points are reviewed to evaluate threshold and target biological reference points. The MAFMC or NEFMC may initiate a framework adjustment, at any time, if they find it necessary to meet or be consistent with the goals and objectives of the Monkfish FMP. The management adjustments or amendments for monkfish will require majority approval of both the MAFMC and the NEFMC. The Monkfish Monitoring Committee (MC) meets six months prior to the beginning of the next fishing year to review available data pertaining to: discards and landings; days-at-sea and other measures of fishing effort; stock status and fishing mortality rates; enforcement of and compliance with management measures; and any other relevant information. The data is provided to the MC by NMFS, but the MC may also consider data provided by the states, ASMFC, the U.S. Coast Guard and other sources. The MC reviews the data and develops target Total Allowable Catch (TAC) recommendations and management options necessary to achieve the FMP goals and objectives.

The FMP defines overfishing as when F exceeds Fmax. Overfished is defined as when the total stock biomass or Bthreshold is less than half of the Bmax Projected. The 2013 Monkfish Operational Assessment conducted by the Northeast Fisheries Science Center (NEFSC) updated the biological reference points from the 2010 stock assessment needed to evaluate stock status for both the northern and southern stock and based on the long term projections determined that neither stock was overfished or experiencing overfishing. All of the biological

reference points are based on results of the SCALE model used in the 2010 stock assessment and are subject to a high level of uncertainty due to the poor quality of data used.

Northern Stock

- Fmax = 0.44
- Bthreshold = 0.5*Bmax Projected = 23,037 mt
- Btarget = Bmax Projected = 46,074 mt
- Bmsy = Fmax Projected = 9,383 mt

Southern Stock

- Fmax = 0.37
- Bthreshold = 0.5*Bmax Projected = 35,834 mt
- Btarget = Bmax Projected = 71,667 mt
- Bmsy = Fmax Projected = 14,328

MANAGEMENT AND RESEARCH NEEDS

From the Northeast Fisheries Science Center 2013 monkfish operational stock assessment the panel recommended further research into (NEFSC 2013):

- Resolution of age, growth, and natural mortality issues.
- Determination of movement patterns in relation to stock areas.
- Development of a one stock model given evidence of movement between the two areas and existing genetic information (on-going genetics work may resolve the two stock-area issue).
- Development of a two-sex model depending on the results of aging work (would require estimation of sex ratios in catch and survey data)

Note: The information for this Fishery Management Plan (FMP) update can be found on the Mid-Atlantic and New England Fishery Management Councils' Website (http://www.mafmc.org or http://www.nefmc.org). Information is also available on NOAA Fisheries website for the Greater Atlantic Region (http://www.greateratlantic.fisheries.noaa.gov/sustainable/species/monkfish/). Please refer to these websites for additional information.

LITERATURE CITED

NEFSC (Northeast Fisheries Science Center). 2013. 2013 Monkfish Operational Assessment. U.S. Department of Commerce, Northeast Fisheries Science Center Reference Document. 13-23; 116 pp.

TABLES

Table 1. Estuarine landings (lb) of monkfish by gear 2006-2015 (NC Trip Ticket Program).

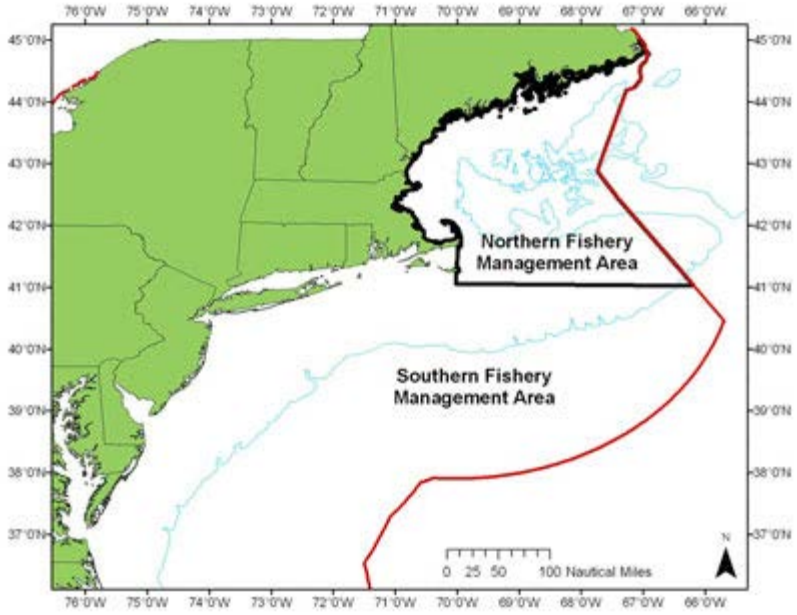
Gear	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Crab Trawl		11		5						
Shrimp Trawl		50								
Pound Net			5				4			
Crab Pot		7								
Gill Net, < 5 in	46	405		202	62	48	61	122	2	
Gill Net, >=5 in	74	86	180	138	30		10	27	49	60
Oyster Dredge							18			
Total	120	559	185	345	92	48	93	149	51	60

Table 2. Ocean landings (lb) of monkfish by gear 2006-2015 (NC Trip Ticket Program).

Gear	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Crab Trawl		11		5						
Flounder Trawl	64,424	40,026	49,961	26,967	23,960	29,371	11,626	8,009	70,988	110,270
Scallop Trawl	166	304	1,138				36			
Shrimp Trawl		104								
Ocean Flynet	1,726	2,896	2,226	1,368	7,265	162	166		1,032	30
Pound Net			5				4			
Crab Pot		7								
Fish Pot										12
Gill Net, < 5 in	3,456	16,238	138	18,542	460	4,072	2,673	792	834	160
Gill Net, >=5 in	94,445	88,951	54,403	52,084	14,857	4,855	6,637	1,629	1,169	362
Gill Net, Runaround										34
Rod-n-reel	45		6						22	
Longline							6	11		
Oyster Dredge							18			
Scallop Dredge	156	964	180	80	28	74	150			512
Total	164,418	149,501	108,057	99,046	46,570	38,534	21,316	10,441	74,045	111,380

FIGURES

Figure 1. 2015 Monkfish fishery management areas (NOAA Fisheries).



FISHERY MANAGEMENT PLAN UPDATE
SCUP NORTH OF CAPE HATTERAS
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	Incorporated into Summer Flounder FMP through Amendment 8 in 1996
Amendments:	Amendment 8 in 1996 Amendment 10 in 1997 Amendment 11 in 1998 Amendment 12 in 1999 Amendment 13 in 2003 Amendment 14 in 2007 Amendment 15 in 2011 Amendment 16 in 2007
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	A benchmark stock assessment was completed in 2015.

Because of their presence in, and movement between, state waters (0-3 miles) and federal waters (3-200 miles), the Mid Atlantic Fisheries Management Council manages scup north of Cape Hatteras cooperatively with the Atlantic States Marine Fisheries Commission (ASMFC). The two management entities work in conjunction with the National Marine Fisheries Service (NMFS) as the federal implementation and enforcement entity. The Summer Flounder, Scup, and Black Sea Bass Fishery Management Plan (FMP) and amendments use output controls (catch and landings limits) as the primary management tool, with landings divided between the commercial and recreational fisheries. The FMP also includes minimum fish sizes, bag limits, seasons, gear restrictions, permit requirements, and other provisions to prevent overfishing and ensure sustainability of the fisheries. Recreational bag/size limits and seasons are determined on a state-by-state basis using conservation equivalency. The commercial quota is divided into state-by-state quotas based on historical landings. Specific details for each Amendment include:

Amendments 1-7 to the FMP were completed prior to black sea bass being incorporated in the Summer Flounder, Black Sea Bass and Scup FMP.

Amendment 8 - Incorporated Scup FMP into Summer Flounder FMP; established scup management measures, including commercial quotas, recreational harvest limits, size limits, gear restrictions, permits, and reporting requirements.

Amendment 10 - Modified commercial minimum mesh requirements; continued commercial vessel moratorium; prohibited transfer of summer flounder at sea; established special permit for party/charter sector for summer flounder.

Amendment 11 - Modified certain provisions related to vessel replacement and upgrading, permit history transfer, splitting, and permit renewal regulations.

Amendment 12 - Revised FMP to comply with the Sustainable Fisheries Act and established framework adjustment process; established quota set-aside for research for summer flounder, scup, and black sea bass; established state-specific conservation equivalency measures; allowed the rollover of winter scup quota; revised the start date for summer quota period for scup fishery; established a system to transfer scup at sea.

Amendment 13 - Revised black sea bass commercial quota system; addressed other black sea bass mgmt. measures; Established multi-year specification setting of quota for all three species; Established region-specific conservation equivalency measures for summer flounder; built flexibility into process to define and update status determination criteria for each plan species.

Amendment 14 - Established a rebuilding schedule for scup; scup Gear Restricted Areas made modifiable through framework adjustment process.

Amendment 15 - Established Annual Catch Limits (ACLs) and Accountability Measures.

Amendment 16 - Standardized bycatch reporting methodology.

Management Unit

U.S. waters in the western Atlantic Ocean from Cape Hatteras northward to the U.S.-Canadian border.

Goal and Objectives

The objectives of the Summer Flounder, Black Sea Bass and Scup FMP are to:

1. Reduce fishing mortality in the summer flounder, scup and black sea bass fisheries to assure that overfishing does not occur;

2. Reduce fishing mortality on immature summer flounder, scup and black sea bass to increase spawning stock biomass (SSB);

3. Improve the yield from these fisheries;

4. Promote compatible management regulations between state and federal jurisdictions;

5. Promote uniform and effective enforcement of regulations;

6. Minimize regulations to achieve the management objectives stated above.

The 2011 Omnibus Amendment contains Amendment 15 to the Summer Flounder, Black Sea Bass and Scup FMP (the most recent Amendment that impacts the scup fishery). The amendment is intended to formalize the process of addressing scientific and management

uncertainty when setting catch limits for the upcoming fishing year(s) and to establish a comprehensive system of accountability for catch (including both landings and discards) relative to those limits, for each of the managed resources subject to this requirement. Specifically: (1) Establish Allowable Biological Catch (ABC) control rules, (2) Establish a Council risk policy, which is one variable needed for the ABC control rules, (3) Establish ACL(s), (4) Establish a system of comprehensive accountability, which addresses all components of the catch, (5) Describe the process by which the performance of the annual catch limit and comprehensive accountability system will be reviewed, (6) Describe the process to modify the measures above in 1-5 in the future.

STATUS OF THE STOCK

Stock Status

The stock is considered to be viable. The 2015 Benchmark Stock Assessment for U.S. waters north of Cape Hatteras indicates the stock is not overfished nor is overfishing occurring relative to biological reference points.

Stock Assessment

The 2015 Benchmark Stock Assessment used a statistical catch at age model calculated using the Age Structured Assessment Program (ASAP). In 2014 the fishing mortality rate was below the threshold reference point (F40%) and the spawning stock biomass (SSB) was above the target reference point (SSB40%).

STATUS OF THE FISHERY

Current Regulations

Commercial: 9-in total length (TL) minimum size limit. Landings windows are set by proclamation with variable harvest limits by time-period (see most recent NCDMF proclamation).

Recreational: Season is year-round. 8-in TL minimum size, 50 fish bag limit/day in state waters; 9-in TL minimum size, 50 fish bag limit in federal waters

Commercial Landings

Most scup landings from north of Cape Hatteras were from flounder trawls although flynets also caught scup. Landings are constrained by the coastwide quota. Annual landings were variable in 2006 to 2015 with very low landings in 2012-2013 but an increase in 2014 (Figure 1). The low landings in 2012-2013 were partly due to the closure of Oregon Inlet to large vessels (such as trawlers) and the consequent transfer of most of North Carolina's quota allocation to Virginia and other states. In 2014 and 2015, more winter trawl vessels returned to North Carolina to land catches rather than transferring quota to Virginia and other states. Trends in commercial trips have generally followed landings trends (Figure 1). Trips include the number of trip ticket records with landings reported. Trips typically represent more than one day of fishing.

Recreational Landings

Recreational harvest and trips for scup from north of Cape Hatteras only occurred in 2011, 2012, and 2015 (Table 1).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Two NCDMF sampling programs collect biological data on commercial and recreational fisheries that catch scup north of Cape Hatteras. Program 433 (Winter Trawl Fishery) is the primary program that collects harvest length data. Other commercial sampling programs focusing on fisheries that do not target scup collect biological data rarely. NCDMF sampling of the recreational fishery through the Marine Recreational Information Program (MRIP) collects harvest length data. Age data have not been collected by NCDMF for scup north of Cape Hatteras.

There were no clear trends in commercial length data in 2006-2015 (Table 2). Annual mean lengths were fairly consistent for the time-series and 2015 was typical. There is a slight increase in the annual maximum length in recent years compared to early in the time-series and 2015 had the second highest maximum length. The number of fish measured in 2015 was the second highest in the time-series.

Recreational harvest length data were only collected in 2011, 2012, and 2015 for scup north of Cape Hatteras (Table 3). Only one fish was measured each year. Very few scup are encountered in this fishery.

Fishery-Independent Monitoring

NCDMF independent sampling programs did not encounter scup north of Cape Hatteras in 2006-2015. NCDMF currently does not have independent sampling programs in ocean waters north of Cape Hatteras.

MANAGEMENT STRATEGY

Management of scup has been based on results from stock assessments. Results from the 2015 Benchmark Stock Assessment will be used to guide management. Projections based on stock assessments are used to set the coastwide quota level each year. Amendments to the FMP are undertaken as issues arise that require action.

MANAGEMENT AND RESEARCH NEEDS

- Implementation of new standardized research surveys that focus on accurately indexing the abundance of older scup (ages 3 and older);
- Continuation of at least the current levels of at-sea and port sampling of the commercial and recreational fisheries in which scup are landed and discarded;
- Quantification of the biases in the catch and discards, including non-compliance;

- Experimental work to better characterize the discard mortality rate of scup captured by different commercial gear types should be conducted to more accurately quantify the magnitude of scup discard mortality.

LITERATURE CITED

NMFS NEFSC. 2015. Stock assessment of scup (*Stenotomus chrysops*). U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Fisheries Science Center.

TABLES

Table 1. Recreational hook and line harvest of scup in numbers of fish north of Cape Hatteras from MRIP data 2006-2015.

Year	Harvest (numbers)
2006	0
2007	0
2008	0
2009	0
2010	0
2011	27
2012	148
2013	0
2014	0
2015	587

Table 2. Summary of scup length (TL, mm) and age data from NCDMF commercial fishery sampling programs north of Cape Hatteras.

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	286	160	393	1,568	ND	ND	ND	ND
2007	281	190	404	1,659	ND	ND	ND	ND
2008	281	183	415	3,493	ND	ND	ND	ND
2009	281	153	403	1,740	ND	ND	ND	ND
2010	276	200	386	1,450	ND	ND	ND	ND
2011	267	198	407	1,076	ND	ND	ND	ND
2012	327	287	401	7	ND	ND	ND	ND
2013	253	192	389	261	ND	ND	ND	ND
2014	281	193	441	2,725	ND	ND	ND	ND
2015	283	127	429	2,998	ND	ND	ND	ND

Table 3. Summary of scup length (TL, mm) and age data from NCDMF recreational fishery sampling programs north of Cape Hatteras.

Year	Mean Length	Minimum Length	Maximum Length	Total Measured	Modal age	Minimum age	Maximum age	Total aged
2006	0	0	0	0	ND	ND	ND	ND
2007	0	0	0	0	ND	ND	ND	ND
2008	0	0	0	0	ND	ND	ND	ND
2009	0	0	0	0	ND	ND	ND	ND
2010	0	0	0	0	ND	ND	ND	ND
2011	181	181	181	1	ND	ND	ND	ND
2012	290	290	290	1	ND	ND	ND	ND
2013	0	0	0	0	ND	ND	ND	ND
2014	0	0	0	0	ND	ND	ND	ND
2015	110	110	110	1	ND	ND	ND	ND

FIGURES

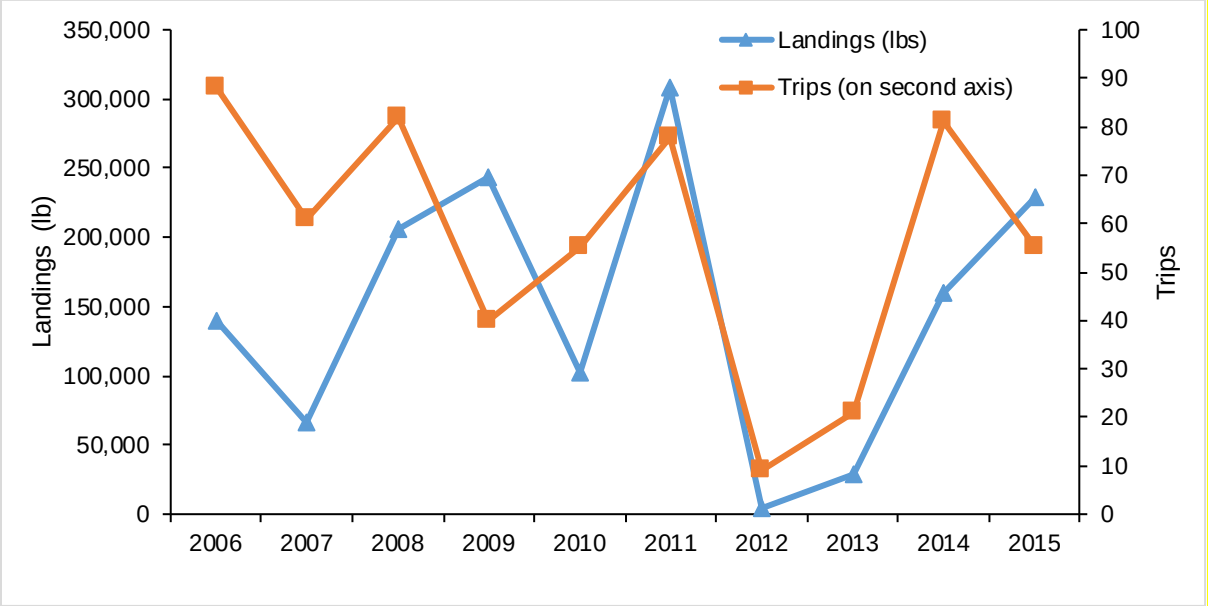


Figure 1. North Carolina commercial landings (lb) and trips for scup north of Cape Hatteras 2006-2015.

FISHERY MANAGEMENT PLAN UPDATE
SHARKS
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	August 2008
Amendments:	None
Revisions:	Addendum I (September 2009) Addendum II (May 2013) Addendum III (October 2013)
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	None

The Atlantic States Marine Fisheries Commission (ASMFC) adopted a fishery management plan (FMP) for coastal sharks in 2008 to complement federal management actions and increase protection of pregnant females and juveniles in inshore nursery areas. The FMP regulates 40 different species of coastal sharks found on the Atlantic coast. The ASMFC does not actively set quotas for any shark species and follows National Marine Fisheries Service (NOAA Fisheries) openings and closures for all shark management groups. Species in the prohibited category may not be possessed or taken. Sandbar sharks (*Carcharhinus plumbeus*) may only be taken with an Atlantic Highly Migratory Species (HMS) Shark Research Fishery Permit. All species must be landed with their fins attached to the carcass by natural means through offloading, with the exception of smooth dogfish (i.e. smoothhound sharks (*Mustelus canis*)). Addendum I (2009) modified the FMP to allow limited smooth dogfish processing at sea (removal of fins from the carcass), removed smooth dogfish recreational possession limits, and removed gillnet check requirements for smooth dogfish fishermen. The goal of Addendum I was to remove restrictive management intended for large coastal sharks from the smooth dogfish fishery, and to allow fishermen to continue their operations while upholding the conservation measures of the FMP. Addendum II (2013) modified the FMP to allow year round smooth dogfish processing at sea and allocated state-shares of the smooth dogfish federal quota. The goal of Addendum II was to implement an accurate fin-to-carcass ratio and prevent the quota of smoothhound shark (formally smooth dogfish) from being harvested in one state. Addendum III (2013) modified the species groups to ensure consistency with NOAA Fisheries. The addendum also increased the recreational size limit for all hammerhead sharks species to 78-in fork length.

Management Unit

The management unit includes the entire coast-wide distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ. The management unit is split between

the Atlantic and Gulf of Mexico regions for aggregated large coastal, hammerhead, non-blacknose small coastal and blacknose sharks. No regional quotas are in place for pelagic shark species.

Goal and Objectives

The Interstate Fishery Management Plan for Coastal Sharks (FMP) established the following goal and objectives.

The goal of the Interstate Fishery Management Plan for Coastal Sharks is "to promote stock rebuilding and management of the coastal shark fishery in a manner that is biologically, economically, socially, and ecologically sound."

In support of this goal, the following objectives are in place for the Interstate Shark FMP:

- Reduce fishing mortality to rebuild stock biomass, prevent stock collapse, and support a sustainable fishery.
- Protect essential habitat areas such as nurseries and pupping grounds to protect sharks during particularly vulnerable stages in their life cycle.
- Coordinate management activities between state and federal waters to promote complementary regulations throughout the species' range.
- Obtain biological and improved fishery related data to increase understanding of state water shark fisheries.
- Minimize endangered species bycatch in shark fisheries.

STATUS OF THE STOCK

Stock Status

Stock status is assessed by species complex for most coastal shark species and by species group for species with enough data for an individual assessment (Table 1).

Stock Assessment

Refer to Table 1 for stock status information by species and species group. The Southeast Data, Assessment and Review (SEDAR) completed a benchmark stock assessment on the smoothhound (smooth dogfish) shark complex (*Mustelus spp*.) in both the Gulf of Mexico and the Atlantic. The assessment found that neither stock was overfished or experiencing overfishing. A 2011 benchmark assessment of dusky (*Carcharhinus obscures*), sandbar, and blacknose (*Carcharhinus acrontus*) sharks indicates that both sandbar and dusky sharks continue to be overfished with overfishing occurring for dusky sharks. Blacknose sharks, part of the SCS 3 complex, are overfished with overfishing occurring. The Board approved the assessment for management use in February 2012, and NOAA Fisheries' Highly Migratory Species Division (HMS) has incorporated the results of the assessment as part of Amendment 5a to its FMP. Porbeagle sharks (*Lamna nasus*) were assessed by the International

Commission for the Conservation of Atlantic Tunas (ICCAT) Standing Committee on Research and Statistics in 2009. The assessment found that while the Northwest Atlantic stock is increasing in biomass, the stock is considered to be overfished with overfishing not occurring. The 2007 SEDAR 13 assessed the SCS complex, finetooth (*Carcharhinus isodon*), Atlantic sharpnose (*Rhizoprionodon terraenovae*), and bonnethead (*Sphyrna tiburo*) sharks. The SEDAR 13 peer reviewers considered the data to be the 'best available at the time' and determined the status of the SCS complex to be 'adequate.' Finetooth, Atlantic sharpnose and bonnethead were all considered to be not overfished and not experiencing overfishing. Atlantic sharpnose and bonnethead were more recently assessed by SEDAR 34, and are still considered not overfished or undergoing overfishing. SEDAR 11 (2006) assessed the LCS complex and blacktip sharks (*Carcharhinus limbatus*). The LCS assessment suggested that it is inappropriate to assess the LCS complex as a whole due to the variation in life history parameters, different intrinsic rates of increase, and different catch and abundance data for all species included in the LCS complex. Based on these results, NMFS changed the status of the LCS complex from overfished to unknown. As part of SEDAR 11, blacktip sharks were assessed for the first time as two separate populations: Gulf of Mexico and Atlantic. The results indicated that the Gulf of Mexico stock is not overfished and overfishing is not occurring, while the current status of blacktip sharks in the Atlantic region is unknown.

STATUS OF THE FISHERY

Current Regulations

Commercial

All non-prohibited coastal shark complexes opened on January 1, 2015, with the exception of large coastal sharks that opened on July 1, 2015 and porbeagle sharks which remained closed due to overharvest (Table 2). These openings followed NOAA Fisheries openings of the species complexes. NOAA Fisheries closes the shark complexes when 80% of their quota is reached. When the fishery closes in federal waters, the Interstate FMP dictates that the fishery also closes in state waters. No harvest of size restrictions is in place with the exception of large coastal sharks, it is unlawful to possess more than 36 large coastal sharks per trip. It is unlawful to possess any shark (with the exception of smooth dogfish) without tail and fins naturally attached to the carcass through offloading. Commercial fishermen may completely remove the fins of smooth dogfish. If fins are removed, the total wet weight of the shark fins may not exceed twelve (12%) of the total dressed weight of smooth dogfish carcasses landed or found onboard a vessel. It is unlawful for a vessel to retain, transship, land, store or sell scalloped hammerhead, great hammerhead or smooth hammerhead sharks with pelagic longline gear onboard. It is unlawful for a vessel to retain sandbar sharks unless the vessel is selected to participate in the shark research fishery, subject to retention limits established by NOAA Fisheries and only when a NOAA Fisheries-approved observer is onboard. It is unlawful to use gears other than rod and reel, handlines, large and small mesh gill nets, shortlines (maximum of two shortlines, 500 yards each with 50 hooks or less, hooks shall not be corrosion resistant and must be designated by the manufacturer as circle hooks),, pound nets/fish traps, and trawl nets. It is unlawful to use a large mesh (stretched mesh size greater than or equal to 5-in) gill net more than 2,734 yards in length to capture sharks. It is unlawful to sell sharks to anyone who is not a federally permitted shark dealer.

NOAA Fisheries sets quotas for coastal sharks through their 2006 Consolidated Highly

Migratory Species Fishery Management Plan (HMS FMP). As indicated above, the states follow NOAA Fisheries openings and closings, which are based on those quotas (Table 2).

Recreational

All non-prohibited coastal shark complexes opened on January 1, 2015. These openings followed NOAA Fisheries openings of the species complexes. It is unlawful for a recreational angler to possess more than one Atlantic sharpnose, and one bonnethead and one additional shark from the recreationally permitted species list (Table 3) per person per calendar day. Additionally, if fishing from a vessel, it is unlawful to have more than one additional shark from the recreationally permitted species list aboard a vessel, per calendar day, regardless of the number of people on board the vessel. It is unlawful to possess silky sharks (*Carcharhinus falciformis*) and sandbar for recreational purposes. It is unlawful to possess great hammerhead, smooth hammerhead and scalloped hammerhead sharks less than 78-in [(fork length) Table 4]. It is unlawful to possess the rest of the Large Coastal Shark and Pelagic Shark species less than 54-in long [(fork length) Table 4]. Smooth dogfish and small coastal sharks have no minimum size. Spiny dogfish are exempt from harvest and size restrictions. It is unlawful for recreational fishermen to possess any shark without head, tail, and fins intact with the carcass through the point of landing. Anglers may still gut and bleed the carcass as long as the tail is not removed. Filleting sharks at sea is prohibited. It is unlawful to fail to return all sharks not meeting harvest requirements (including prohibited species) to the water in a manner that ensures the highest likelihood of survival. It is unlawful for recreational fishermen to catch sharks by any gear other than rod and reel or handlines. Handlines are defined as a mainline with no more than two gangions or hooks attached that are retrieved by hand only. It is unlawful to possess a great hammerhead, scalloped hammerhead, smooth hammerhead or oceanic whitetip shark while in possession of tunas, billfish or swordfish.

Commercial Landings

Coastwide commercial landings of Atlantic aggregated large coastal shark species in 2015 were 327,202 lb dressed weight (dw). Commercial landings of hammerhead sharks were 39,545 lb dw. Both large coastal and hammerhead landings were slightly higher compared to 2014 by a total of 9,572 lb dw. Commercial landings of non-blacknose small coastal shark species in 2015 were 307,371 lb dw. Commercial landings of blacknose sharks were 45,405 lb dw. This is an increase of approximately 86,294 lb dw from 2014 due to the reopening of the non-blacknose small coastal shark fishery north of 34° N latitude. The non-blacknose small coastal shark quota in the Atlantic was linked to the Atlantic blacknose shark quota and the fishery closed prematurely on June 7, 2015 for the whole Atlantic. Starting August 18, 2015 this link was removed for non-blacknose small coastal sharks caught north of 34° N latitude. Landings of Atlantic pelagic species of sharks were 213,974 lb dw 2015. This is a decrease of approximately 125,345 lb dw from 2014.

Recreational Landings

Recreational harvest for small coastal sharks has fluctuated from a peak harvest number of 6,299 in 2007 to a low of 1,449 in 2012, and averaged 3,523 from 2006 to 2015. Recreational landings ranged from 8,038 lb whole weight (ww) to 36,544 lb ww and averaged 21,826 lb ww from 2006 to 2015 (Table 5).

Recreational harvest for large coastal sharks has been on a much smaller magnitude compared to small coastal sharks. Harvest numbers have ranged from 0 to 1,105 and averaged 281 sharks from 2006 to 2015. Recreational landings ranged from 0 lb ww to 22,634 lb ww and averaged 7,146 lb ww from 2006 to 2015 (Table 6).

Recreational harvest of pelagic sharks is similar to large coastal sharks. Harvest numbers for pelagic sharks ranged from 28 to 576 and averaged 145 sharks from 2006 to 2015. Recreational landings ranged from 1,219 lb ww to 63,862 lb ww and averaged 14,182 lb ww from 2006 to 2015 (Table 7).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

North Carolina does not collect individual lengths for sharks other than spiny dogfish, due to the fish arriving at the dock dressed (i.e head and tail removed).

Fishery-Independent Monitoring

NCDMF has an independent red drum longline project established in 2007, which allows for capture and tagging of Atlantic coastal sharks. The independent red drum longline project in the Pamlico Sound resulted in a catch of 12 coastal sharks in 2015 (Table 8). Three species of sharks were captured; six blacktip, two sandbar, and four Atlantic sharpnose. A total of three blacktip and two sandbar were also tagged with Northeast Fisheries Science Center's (NEFSC) Apex Predators Program tags.

A fisheries independent gill net survey was initiated in the Pamlico Sound of North Carolina in 2001. The objective of this project is to provide annual independent relative indices of abundance for key estuarine species in sounds and rivers that can be incorporated into stock assessments and used to improve bycatch estimates, evaluate management measures, and evaluate habitat usage. Results from this project are used by the NCDMF and other Atlantic coast fishery management agencies to evaluate the effectiveness of current management measures and to identify additional measures that may be necessary to conserve marine and estuarine stocks. Developing fishery independent indices of abundance for target species allows the NCDMF to assess the status of these stocks without relying solely on commercial and recreational fishery dependent data. Sampling is a stratified random sampling design in Pamlico Sound, utilizing multiple mesh gill nets (3.0-6.5-in, ½-in increments). In 2015, a total of 278 individual coastal sharks were captured in the Pamlico Sound independent gill net survey (Table 9).

The Fisheries Independent Assessment Program Ocean Gillnet began in February, 2008, funded by the Coastal Recreational Fishing License receipts and sampling was discontinued in 2015. The program utilized the same sampling framework as the fisheries independent gill net survey. This program was designed to gather data on fishes utilizing the nearshore ocean (<3 miles) from New River Inlet south to the SC/NC state line and the Cape Fear and New Rivers. The goals of the program were to provide CPUE data for coastal fishes, to supplement age, growth, and reproduction studies, to evaluate catch rates and species distribution for use in management plans, and to characterize habitat use. Sampling was discontinued in 2015 at the recommendation of the NCDMF Biological Review Team (BRT) and

Management Review Team (MRT) due to concerns with the overall CPUE of target species in the Atlantic Ocean (remaining low) and the PSE were high for most species.

MANAGEMENT STRATEGY

These species cross domestic and international boundaries; NOAA Fisheries' HMS Management Division is responsible for managing them under the Magnuson-Stevens Fishery Conservation and Management Act. In cooperation with an advisory panel, the division develops and implements fishery management plans for these species taking into account various domestic and international requirements. The ASMFC adopts NOAA Fisheries regulations in state waters.

MANAGEMENT AND RESEARCH NEEDS

The 2013 review of the ASMFC FMP for coastal sharks lists the following research needs:

Species-Specific Priorities

- Investigate the appropriateness of using vertebrae for ageing adult sandbar sharks. If appropriate, implement a systematic sampling program that gathers vertebral samples from entire size range for annual ageing to allow tracking the age distribution of the catch as well as updating of age-length keys.
- Re-evaluate finetooth shark life history in the Atlantic Ocean in order to validate fecundity and reproductive periodicity.
- Develop and conduct tagging studies on dusky and blacknose stock structure with increased international collaboration (e.g., Mexico) to ensure wider distribution and returns of tags.
- Expand research efforts directed towards tagging of individuals in south Florida and Texas/Mexico border to get better data discerning potential stock mixing.

General Priorities

- Generally update age and growth and reproductive studies for all species currently assessed.
- Examine female sharks during the pupping periods to determine the proportion of reproductive females.
- Expand or develop monitoring programs to collect appropriate length and age samples from the catches in the commercial sector by gear type, from catches in the recreational sector, and from catches taken in research surveys to provide reliable length and age compositions for stock assessments.
- Evaluate to what extent the different CPUE indices track population abundance (e.g., through power analysis).
- Explore modeling approaches that do not require an assumption that the population is at virgin level at some point in time.

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TABLES

Table 1. Stock status of Atlantic coastal shark species and species groups (ASMFC 2015).

Species or Complex Name	Stock Status		References/Comments
	Overfished	Overfishing is Occuring	
Pelagic			
Porbeagle	Y	N	Porbeagle Stock Assessment, ICCAT Standing Committee on Research and Statistics Report (2009)
Blue	N	N	ICCAT Standing Committee on Research and Statistics Report (2008)
Shortfin mako	N	N	ICCAT Standing Committee on Research and Statistics Report (2012)
All other pelagic sharks	Unknown	Unknown	
Large Coastal Sharks			
Blacktip	Unknown	Unknown	SEDAR 11 (2006)
Aggregated Large Coastal Sharks-Atlantic Region	Unknown	Unknown	SEDAR 11 (2006); difficult to assess as a species complex due to various life history characteristics/lack of available data
Non-blacknose Small Coastal Sharks (SCS)			
Atlantic Sharpnose	N	N	SEDAR 34 (2013)
Bonnethead	N	N	SEDAR 34 (2013)
Finetooth	N	N	SEDAR 13 (2007)
Hammerhead			
Scalloped	Y	Y	SEFSC Scientific Review (2009): Rebuilding ends in 2023 (HMS Am. 5a)
Blacknose			
Blacknose	Y	Y	SEDAR 21 (2010); Rebuilding ends in 2043 (HMS Am. 5a)
Smoothhound			
Smooth Dogfish	N	N	SEDAR 39 (2010)
Research			
Sandbar	Y	N	SEDAR 21 (2010)
Prohibited			
Dusky	Y	Y	SEDAR 21 (2010): Rebuilding ends in 2108 (HMS Am. 2)
All other prohibited sharks	Unknown	Unknown	

Table 2. Summary of the 2015 coastwide and North Carolina 2015 Atlantic coastal shark commercial fishery (NOAA Fisheries and NCTTP).

Management Group	Region	2015 Annual Adjusted Quota (lb dw)	Season Opening Date	Season Closing Date	2015 Estimated Coastwide Landings (lb dw)	2015 NC Commercial Landings (lb dw)
Aggregated Large Coastal Sharks	Atlantic	372,552	1/1/2015	12/31/2015	327,202	150,394
Hammerhead Sharks		59,736			39,545	41,768
Non-Blacknose Small Coastal Sharks		582,333		12/31/2015	307,731	371,069
Blacknose Sharks		38,638		6/7/2015 (south of 34º N Lat.)	45,405	3,957
Blue Sharks	No Regional Quotas	601,856	1/1/2015	12/31/2015	1,114	0
Porbeagle Sharks		0		Closed 2015	0	0
Pelagic Sharks Other Than Porbeagle or Blue		1,075,856		12/31/2015	212,860	176,882

*NCTTP program landings higher than estimated coast-wide due to the error in estimation

Table 3. Recreationally permitted species list.

SPECIES AUTHORIZED FOR RECREATIONAL HARVEST			
Large Coastal Sharks (LCS) (non-ridgeback* LCS & tiger)	Small Coastal Sharks (SCS)	Pelagic Sharks	Other
Blacktip Bull Hammerhead, great** Hammerhead, scalloped** Hammerhead, smooth** Lemon Nurse Spinner Tiger	Atlantic Sharpnose Blacknose Bonnethead Finetooth	Blue Oceanic whitetip** Porbeagle Shortfinmako Thresher	smoothhound shark (smooth dogfish)

Table 4. Recreational size and bag limits.

RECREATIONALSIZE / BAG LIMITS and SEASONS			
Species	Minimum Size (Fork Length) in Inches (“)	Trip Bag Limit/Calendar Day	Season
Atlantic sharpnose	None	1 per person of each species	Jan. 1 – Dec. 31
Bonnethead	None		
Hammerheads (Great, Smooth and Scalloped)	78”	1 per vessel OR 1 per person for shore-anglers	
Large Coastal Sharks (LCS), Tiger and Pelagic Sharks	54”		
Small Coastal Sharks (SCS)	None		

Table 5. MRIP small coastal shark recreational harvest and discards 2006-2015 (NMFS 2016).

Year	Harvest Number (A+B1, MRIP)	PSE (Num)	Weight (lb), (A+B1, MRIP)	PSE (lb)	Number Released (MRIP)	PSE
2006	4,605	69.2	27,690	69.6	24,791	54.1
2007	6,299	60.7	33,127	52.2	2,782	70.8
2008	3,268	66.4	18,610	66.4	0	
2009	3,402	38.7	29,148	44.6	1,260	65.3
2010	5,989	31.9	36,544	34.1	12,358	59.6
2011	2,127	42.8	15,414	44.0	11,049	29.9
2012	1,449	51.6	9,839	51.6	3,319	46.5
2013	1,325	37.6	8,038	39.4	5,736	43.6
2014	2,796	32.0	15,657	31.1	1,662	45.1
2015	3,973	32.7	24,188	32.1	5,132	50.1
10 Yr Ave	**3,523**		**21,826**			

*PSE higher than 50 indicates a very imprecise estimate.

Table 6. MRIP large coastal shark recreational harvest and discards 2006-2015 (NMFS 2015).

Year	Harvest Number (A+B1)	PSE (Num)	Weight (lb), (A+B1)	PSE (lb)	Number Released	PSE
2006	118	101.3	6,789	101.3	4,179	57.3
2007	1,105	70.0	17,344	46.0	8,731	46.9
2008	61	104.8	798	104.8	0	
2009					582	89.1
2010	388	94.0	685	94.0	10589	57.2
2011	305	99.9	471	99.9	3,342	77.9
2012	243	76.7	22,634	64.1	3,898	59.7
2013	59	113.4	11,128	113.4	2,776	35.1
2014	242	79.0	4,464	80.2	7,993	54.6
2015	10	99.9	0		25,511	50.9
10 Yr Ave	**281**		**7,146**			

*PSE higher than 50 indicates a very imprecise estimate.

Table 7. MRIP pelagic shark recreational harvest and discards 2006-2015 (NMFS 2015).

Year	Harvest Number (A+B1, MRIP)	PSE (Num)	Weight (lb), (A+B1, MRIP)	PSE (lb)	Number Released (MRIP)	PSE
2006	254	68.6	24,001	66.5	428	95.2
2007	80	74.3	7,439	74.9	11	112.3
2008	30	79.8	2,693	79.8		
2009	102	55.6	9,009	55.1		
2010	87	78.2	13,559	84.4	116	98.9
2011	88	77.0	5,356	68.6	25	63.8
2012	172	63.2	11,697	61.1	13	98.0
2013	28	100.8	1,219	100.8	374	96.4
2014	37	56.0	2,981	53.4	62	110.8
2015	576	78.0	63,862	84.1	467	93.9
10 Yr Ave	**145**		**14,182**			

*PSE higher than 50 indicates a very imprecise estimate.

Table 8. Shark species captured in the NCDMF 2015 independent red drum longline project in the Pamlico Sound.

Species	Number Measured	Min of TL (mm)	Max of TL (mm)	Average of TL (mm)
Atlantic Sharpnose Shark	4	480	526	502
Blacktip Shark	6	1,210	1,592	1,328
Sandbar Shark	2	955	965	960
Total	12			

Table 9. Shark species captured in the NCDMF 2015 Pamlico Sound independent gill net survey.

Species	Number Measured	Min of TL (mm)	Max of TL (mm)	Average of TL (mm)
Atlantic Sharpnose Shark	202	296	1,020	682
Blacknose Shark	3	963	1,277	1,082
Blacktip Shark	4	955	1,269	1,161
Bonnethead Shark	19	770	1,400	980
Bull Shark	10	595	926	802
Dusky Shark	2	665	1,120	893
Sand Tiger Shark	1	2,438	2,438	2,438
Sandbar Shark	6	394	835	680
Smooth Dogfish	29	555	1,289	829
Thresher Shark	2	1,790	1,803	1,797
Total	**278**			

FISHERY MANAGEMENT PLAN UPDATE
SNAPPER GROUPER COMPLEX
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption: August 1983 (SAFMC 1983a,b; 48 FR 39463)

Amendments:

Amendment	Amendment approved	All Actions Effective By:
Regulatory Amendment 1	1987	March 1987
Regulatory Amendment 2	1988	March 1989
Amendment 1	1988	January 1989
Regulatory Amendment 3	1989	November 1990
Amendment 2	1990	December 1990
Amendment 3	1990	January 1991
Amendment 4	1991	January 1992
Amendment 5	1992	April 1992
Regulatory Amendment 4	1992	July 1993
Regulatory Amendment 5	1992	July 1993
Amendment 6	1993	July 1994
Amendment 7	1994	January 1995
Regulatory Amendment 6	1994	May 1995
Amendment 8	1997	December 1998
Regulatory Amendment 7	1998	January 1999
Amendment 9	1998	February 1999/ October 2000
Amendment 10	1998	July 2000
Amendment 11	1998	December 1999
Regulatory Amendment 8	2000	November 2000
Amendment 12	2000	September 2000
Amendment 13a	2003	April 2004
Amendment 13c	2006	October 2006
Amendment 14	2007	February 2009
Amendment 15a	2008	March 2008
Amendment 15b	2008	February 2010
Amendment 16	2009	July 2009
Amendment 19	2009	July 2010
Amendment 17a	2010	March 2011

Amendment 17b	2010	January 2011
Regulatory Amendment 10	2011	May 2011
Regulatory Amendment 9	2011	July 2011
Regulatory Amendment 11	2012	May 2012
Amendment 25	2012	April 2012
Amendment 24	2012	July 2012
Amendment 23	2011	January 2012
Amendment 18a	2012	July 2012/ January 2013
Amendment 20a	2012	October 2012
Regulatory Amendment 12	2012	October 2012
Amendment 18b	2012	May 2013
Regulatory Amendment 13	2013	July 2013
Regulatory Amendment 14	2013	December 2014
Regulatory Amendment 15	2013	September 2013
Amendment 27	2013	January 2014
Amendment 31	2013	January 2014
Amendment 28	2013	August 2013
Regulatory Amendment 18	2013	September 2013
Regulatory Amendment 19	2013	October 2013
Regulatory Amendment 21	2014	November 2014
Amendment 32	2014	March 2015
Amendment 29	2015	July 2015
Regulatory Amendment 22	2015	August/ September 2015
Regulatory Amendment 20	2015	August 2015
Amendment 33	2015	January 2016
Amendment 34	2015	February 2016
Amendment 35	2015	June 2016

Revisions: N/A

Supplements: N/A

Information Updates: N/A

Schedule Changes: N/A

Next Benchmark Review: N/A

Of the 75 species managed by the South Atlantic Fishery Management Council (SAFMC), 59 of these are included in the Snapper Grouper management complex. Because of its mixed species nature, this fishery offers the greatest challenge for SAFMC to manage successfully. Initially, Fishery Management Plan (FMP) regulations consisted of minimum sizes, gear restrictions and a provision for the designation of special management zones (SMZs). Early

attempts to develop more effective management measures were thwarted by lack of data on both the resource and the fishery. The condition of many of the species within the snapper grouper complex was, and still is, unknown. Improved data collection (in terms of quantity and quality) during the 1980's and 90's has provided more management information on some of the more commercially and recreationally valuable species, but lack of basic management data on many of the species still remains the major obstacle to successful management.

Snapper grouper management is also difficult because many of these species are slow growing, late maturing, hermaphroditic, and long lived, so rebuilding efforts for some species will take years to produce full recovery. Strict management measures, including prohibition of harvest in some cases, have been implemented to rebuild overfished species in the snapper grouper complex. Such harvesting restrictions are beneficial not only in rebuilding species, but also in helping to alleviate the need for these species to be listed in the future.

Regulatory Amendment 1 (48 FR 9864) prohibited fishing in SMZs except with hand-held hook-and-line and spearfishing gear; prohibited harvest of goliath grouper in SMZs; and implemented Special Management Zones (SMZ) off SC and GA.

Regulatory Amendment 2 (54 FR 8342) established two artificial reefs off Ft. Pierce, FL as SMZs.

Amendment 1 (SAFMC 1988; 54 FR 1720) prohibited use of trawl gear to harvest fish in the snapper grouper fishery south of Cape Hatteras, NC and north of Cape Canaveral, FL; defined directed snapper grouper fishery as a vessel with trawl gear and greater than or equal to 200-pounds of snapper grouper species onboard; and established the assumption that vessels with snapper grouper species onboard harvested these fish in the Exclusive Economic Zone (EEZ).

Regulatory Amendment 3 (55 FR 40394) established an artificial reef at Key Biscayne, FL as an SMZ in Dade County, FL; prohibited fish trapping, bottom longlining, spearfishing and harvesting of Goliath grouper in SMZs.

Amendment 2 (SAFMC 1990a; 55 FR 46213) prohibited harvest or possession of Goliath grouper in or from the EEZ in the South Atlantic, and defined overfishing for snapper grouper species according to NMFS 602 guidelines.

Amendment 3 (SAFMC 1990b; 56 FR 2443) established a management program for the wreckfish fishery which: added wreckfish to the snapper grouper management unit; defined OY and overfishing; required an annual permit to fish for, land or sell wreckfish; established a control date of March 28, 1990 for the area bounded by 33° and 30° N. latitude; established a fishing year beginning April 16; established a process whereby annual quotas would be specified; implemented a 10,000 pound trip limit and a January 15 – April 15 spawning season closure.

Amendment 4 (SAFMC 1991a; 56 FR 56016) prohibited the use of various gear, including fish traps, the use of bottom longlines for wreckfish, and powerheads in Special Management Zones off SC; established bag limits and minimum size limits for several species; established income requirements to qualify for permits; and required that all snapper grouper species possessed in South Atlantic federal waters must have heads and fins intact through landing.

Amendment 5 (SAFMC 1991b; 57 FR 7886) established an Individual Transferable Quota (ITQ) management program for the wreckfish fishery.

Regulatory Amendment 4 (SAFMC 1992a; 58 FR 36155) modified the definition of black sea bass pots; allowed for multi-gear trips and the retention of incidentally caught fish.

Regulatory Amendment 5 (SAFMC 1992b; 58 FR 35895) established eight additional Special Management Zones (SMZs) off the coast of SC.

Amendment 6 (SAFMC 1993; 59 FR 27242) established commercial quotas for snowy grouper, golden tilefish; established commercial trip limits for snowy grouper, golden tilefish, speckled hind, and warsaw grouper; included golden tilefish in grouper recreational aggregate bag limits; prohibited sale of warsaw grouper and speckled hind; created the Oculina Experimental Closed Area; and specified data collection needs for evaluation of possible future IFQ system.

Amendment 7 (SAFMC 1994a; 59 FR 66270) established size limits and bag limits for hogfish and mutton snapper; specified allowable gear; prohibited the use of explosive charges, including powerheads, off SC; and required dealer, charter and headboat federal permits.

Regulatory Amendment 6 (SAFMC 1994b; 60 FR 19683) includes provisions to rebuild and protect hogfish by implementing a recreational bag limit of 5 fish per person off FL; protect cubera snapper by implementing a recreational bag limit of 2 per person for fish 30" total length or larger off Florida; and protect gray triggerfish by implementing a minimum size limit of 12-in total length off Florida.

Amendment 8 (SAFMC 1997; 63 FR 38298) established a limited entry system for the snapper grouper fishery.

Regulatory Amendment 7 (63 FR 71793) established 10 SMZs at artificial reefs off SC.

Amendment 9 (SAFMC 1998a; 64 FR 3624; 65 FR 55203) increased the minimum size limits on red porgy, black sea bass, vermillion snapper (recreational only), gag, and black grouper; changed bag limits for red porgy, black sea bass, greater amberjack, gag, and black grouper; established an aggregate recreational bag limit of 20 fish per person per day inclusive of all snapper grouper species currently not under a bag limit, excluding tomtate and blue runners; and specified that vessels with bottom longline gear aboard may only possess snowy grouper, warsaw grouper, yellowedge grouper, misty grouper, golden tilefish, blueline tilefish, and sand tilefish.

Amendment 10 (SAFMC 1998b; 65 FR 37292) identified Essential Fish Habitat (EFH) and EFH - Habitat Areas of Particular Concern for species in the snapper grouper management unit.

Amendment 11 (SAFMC 1998c; 64 FR 59126) amended the Fishery Management Plan (FMP) as required to make definitions of MSY, OY, overfishing and overfished consistent with "National Standard Guidelines"; identified and defined fishing communities; and addressed bycatch management measures.

Regulatory Amendment 8 (65 FR 61114) established 12 SMZs at artificial reefs off GA; revised boundaries of seven existing SMZs off GA to meet Coast Guard permit specs; restricted fishing in new and revised SMZs.

Amendment 12 (SAFMC 2000; 65 FR 51248) set regulatory limits for red porgy including a recreational bag limit, a commercial incidental catch limit, and a recreational and commercial

size limit. It also permitted the transfer of the 225-pound trip limited commercial permit to another vessel (not another person) regardless of vessel size.

Amendment 13A (SAFMC 2003; 69 FR 15731) extended regulations within the Oculina Experimental Closed Area off the east coast of Florida that prohibit fishing for and retention of snapper grouper species for an indefinite period with a 10-year re-evaluation by the Council. The Council will review the configuration and size of the area within 3-years of publication of the Final Rule (March 26, 2004).

Amendment 13C (SAFMC 2006; 71 FR 55096) addressed overfishing for snowy grouper, golden tilefish, black sea bass and vermilion snapper. The amendment also allowed for a moderate increase in the harvest of red porgy as stock continues to rebuild.

Amendment 14 (SAFMC 2007a; 74 FR 1621) established a series of deepwater marine protected areas in the South Atlantic Exclusive Economic Zone.

Amendment 15A (SAFMC 2008a; 73 FR 14942) updated management reference points for snowy grouper, black sea bass, and red porgy; modified rebuilding schedules for snowy grouper and black sea bass; defined rebuilding strategies for snowy grouper, black sea bass, and red porgy; and redefined the minimum stock size threshold for the snowy grouper stock.

Amendment 15B (SAFMC 2008b; 74 FR 58902) prohibited sale the sale of bag-limit caught snapper grouper species; reduced the effects of incidental hooking on sea turtles and smalltooth sawfish; changed the commercial permit renewal period and transferability requirements; implemented a plan to monitor and address bycatch; and established management reference points for golden tilefish. Amendment 15B also established allocations between recreational and commercial fishermen for snowy grouper and red porgy.

Amendment 16 (SAFMC 2009a; 74 FR 30964) included measures to end overfishing for gag grouper and vermilion snapper; established commercial and recreational allocations for both species; established a January through April spawning season closure for gag, black grouper, red grouper, scamp, red hind, rock hind, yellowmouth grouper, tiger grouper, yellowfin grouper, graysby, and coney; reduced the aggregate grouper bag limit from 5 fish to 3 fish, and within that, reduced the gag bag limit from 2 fish to 1 gag or black grouper, combined; reduced the vermilion snapper bag limit from 10 fish to 5 fish; established a recreational closed season for vermilion snapper of November through March; excluded captain and crew on for-hire vessels from retaining a bag limit of groupers; and required the use of dehooking tools to reduce bycatch mortality.

Amendment 19 (SAFMC 2009b; 75 FR 35330) was included under the Comprehensive Ecosystem-Based Amendment 1 (CE-BA 1) and included measures to provide presentation of spatial information for Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concern (EFH-HAPC) designations under the Snapper Grouper FMP; and designation of deepwater coral HAPCs.

Amendment 17A (SAFMC 2010a; 75 FR 76874) addressed management measures to end overfishing of red snapper and rebuild the stock, including Annual Catch Limits and Accountability Measures. It extended the prohibition of red snapper in federal waters throughout the South Atlantic EEZ effective immediately. Amendment 17A also included a regulation requiring the use of non-stainless circle hooks north of 28 degrees N. latitude effective March 3, 2011.

Amendment 17B (SAFMC 2010b; 75 FR 82280) established Annual Catch Limits (ACLs) and Accountability Measures (AMs) and addressed overfishing for nine species in the snapper grouper management complex: golden tilefish, snowy grouper, speckled hind, warsaw grouper, black grouper, black sea bass, gag, red grouper, and vermilion snapper. Measures in Amendment 17B included a deepwater closure (240 ft. seaward) for deepwater species to help protect warsaw grouper and speckled hind. Additional measures in the amendment included a reduction in the snowy grouper bag limit; establishment of a combined ACL for gag, black grouper, and red grouper; an allocation of 97% commercial and 3% recreational for the golden tilefish fishery based on landings history; and establishment of accountability measures as necessary.

Regulatory Amendment 10 (SAFMC 2011a; 76 FR 23728) eliminated the large area closure in Amendment 17A for all snapper grouper species off the coasts of southern GA and north/central FL. The regulatory amendment modified measures implemented in Amendment 17A to end overfishing for red snapper.

Regulatory Amendment 9 (SAFMC 2011b; 76 FR 34892) reduced the bag limit for black sea bass from 15 fish per person to 5 fish per person, established trip limits on vermilion snapper and gag, and increased the trip limit for greater amberjack.

Regulatory Amendment 11 (SAFMC 2011c; 77 FR 27374) eliminated a restriction on the possession or harvest of some deepwater snapper grouper species in waters greater than 240 feet deep.

Amendment 25 (Comprehensive Annual Catch Limit Amendment) (SAFMC 2011d; 77 FR 15916) met the 2011 deadline mandated by the Magnuson-Stevens Act to establish Annual Catch Limits (ACLs) and Accountability Measures (AMs) for species managed by the Council that are not undergoing overfishing.

Amendment 24 (SAFMC 2011e; 77 FR 34254) proposed measures to end overfishing and establish a rebuilding plan for red grouper. The amendment also implemented or revised parameters such as Maximum Sustainable Yield (MSY), Minimum Stock Size Threshold (MSST), Annual Catch Limits (ACLs) and Accountability Measures (AMs) and specified allocations for the commercial and recreational sectors.

Amendment 23 (Comprehensive Ecosystem-Based Amendment 2) (SAFMC 2011f; 76 FR 82183) included measures to designate the Deepwater MPAs as EFH-HAPCs; limited harvest of snapper grouper species in SC Special Management Zones to the bag limit; and modified sea turtle release gear.

Amendment 18A (SAFMC 2012a; 77 FR 32408; 77 FR 72991) established management actions to limit participation and effort in the black sea bass fishery. Measures included establishment of an endorsement program and other modifications to the commercial black sea bass pot fishery; establishment of a commercial trip limit (all gear-types) for black sea bass; and increased minimum size limits for both commercial and recreational black sea bass fisheries.

Amendment 20A (SAFMC 2012b; 77 FR 59129) defined and reverted inactive shares within the wreckfish ITQ program; redistributed reverted shares to active shareholders; established a share cap; and implemented an appeals process.

Regulatory Amendment 12 (77 FR 61295) adjusted the Annual Catch Limit (ACL) and Optimum Yield (OY) for golden tilefish; specified a commercial Annual Catch Target (ACT); and revised recreational Accountability Measures (AMs) for golden tilefish.

Amendment 18B (SAFMC 2012c; 78 FR 23858) addressed management of golden tilefish. Actions included in the amendment are: An endorsement program for the longline sector of the golden tilefish component of the snapper-grouper fishery; establishment of landings criteria to determine who will receive endorsements; an appeals process for the golden tilefish endorsement program; establishment of a procedure to allow transferability of golden tilefish endorsements; allocation of 75% of the commercial annual catch limit to the longline sector and 25% to the hook-and-line sector; and modification of the golden tilefish trip limit.

Regulatory Amendment 13 (SAFMC 2012d; 78 FR 36113) revised the acceptable biological catch estimates, annual catch limits (including sector annual catch limits), and recreational annual catch targets for 37 un-assessed snapper-grouper species. The revisions incorporated updates to the recreational data for these species, as per the new Marine Recreational Information Program, as well as revisions to commercial and for-hire landings. Regulatory Amendment 13 was necessary to avoid triggering accountability measures for these snapper-grouper species based on annual catch limits that were established by the Comprehensive Annual Catch Limit Amendment in April 2012, using recreational data under the Marine Recreational Fisheries Statistics Survey system.

Regulatory Amendment 14 (SAFMC 2013a; 79 FR 66316) modified the fishing year for greater amberjack; revised the minimum size limit measurement for gray triggerfish; increased the minimum size limit for hogfish; modified the commercial and recreational fishing year for black sea bass; adjusted the commercial fishing season for vermilion snapper; modified the aggregate grouper bag limit; and revised the Accountability Measures for gag and vermilion snapper.

Regulatory Amendment 15 (SAFMC 2013b; 78 FR 49183) modified the existing specification of optimum yield and annual catch limit for yellowtail snapper in the South Atlantic; modified existing regulations for yellowtail snapper in the South Atlantic; and modified the existing gag commercial annual catch limit and accountability measure for gag that requires a closure of all other shallow water groupers (black grouper, red grouper, scamp, red hind, rock hind, graysby, coney, yellowmouth grouper, and yellowfin grouper) in the South Atlantic when the gag commercial annual catch limit is met or projected to be met.

Amendment 27 (SAFMC 2013c; 78 FR 78770) assumed management of Nassau grouper in the Gulf of Mexico; modified the crew size restriction for dual-permitted vessels (those with a Snapper Grouper Unlimited or 225-Pound Permit and a Charter/Headboat Permit for Snapper Grouper); modified the bag limit retention restriction for captain and crew of for-hire vessels; changed the existing snapper grouper framework procedure to allow for more timely adjustments to annual catch limits; and removed blue runner from the fishery management unit.

Amendment 31 (Joint South Atlantic and Gulf of Mexico Generic Headboat Reporting Amendment) (SAFMC 2013d; 78 FR 78779) modified logbook reporting for headboats to require fishing records be reported electronically reported (as regards snapper-grouper species) on a weekly basis.

Amendment 28 (SAFMC 2013e; 78 FR 44461) established a process to determine if a red snapper fishing season will occur each year, including specification of the allowable harvest for both sectors and season length for the recreational sector; an equation to determine the annual catch limit amount for red snapper for each sector; and management measures if fishing for red snapper is allowed.

Regulatory Amendment 18 (SAFMC 2013f; 78 FR 47574) adjusted the annual catch limit (and sector annual catch limits) for vermilion snapper and red porgy based on the stock assessment updates for those two species and removed the annual recreational closure for vermilion snapper.

Regulatory Amendment 19 (SAFMC 2013g; 78 FR 58249) adjusted the black sea bass annual catch limits based on the results of the 2013 assessment. Because the increase to the annual catch limit was substantial, there was concern that this could extend fishing with pots into the calving season for right whales and create a risk of entanglement for large migratory whales during the fall months. To minimize this risk, the amendment also established a closure to black sea bass pot gear from November 1 to April 30.

Regulatory Amendment 21 (SAFMC 2014a; 79 FR 60379) prevents snapper-grouper species with low natural mortality rates (red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack) from being unnecessarily classified as overfished. For these species, even small fluctuations in biomass due to natural conditions rather than fishing mortality may cause a stock to be classified as overfished. Modifying the minimum stock size threshold definition (used in determining whether a species is overfished) prevents these species from being classified as overfished unnecessarily.

Amendment 32 (SAFMC 2014b; 80 FR 16583) addressed the determination that blueline tilefish are overfished and undergoing overfishing. The amendment removed blueline tilefish from the deep-water complex; established blueline tilefish commercial and recreational sector annual catch limits (ACLs) and accountability measures (AMs); revised the deep-water complex ACLs and AMs; established a blueline tilefish commercial trip limit; and revised the blueline tilefish recreational bag limit and harvest season.

Amendment 29 (SAFMC 2014c; 80 FR 30947) revised annual catch limits (ACLs) and recreational annual catch targets (ACTs) for four unassessed snapper grouper species (bar jack, Atlantic spadefish, scamp, and gray triggerfish) and three snapper grouper species complexes (snappers, grunts, and shallow water groupers) based on an update to the acceptable biological catch (ABC) control rule and revised ABCs for 14 snapper-grouper stocks (bar jack, margate, red hind, cubera snapper, yellowedge grouper silk snapper, Atlantic spadefish, gray snapper, lane snapper, rock hind, tomtate, white grunt, scamp, and gray triggerfish). Additionally, this final rule revises management measures for gray triggerfish in federal waters in the South Atlantic region, including modifying minimum size limits, establishing a split commercial season, and establishing a commercial trip limit.

Regulatory Amendment 22 (SAFMC 2015a; 80 FR 48277) adjusted the ACLs and OY for gag and wreckfish. Changes to the gag recreational bag limit were proposed, but status quo was maintained.

Regulatory Amendment 20 (SAFMC 2014d; 80 FR 43033) increased the recreational and commercial ACLs for snowy grouper, increased the commercial trip limit, and modified the

recreational fishing season. This amendment also adjusted the re-building strategy for snowy grouper.

Amendment 33 (SAFMC 2015b; 80 FR 80686) updated regulations that allow snapper-grouper fillets to be brought into the United States Exclusive Economic Zone from the Bahamas. Snapper grouper fillets form the Bahamas must have the skin intact, two fillets (regardless of size) will count as one fish towards the bag limit, and fishermen must abide by both US and Bahamian bag/possession limits (whichever is more restrictive). All boats must have the proper permits, and fishermen must carry passports which are required to be stamped and dated to prove vessel passengers were in the Bahamas. All fishing gear must be appropriately stowed while in transit.

Amendment 34 (SAFMC 2015c; 81 FR 3731) revised the accountability measures for several snapper grouper species (black grouper, mutton snapper, yellowtail snapper, greater amberjack, red porgy, gag, golden tilefish, red grouper, snowy grouper, gray triggerfish, hogfish, scamp, Atlantic spadefish, bar jack, snappers complex, jacks complex, shallow water grouper complex, porgies complex, and wreckfish (recreational).

Amendment 35 (SAFMC 2015d; 81 FR 32249) becomes effective June 22, 2016. This amendment clarifies regulations governing the use of golden tilefish longline endorsements to align them with the SAFMC's intent when the program was originally implemented. Four species will also be removed from the FMP (black snapper, mahogany snapper, dog snapper, and schoolmaster).

There are several other amendments either in development or under secretarial review (Table 1).

Management Unit

The original SAFMC plan stated the management unit of the snapper-grouper fishery is the stocks within the EEZ from North Carolina/ Virginia border through the east coast of Florida. In the case of black sea bass, the unit is limited to south of Cape Hatteras. Since the inception of the FMP, there has been the addition of four species: wreckfish (1990), spadefish, banded rudderfish, and lesser amberjack. In recent years, 14 species have been removed; 13 in 2012 (tiger grouper, sheepshead, queen triggerfish, puddingwife, black margate, yellow jack, Crevalle jack, porkfish, grass porgy, small mouth grunt, French grunt, Spanish grunt, and blue striped grunt) and one in 2014 (blue runner). In June 2016, Amendment 35 removed four additional species from the complex (black snapper, mahogany snapper, dog snapper, and schoolmaster).

Goals and Objectives

The following are the fishery management plan objectives for the snapper grouper fishery as specified by the Council. These were last updated in Snapper Grouper FMP Amendment 8 in July 1997 (SAFMC 1997).

1. Prevent overfishing.

2. Collect necessary data.

3. Promote orderly utilization of the resource.

4. Provide for a flexible management system.
5. Minimize habitat damage.
6. Promote public compliance and enforcement.
7. Mechanism to vest participants.
8. Promote stability and facilitate long-run planning.
9. Create market-driven harvest pace and increase product continuity.
10. Minimize gear and area conflicts among fishermen.
11. Decrease incentives for overcapitalization.
12. Prevent continual dissipation of returns from fishing through open access.
13. Evaluate and minimize localized depletion.

STATUS OF THE STOCK

Stock Status

Concern

Of the 59 species in the South Atlantic Fishery Management Council (SAFMC) management unit, several species are either overfished or experiencing some degree of overfishing. The overfished stocks include red porgy, red snapper, hogfish (East Florida) and snowy grouper. Stocks experiencing overfishing are red snapper, blueline tilefish, speckled hind, Warsaw grouper, and hogfish (East Florida)

Stock Assessment

The status of a number of the species within the snapper grouper complex is unknown. However, for some of the species assessments are available through various federal entities; the snapper grouper complex is regionally (North Carolina south to eastern Florida) managed, and none of the assessments have been conducted by NCDMF (Table 2).

Since 2002, stock assessments have been conducted through the Southeast Data, Assessment, and Review (SEDAR) which is the cooperative process by which stock assessment projects are conducted in NOAA Fisheries' Southeast Region. Currently stock assessments are available for 16 of the complex species. There are assessments scheduled for Goliath grouper (SEDAR 47) and black grouper (SEDAR 48) to be final in 2016. There are also assessments scheduled for red grouper (SEDAR 19 update) and blueline tilefish (SEDAR 50) to be final in 2016/2017; scamp and gray snapper have assessments to be scheduled for 2017. Vermillion snapper and greater amberjack have updates to their assessments scheduled, and black sea bass, snowy grouper, and red porgy have standard assessments scheduled in the next few years.

Some of the other species have status updates provided by National Marine Fisheries Service (NFMS). These updates are based on landings data to determine whether or not the stock is overfished or undergoing overfishing. This information is updated quarterly by NMFS and available on their website (http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/status_updates.html).

STATUS OF THE FISHERY

Current Regulations

The following species have state and federal regulations for minimum lengths:

- Greater amberjack: 28” Fork Length (FL) (recreational); 36” FL (commercial)
- Black and gag groupers: 24” TL
- Red, scamp, yellowfin, and yellowmouth groupers: 20” TL
- Black sea bass: 13” TL (recreational); 11” (commercial)
- Red porgy: 14” TL
- Vermilion, gray, cubera, queen, silk, yellowtail and blackfin snappers: 12” TL
- Hogfish (not pigfish): 12” FL
- Mutton snapper: 16” TL
- Gray triggerfish: 12” FL
- Lane snapper: 8” TL

All species have sector ACLs and recreational bag limits. See the SAFMC or NCDMF websites for the most current information.

The fisheries are open year round, with the exception of:

- Goliath grouper, Nassau grouper, Warsaw grouper, and speckled hind, unlawful to possess/harvest (commercial and recreational)
- Red snapper, unlawful to possess/harvest (commercial and recreational); limited season may occur based on previous years’ data
- January-April shallow water grouper spawning closure (commercial and recreational); Commercial also has same closure for red porgy
- Wreckfish have commercial spawning closure January 15-April 15; recreational fishery open July 1-August 31 annually
- April commercial closure for greater amberjack
- Snowy grouper and blueline tilefish recreational fishery open May 1- August 31

Temporary closures may result for a species if the ACL is met. NOAA fisheries monitors the landings for the species managed by SAFMC, and this information is available online for both the commercial and recreational sectors (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/index.html). See also the SAFMC or NCDMF websites for more details, and the most current information.

Commercial Landings

Commercial gear used in the snapper grouper fishery includes bandit reels, electromate reels, manual hook-and-line, long lines, fish pots, spear, and trolling. Bandit reels, followed by electromate rods and reels are the two most prevalent gear types used, especially south of

Cape Hatteras (NCDMF 2015a). Spear fishing seems to be limited to south of Hatteras, while longlines are primarily fished north of Hatteras (NCDMF 2015a); their use is limited to six deepwater species and depths greater than 50 fathoms. Fish pots are used primarily to target black sea bass. Trip lengths vary dependent on the area fished and the gear used, but tended to average between 2-3d in length over the past 5 years; trips ranged from 1 day to 12 days for the entire commercial snapper grouper fleet (NCDMF 2015a).

The average landings for commercially caught snapper grouper from 2006-2015 was 2,058,952 pounds with a dockside value of $4,568,308.[1] The highest landings from the past 10 years were in 2008 and 2009, after which landings dropped; landings have been under 2 million pounds for the last 4 years (Table 3). The decline in landings over the past 5 years is most likely due to the removal of species from the complex, as well as the changes to annual catch limits and trip limits by the SAFMC (i.e., gag grouper).

Over the last 5-years landings have been dominated by five main aggregates, sea bass, grouper, snapper, triggerfish, and tilefish though the dominant group varies by year (Table 4). The top ten dominant species are: black sea bass, vermillion snapper, blueline tilefish, gag, triggerfish, red grouper, red porgy, amberjack, scamp, and grunts (NCDMF 2015a).

Recreational Landings

Recreational fishing uses many of the same gear types as the commercial fishery, with the exception of fish pots and longlines. The average recreational catch of snapper grouper species was 1,304,774 pounds for 2006-2015. Since 2008, the total amount of fish landed has declined steadily; the highest amount landed was in 2007/2008 and the lowest in 2014 (Table 5). Recreational landings have dropped by approximately 75%. As with the commercial fishery this is most likely due to the removal of species from the complex, as well as the changes to annual catch limits by SAFMC. For the last five years, the number of releases has been above 80% of the total fish caught.

For 2014, the dominant species (by harvest number) landed were black sea bass, white grunt, gray triggerfish, vermillion snapper, blueline tilefish, Atlantic spadefish, and red porgies. This pattern mainly holds true for the last 5 years, though occasionally some of the jack species are dominant (Table 6).

MONITORING PROGRAM DATA

Most of the data (dependent and independent) collected by NCDMF is provided to National Marine Fisheries Service (NMFS). The division received a grant, which ended in 2014, to look the age structure and release mortality of the commercial snapper grouper fishery in general and at the south of Hatteras black sea bass stock age structure specifically. Data collected for this grant is summarized in the final MARFIN reports (NCDMF 2015a, b).

Fishery-Dependent Monitoring

Commercial fisheries are monitored by port agents (state and federal) who collect information on trips, as well as biological information. Information is collected through the Trip Information

[1] These averages do not include sheepshead, as well as a number of other species, as they were removed from the complex in 2012. See Amendment 25 for list of species removed from complex.

Program (TIP), seafood dealer reporting, and logbooks (SAMFC 2014e). Recreational fisheries are monitored by creel clerks through the Southeast Region Headboat Survey program and the Marine Recreation Information Program (MRIP) (SAFMC 2014e). North Carolina contributes to this data through the collection of trip and biological information for both fisheries.

Fishery-Independent Monitoring

The Southeast Reef Fish Survey (SERFS) maintains the fisheries independent data for the snapper grouper complex. SERFS is a collective program for gathering fisheries independent data within the South Atlantic federal waters. There are three primary programs that contribute to the data:

- Marine Resources Monitoring, Assessment, and Prediction (MARMAP) survey
- Southeast Fisheries-Independent Survey (SEFIS), and
- Southeast Area Monitoring and Assessment Program (SEAMAP)- South Atlantic. (SAFMC 2015e).

North Carolina contributes to the data collected through programs such as the gag ingress work done in partnership with SEAMAP.

MANAGEMENT STRATEGY

The snapper grouper complex is managed under the various amendments of the SAFMC fisheries management plan. The fishery is a regional fishery, and the Council has authority within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia, and east Florida to Key West with the exception of black sea bass north of Cape Hatteras, North Carolina. In state waters, North Carolina defers to the Council and the same regulations are followed. Thresholds and targets for the species are determined by the SAFMC and are species dependent.

MANAGEMENT AND RESEARCH NEEDS

The reauthorization of the Magnuson-Stevens Fishery Conservation and Management Act in 2006 directed that all regional management councils develop a prioritized research plan for annual submission to the Secretary of Commerce. The following (below) are research and management needs as determined by the council in 2007 (SAFMC 2007b). All needs are ongoing; however, the emphasis changes annually based on the SAFMC Science and Statistical Committee review of these needs. The reviewed list and priorities for the year are then approved for submission to the NMFS Southeast Fisheries Science Center. The council has a series of research and monitoring needs for the period of 2012-2016 (SAFMC 2012e), and has developed another set of needs for 2015-2019 (SAFMC 2015f).

- Continue monitoring of catches
- Collect otoliths and spines for ageing
- Estimate mortality rates
- Determine if stock structure exists for many of the species
- Note seasonal and spawning migrations
- Identify and map essential/critical fish habitat
- Determine spawning locations and seasons
- Continue life history studies

- Estimate reproductive parameters including fecundity, age and size of maturity, age and size of sexual transition, and sex ratio
- Determine reliability of historical landings
- Expand diet studies
- Develop juvenile and adult indexes

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TABLES

Table 1. Amendments under consideration/review by the SAFMC. Summaries of the issues the amendment addresses are included; documentation is provided as available

Amendment	Issue addressed	Where in process	Documentation
Regulatory 16	Revise the prohibition of fishing with black sea bass pots from November 1- April 30	Approved by SAFMC December 2015; under secretarial review	SAFMC 2016a
Regulatory 25	Adjust the ACLs, OY, and commercial and recreational management measures for the blueline tilefish stock; change fishing year for yellowtail snapper; increase recreational bag limit for black sea bass	Approved by SAFMC December 2015; under secretarial review	1- SAFMC 2016b 2- Proposed rule (81 FR 34944)
26 [Comprehensive Ecosystem-Based Amendment (CE-BA) 3]	Modify bycatch and discard data collection methods/reporting for commercial and for-hire vessels	Under development by council (SAFMC)	
36	Establish spawning Special Management Zones (SMZs) to enhance protection for the snapper-grouper species in spawning condition (inc. speckled hind and Warsaw grouper)	Approved by SAFMC December 2015; under secretarial review	SAFMC 2016c
37	Modify the hogfish fishery management unit (separate into two stocks- NC to GA and Florida Keys/East Florida); specify fishing levels for the two stocks; establish a rebuilding plan for the FKEF stock; establish/revise management measures for both stocks (inc., size limits, recreational bag limits, and commercial trip limits)	Under development by council (SAFMC)	SAFMC 2016d
38	Expand the management boundaries for species in the snapper-grouper fishery management unit; revise management measures for blueline tilefish	Under development by council (SAFMC)	

Table 1 (continued)**.**

Amendment	Issue addressed	Where in process	Documentation
41	Update the ABC, ACL, MSY, MSST, OY, and revise management measures for mutton snapper	Under development by council (SAFMC)	SAFMC 2016e
43	Management measures for red snapper	Under development by council (SAFMC)	
Regulatory 17	Proposed Marine Protected Areas for speckled hind and Warsaw grouper	Not developed	
22	Establish a recreational harvest tag program for species with low ACLs	Not developed	

Table 2. Stock status of the 59 species within the snapper grouper complex. Documentation is provided for the assessment associated with each species. No assessments have been conducted by NCDMF due to the nature of the fishery.

Family (species aggregate)	Species	Overfishing?	Overfished?	Approaching overfished condition?	Documentation
Serranidae (Sea basses and Groupers)	Gag (*Mycteroperca microlepis*)	No** (**based on NMFS assessment)	No	No	SEDAR 10 Update (SEDAR 2014); NMFS 2016
	Red grouper (*Epinephelus morio*)	No	No	No	SEDAR 19 (SEDAR 2010a); NMFS 2016
	Scamp (*Mycteroperca phenax*)	No	Unknown	Unknown	NMFS 2016
	Black grouper (*Mycteroperca bonaci*)	No	No	No	SEDAR 19 (SEDAR 2010b); NMFS 2016
	Rock hind (*Epinephelus adcensionis*)	Unknown	Unknown	Unknown	NMFS 2016
	Red hind (*Epinephelus guttatus*)	Unknown	Unknown	Unknown	NMFS 2016
	Graysby (*Cephalopholis cruentata*)	Unknown	Unknown	Unknown	NMFS 2016
	Yellowfin grouper (*Mycteroperca venenosa*)	Unknown	Unknown	Unknown	NMFS 2016
	Coney (*Cephalopholis fulva*)	Unknown	Unknown	Unknown	NMFS 2016
	Yellowmouth grouper (*Mycteroperca interstitialis*)	Unknown	Unknown	Unknown	NMFS 2016
	Goliath grouper (*Epinephelus itajara*)	No (Permanent closure)	Unknown	Unknown	SEDAR 23 (SEDAR 2011a); NMFS 2016
	Nassau grouper (*Epinephelus striatus*)	No (Permanent closure)	Unknown	Unknown	NMFS 2016
	Snowy grouper (*Epinephelus niveatus*)	No	Yes	No	SEDAR 36 (SEDAR 2013a); NMFS 2016
	Yellowedge grouper (*Epinephelus flavolimbatus*)	Unknown	Unknown	Unknown	NMFS 2016

* indicates ecosystem component species which do not have management measures in place and are not assessed.

Table 2 (continued).

Family (species aggregate)	Species	Overfishing?	Overfished?	Approaching overfished condition?	Documentation
Serranidae (Sea basses and Groupers)	Warsaw grouper (*Epinephelus nigritus*)	Yes (Permanent closure)	Unknown	Unknown	SG Amendment 17b (SAFMC 2010b); NMFS 2016
	Speckled hind (*Epinephelus drummondhayi*)	Yes (Permanent closure)	Unknown	Unknown	SG Amendment 17b (SAFMC 2010b); NMFS 2016
	Misty grouper (*Epinephelus mystacinus*)	Unknown	Unknown	Unknown	NMFS 2016
	Black sea bass (*Centropristis striata*)	No	No	No	SEDAR 25 (SEDAR 2013b); NMFS 2016
	*Bank sea bass (*Centropristis ocyurus*)	N/A	N/A	N/A	
	*Rock sea bass (*Centropristis philadelphica*)	N/A	N/A	N/A	
Polyprionidae (Wreckfish)	Wreckfish (*Polyprion americanus*)	No	No	No	NMFS 2016
Lutjanidae (Snappers)	Queen snapper (*Etelis oculatus*)	Unknown	Unknown	Unknown	NMFS 2016
	Yellowtail snapper (*Ocyusus chrysurus*)	No	No	No	SEDAR 27A (SEDAR 2012c); NMFS 2016
	Gray snapper (*Lutjanus griseus*)	Unknown	Unknown	Unknown	NMFS 2016
	Mutton snapper (*Lutjanus analis*)	No	No	No	SEDAR 15A Update (SEDAR 2015); NMFS 2016
	Lane snapper (*Lutjanus synagris*)	Unknown	Unknown	Unknown	NMFS 2016
	Cubera snapper (*Lutjanus cyanopterus*)	Unknown	Unknown	Unknown	NMFS 2016

* indicates ecosystem component species which do not have management measures in place and are not assessed.

Table 2 (continued).

Family (species aggregate)	Species	Overfishing?	Overfished?	Approaching overfished condition?	Documentation
Lutjanidae (Snappers)	Vermilion snapper (*Rhomboplites aurorubens*)	No	No	No	SEDAR 17 Update (SEDAR 2012a); NMFS 2016
	Red snapper (*Lutjanus campechanus*)	Yes	Yes	N/A	SEDAR Assessment 41 (SEDAR 2016a); NMFS 2016
	Silk snapper (*Lutjanus vivanus*)	Unknown	Unknown	Unknown	NMFS 2016
	Blackfin snapper (*Lutjanus buccanella*)	Unknown	Unknown	Unknown	NMFS 2016
Sparidae (Porgies)	Red Porgy (*Pagrus pagrus*)	No	Yes	No	SEDAR 1 Update (SEDAR 2012b); NMFS 2016
	Knobbed porgy (*Calamus nodosus*)	Unknown	Unknown	Unknown	NMFS 2016
	Jolthead porgy (*Calamus bajonado*)	Unknown	Unknown	Unknown	NMFS 2016
	Scup (*Stenotomus chrysops*)	Unknown	Unknown	Unknown	NMFS 2016
	Whitebone porgy (*Calamus leucosteus*)	Unknown	Unknown	Unknown	NMFS 2016
	Saucereye porgy (*Calamus calamus*)	Unknown	Unknown	Unknown	NMFS 2016
	*Longspine porgy (*Stenotomus caprinus*)	N/A	N/A	N/A	
Haemulidae (Grunts)	White grunt (*Haemulon plumieri*)	Unknown	Unknown	Unknown	NMFS 2016
	Margate (*Haemulon album*)	Unknown	Unknown	Unknown	NMFS 2016
	Tomtate (*Haemulon aurolineatum*)	Unknown	Unknown	Unknown	NMFS 2016

* indicates ecosystem component species which do not have management measures in place and are not assessed.

Table 2 (continued).

Family (species aggregate)	**Species**	**Overfishing?**	**Overfished?**	**Approaching overfished condition?**	**Documentation**
Haemulidae (Grunts)	Sailor's choice (*Haemulon parra*)	Unknown	Unknown	Unknown	NMFS 2016
	*Cottonwick (*Haemulon melanurum*)	N/A	N/A	N/A	
Carangidae (Jacks)	Greater Amberjack (*Seriola dumerili*)	No	No	No	SEDAR 15 (SEDAR 2008); NMFS 2016
	Almaco jack (*Seriola rivoliana*)	Unknown	Unknown	Unknown	NMFS 2016
	Banded rudderfish (*Seriola zonanta*)	Unknown	Unknown	Unknown	NMFS 2016
	Bar jack (*Caranx ruber*)	Unknown	Unknown	Unknown	NMFS 2016
	Lesser Amberjack (*Seriola fasciata*)	Unknown	Unknown	Unknown	NMFS 2016
Malacanthidae (Tilefishes)	Golden tilefish (*Lopholatilus chamaeleonticeps*)	Yes** (**based on SEDAR 25 update)	No	No	SEDAR 25 Update (SEDAR 2016b); NMFS 2016
	Blueline (or gray) tilefish (*Caulolatilus microps*)	Yes	No** (**based on NMFS assessment)	No	SEDAR Assessment 32 (SEDAR 2013c); NMFS 2016
	Sand tilefish (*Malacanthus plumier*)	Unknown	Unknown	Unknown	NMFS 2016
Balistidae (Triggerfishes)	Gray triggerfish (*Balistes capriscus*)	No	Unknown	Unknown	NMFS 2016; SEDAR Assessment 41 (SEDAR 2016c)
	*Ocean triggerfish (*Canthidermis sufflamen*)	N/A	N/A	N/A	
Labridae (Wrasses)	Hogfish (*Lachnolaimus maximus*)	Unknown (Carolinas); Yes (FL)	Unknown (Carolinas); Yes (FL)	No (Carolinas and FL)	NFMS 2016; SEDAR 37 (SEDAR 2013d)
Eppiphidae (Spadefishes)	Atlantic spadefish (*Chaetodipterus faber*)	Unknown	Unknown	Unknown	NMFS 2016

* indicates ecosystem component species which do not have management measures in place and are not assessed.

Table 3. Landings of all snapper grouper species for the commercial fishery for 2006-2015. Sheepshead were removed from the fishery in 2012 and therefore not included past 2011.

Year	Weight of harvested fish (pounds)	Value of Landings (US dollars)
2006	2,656,197	5,360,733
2007	2,628,718	5,937,645
2008	3,204,928	6,809,934
2009	3,090,370	5,970,973
2010	2,532,771	5,293,967
2011	2,046,943	5,143,177
2012	1,763,090	4,424,113
2013	1,782,566	4,410,200
2014	1,615,921	3,989,492
2015	1,360,208	3,319,466

Table 4. Landings (in pounds) of snapper grouper, by aggregate groups, for the commercial fishery from 2011-2015. Aggregate groups are those used by the SAFMC and are done by family (as in Table 2). Sheepshead were removed from the fishery in 2012 and therefore not included past 2011; these are included in the porgy aggregate. Only black sea bass and scup from south of Cape Hatteras are included, as the northern populations are managed by the Atlantic States Marine Fisheries Commission (ASMFC) and the Mid-Atlantic Fisheries Management Council (MAFMC). Wreckfish landings are confidential after 2011.

	Year				
Species	**2011**	**2012**	**2013**	**2014**	**2015**
Sea basses	173,681	194,778	241,403	316,420	226,319
Grouper	408,491	382,085	309,116	299,539	261,016
Wreckfish	23	--	--	--	--
Snapper	326,371	279,367	276,533	251,062	232,015
Porgies	211,699	83,918	72,666	82,655	54,372
Grunts	33,443	49,733	44,698	39,043	32,583
Jacks	73,810	140,525	104,673	202,152	7,607
Tilefish	133,824	361,074	217,079	91,074	45,354
Triggerfish	220,202	143,085	160,573	109,764	53,810
Hogfish	10,793	8,256	7,847	9,767	8,113
Spadefish	21,535	24,238	20,369	22,761	15,994
Unclassified	7,681	12,038	14,928	21,962	23,341

Table 5. Landings of all snapper grouper species for the recreational fishery for 2006-2015. Sheepshead were removed from the fishery in 2012 and therefore not included past 2011.

Year	Number Harvested	Weight of harvested fish (pounds)	Number Released	Percent Released
2006	556,106	2,151,369	1,820,128	77%
2007	796,483	2,676,376	1,845,786	70%
2008	733,013	3,000,717	1,453,381	66%
2009	620,080	2,360,469	1,181,280	66%
2010	555,203	1,771,445	1,341,356	71%
2011	260,892	715,181	1,196,614	82%
2012	313,026	840,786	2,183,573	87%
2013	190,045	514,086	1,503,181	89%
2014	175,681	447,975	1,439,193	89%
2015	174,411	514,530	1,610,973	90%

Table 6. Recreational landings (in pounds), by aggregate groups, for 2011-2015. Aggregate groups are those used by the SAFMC and are done by family (as in Table 2). Sheepshead were removed from the fishery in 2012 and therefore not included past 2011; these are included in the porgy aggregate. Only black sea bass from south of Cape Hatteras are included, as the northern population is managed by ASMFC.

Species aggregate	Year				
	2011	2012	2013	2014	2015
Black sea bass	95,924	120,468	58,233	131,171	96,260
Groupers	107,852	126,567	54,417	18,972	21,125
Snappers	25,167	60,164	14,013	14,603	15,147
Porgies	191,262	26,249	16,720	15,658	9,420
Grunts	44,213	95,724	26,769	39,266	32,119
Jacks	138,703	175,197	197,482	88,427	272,051
Tilefish	27,163	43,681	33,525	36,760	4,821
Triggerfish	77,371	148,982	96,262	68,138	55,208
Hogfish	1,539	14,961	3,619	0	0
Atlantic Spadefish	2,711	25,905	12,459	34,789	7,804

FISHERY MANAGEMENT PLAN UPDATE
SPANISH MACKEREL
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	February 1983
Amendments:	Amendment 2 – July 1987 Amendment 3 – August 1989 Amendment 4 – October 1989 Amendment 5 – August 1990 Amendment 6 – November 1992 Amendment 8 – March 1998 Amendment 9 – April 2000 Amendment 10 – June 1999 Amendment 11 – December 1999 Amendment 12 – October 2000 Amendment 13 – August 1992 Amendment 14 – July 2002 Amendment 15 – February 2004 Amendment 18 – December 2011 Amendment 20a – July 2014 Amendment 20b – March 2015 Omnibus Amendment – August 2011 Addendum I to Omnibus Amendment – August 2011
Revisions:	None
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	A benchmark stock assessment was completed for Spanish mackerel in the South Atlantic in 2012. The next assessment has not been scheduled.

Spanish mackerel are currently included in the Interjurisdictional Fishery Management Plan which defers to the Atlantic States Marine Fisheries Commission's (ASMFC) Fishery Management Plan for Spanish mackerel and South Atlantic Fishery Management Council's Coastal Migratory Pelagics Fishery Management Plan. The original Gulf and South Atlantic Fisheries Management Councils (GSAFMCs) fishery management plan (FMP) for Coastal Migratory Pelagic Resources (mackerels) was approved in 1983. This plan treated king and Spanish mackerel each as one U.S. stock. Allocations were established for recreational and commercial fisheries, and the commercial allocation was divided between net and hook–and–line fishermen; Established procedures for the Secretary to take action by regulatory

amendment to resolve possible future conflicts in the fishery, such as establish fishing zones and local quotas to each gear or user group. Numerous amendments have been implemented since the first FMP and those relevant to Spanish mackerel are described below:

Amendment 2, established in 1987 revised Spanish mackerel maximum sustainable yield (MSY) downward, recognized two migratory groups, and set commercial quotas and bag limits. Charter boat permits were required, and it was clarified that Total allowable catch (TAC) for overfished stocks must be set below the upper range of acceptable biological catch (ABC). The use of purse seines on overfished stocks was prohibited.

Amendment 3 (1989) prohibited drift gill nets for coastal pelagics and purse seines and run-around gillnets for the overfished groups of mackerels. The habitat section of the FMP was updated and vessel safety considerations were included in the plan. A new objective to minimize waste and bycatch in the fishery was added to the plan.

Amendment 4 (1989) reallocated Spanish mackerel equally between recreational and commercial fishermen on the Atlantic group with an increase in TAC.

Amendment 5 established in 1990 Extended the management area for the Atlantic groups of mackerels through Mid-Atlantic Fishery Management Council (MAFMC) jurisdiction. It revised problems in the fishery and plan objectives, revised the definition of "overfishing", added cobia to the annual stock assessment procedure, provided that the SAFMC will be responsible for pre–season adjustments of TACs and bag limits for the Atlantic migratory groups of mackerels, redefined recreational bag limits as daily limits; created a provision specifying that the bag limit catch of mackerel may be sold, provided guidelines for corporate commercial vessel permits, imposed a bag limit of two cobia per person per day for all fishermen, established a minimum size of 12–in (30.5 cm.) fork length or 14–in total length for king mackerel and included a definition of "conflict" to provide guidance to the Secretary.

Amendment 6 (1992) Identified additional problems and an objective in the fishery, provided for rebuilding overfished stocks of mackerels within specific periods, provided for biennial assessments and adjustments, provided for more seasonal adjustment actions, including size limits, vessel trip limits, closed seasons or areas, and gear restrictions, provided for commercial Atlantic Spanish mackerel possession limits, changed commercial permit requirements to allow qualification in one of three preceding years, discontinued the reversion of the bag limit to zero when the recreational quota is filled, modified the recreational fishing year to the calendar year; and changed minimum size limit for king mackerel to 20-in fork length, and changed all size limit measures to fork length only.

Amendment 8 (1996) Identified additional problems in the fishery, specified allowable gear, established a moratorium on new commercial Spanish and king mackerel permits and provided for transferability of permits during the moratorium, revised qualifications for a commercial permit, extended the management area of cobia through New York, allowed retention of up to 5 damaged king mackerel on vessels with commercial trip limits, revised the seasonal framework procedures to a). delete a procedure for subdividing the Gulf migratory group of king mackerel, b). request that the stock assessment panel provide additional information on spawning potential ratios and mixing of king mackerel migratory groups, c). provide for consideration of public comment, d). redefine overfishing and allow for adjustment by framework procedure, e). allow changes in allocation ratio of Atlantic Spanish mackerel, f). allow setting zero bag limits, g). allow gear regulation including prohibition.

Amendment 9 (2000) changed the percentage of the commercial allocation of TAC for the Florida east coast (North Area) and Florida west coast (South/West Area) of the Eastern Zone to 46.15% North and 53.85% South/West (previously, this allocation was 50%/50%); and allowed possession of cut-off (damaged) king or Spanish mackerel that comply with the minimum size limits and the trip limits in the Gulf, Mid-Atlantic, or South Atlantic EEZ (sale of such cut-off fish is allowed and is in addition to the existing allowance for possession and retention of a maximum of 5 cut-off (damaged) king mackerel that are not subject to the size limits or trip limits, but that cannot be sold or purchased, nor counted against the trip limit). (Note: Several other changes were made involving allocation and gear restrictions that affected the Florida west coast and Gulf fisheries).

Amendment 10 (1998) designated Essential Fish Habitat (EFH) and EFH-Habitat Areas of Particular Concerns for coastal migratory pelagics.

Amendment 11 (1998) amended Fishery Management Plan (FMP) as required to make definitions of MSY, optimal yield (OY), overfishing and overfished consistent with "National Standard Guidelines"; identified and defined fishing communities and addressed bycatch management measures.

Amendment 13 (2002) established two marine reserves in the exclusive economic zone (EEZ) of the Gulf of Mexico in the vicinity of the Dry Tortugas, Florida known as Tortugas North and Tortugas South, in which fishing for coastal migratory pelagic species is prohibited. This action complements previous actions taken under the National Marine Sanctuaries Act.

Amendment 18 (2011) establishes Annual Catch Limits and Accountability Measures for king and Spanish mackerel, as well as cobia.

Amendment 20a (2014) prohibits the sale of king mackerel caught under the bag limit unless the fish are caught as part of a state-permitted tournament and the proceeds from the sale are donated to charity. In addition, the rule removes the income qualification requirement for king mackerel commercial vessel permits.

Amendment 20b (2015) eliminates the 500-pound trip limit that is effective when 75% of the respective quotas are landed for king mackerel in the Florida west coast Northern and Southern Subzones, allows transit of commercial vessels with king mackerel through areas closed to king mackerel fishing, if gear is appropriately stowed, creates Northern and Southern Zones for Atlantic migratory group king and Spanish mackerel, each with separate quotas. NOAA Fisheries will close each zone when the respective quota is met or expected to be met. The dividing line between the zones is at the North Carolina/South Carolina state line.

The ASMFC approved the Omnibus Amendment in 2011. The management goal for the Omnibus Amendment is to bring the Fishery Management Plan for Spanish mackerel under authority of the Atlantic Coastal Fisheries Cooperative Management Act, providing for more efficient and effective management and changes to management in the future. Addendum I to the Omnibus Amendment (August 2013) establishes a pilot program that would allow states to reduce the Spanish mackerel minimum size limit for the commercial pound net fishery to 11 ½ -in during the summer months of July through September for the 2013 and 2014 fishing years only. In August 2015, the South Atlantic Board formally extended the provisions of Addendum I for the 2015 and 2016 fishing seasons. Reports by North Carolina, the only state to reduce their minimum size, will be reviewed annually.

Management Unit

The management unit is defined as Spanish mackerel within US waters of the Atlantic.

Goals and Objectives

Omnibus amendment 1 objectives include:

1. Manage the Spanish mackerel fishery by restricting fishing mortality to rates below the threshold fishing mortality rates to provide adequate spawning potential to sustain long-term abundance of the Spanish mackerel populations.

2. Manage the Spanish mackerel stock to maintain the spawning stock biomass above the target biomass levels.

3. Minimize endangered species bycatch in the Spanish mackerel fishery.

4. Provide a flexible management system that coordinates management activities between state and federal waters to promote complementary regulations throughout Spanish mackerel's range which minimizes regulatory delay while retaining substantial ASMFC, Council, and public input into management decisions; and which can adapt to changes in resource abundance, new scientific information and changes in fishing patterns among user groups or by area.

5. Develop research priorities that will further refine the Spanish mackerel management program to maximize the biological, social, and economic benefits derived from the Spanish mackerel population.

STATUS OF THE STOCK

Stock Status

A statistical catch-age model was used to assess the population of Atlantic Spanish mackerel. The age-structured assessment indicated that the stock was not overfished and that overfishing was not occurring.

Stock Assessment

There is a lack of available fishery independent indices of abundance for this species. Many of the indices of abundance that were made available were rejected due to concerns about the way the fishers targeted Spanish mackerel. The schooling behavior of Spanish mackerel makes a random survey of their population particularly difficult. The one fishery independent index used (SEAMAP young of the year) was highly variable, as would be expected for a recruitment index. The base run of the age-structured assessment model indicated that the stock is not over shed ($SSB_{2009\text{-}2011}=SSB_{MSY}$ = 1.49) and that overfishing is not occurring ($F_{2011}=F_{MSY}$ = 0.57). The sensitivity analyses yielded similar results and there was no retrospective pattern of concern. Conclusions about stock status during the MCB analysis were most sensitive to different combinations of input data and variance around fixed parameters (steepness, recreational discard mortality, historical recreational landings and natural mortality).

STATUS OF THE FISHERY

Current Regulations

Commercial: 3,500 lb trip limit

Recreational: 12-in FL minimum size; 15 fish/day

Commercial Landings

From 2006 - 2015, landings of Spanish mackerel stayed below 500,000 lb until 2009 in which time landings almost doubled to over 900,000 lb (Figure 1.)

Recreational Landings

During the time series (2006 – 2015), estimated MRIP landings of Spanish mackerel peaked in 2008 at 968,108 lb and declined and stabilized over the next 6 years to between 665,201 lb and 421,121 lb in for the remainder of the series (Figure 2.)

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Length-frequency information for the commercial Spanish mackerel fishery in North Carolina is collected by port agents through the trip ticket program and fish house samplers, specifically programs 431, 434, 437 and 461. Maximum sizes of Spanish mackerel sampled over the last 10 years have fluctuated from < 700 mm to over 1000 mm but, average lengths of harvested fish have remained steady at about 400 mm (Table 1.).

Fishery-Independent Monitoring

Spanish mackerel are frequently caught in the division's statewide independent gill net survey (Prg. 915) and Pamlico Sound trawl survey (Prg. 195) from which ageing structures are collected. Ageing structures are collected from both independent and dependent sampling programs and sent to the Southeast Fisheries Science Center in Panama City, Florida for processing and aging (Table 2.) The average size of Spanish mackerel caught in the independent surveys (316 mm) is smaller than the fish sampled from the fishery (404 mm; Table 1. and Table 3.)

MANAGEMENT STRATEGY

In North Carolina, Spanish mackerel are currently included in the Interjurisdictional Fishery Management Plan (FMP), which defers to the South Atlantic Fishery Management Council management measures and is currently managed under recent Amendments 20A (2014) and Framework Amendment 1 (2014) to the Coastal Migratory Pelagics Fishery Management Plan. Amendment 20A prohibits the sale of all bag-limit-caught Spanish mackerel, except those harvested during a state-permitted tournament. Framework Amendment 1 modifies the annual catch limits for Atlantic Spanish mackerel and modifies the recreational annual catch target,

based on the results of the most recent stock assessments for these stocks. Current management strategies for Spanish mackerel in South Atlantic waters are summarized in Table 4.

MANAGEMENT AND RESEARCH NEEDS

From Omnibus Amendment:

- Increase collection of fishery-dependent length, sex, age, and CPUE data to improve stock assessment accuracy. Simulations on CPUE trends should be explored and impacts on assessment results determined. Data collection is needed for all states, particularly those north of North Carolina.
- Develop fishery-independent methods to monitor stock size.
- Develop methodology for predicting year class strength and determination of the relationship between juvenile abundance and subsequent year class strength.
- To ensure more accurate estimates of t0, increase efforts to collect age 0 specimens for use in estimating von Bertalanffy growth parameters.
- Provide better estimates of recruitment, natural mortality rates, fishing mortality rates, and standing stock. Specific information should include an estimate of total amount caught and distribution of catch by area, season, and type of gear.
- Commission and member states should support and provide the identified data and input needed to improve the SEDAR process.
- Conduct yield per recruit analyses relative to alternative selective fishing patterns.
- Investigate the discard mortality of Spanish mackerel in the commercial and recreational trolling fisheries and commercial gill net fishery.
- Need observer coverage for Spanish mackerel fisheries: gill nets, cast nets, handlines, pound nets, and shrimp trawl bycatch.
- Evaluate potential bias of the lack of appropriate stratification of the data used to generate age-length keys.
- Evaluate CPUE indices related to standardization methods and management history, with emphasis on greater temporal and spatial resolution in estimates of CPUE.
- Expand TIP sampling to better cover all statistical areas.
- Complete research on the application of assessment and management models relative to dynamic species such as Spanish mackerel.
- Establish a monitoring program to characterize the bycatch and discards of Spanish mackerel in the directed shrimp fishery in Atlantic Coastal waters.
- Obtain adequate data to determine gutted to whole weight relationships.
- Conduct inter-lab comparisons of age readings from test sets of otoliths in preparation for any future stock assessment.
- Address issue of fish retained for bait (undersized) or used for food by crew (how to capture these as landings).
- Investigate whether catchability varies as a function of fish density and/or environmental conditions.
- Investigate how temporal changes in migratory patterns may influence indices of abundance.
- Investigate the possibility of using models that allow catchability to follow a random walk, which can be useful in tracking longer-term trends in time-varying catchability and thus detect changes over time in CPUE (from SEDAR 2009)

LITERATURE CITED

ASMFC Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout. 161 pp.

SEDAR 28 Stock Assessment report South Atlantic Spanish mackerel. SEDAR Charleston, SC. 444 pp.

TABLES

Table 1. Mean, minimum and maximum fork lengths (mm) and total number sampled of Spanish mackerel from fishery dependent sampling programs.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	430.4	178	704	2238
2007	372.3	64	810	2445
2008	376.7	75	668	2489
2009	395.3	54	971	3606
2010	411.6	172	677	4785
2011	420.9	256	1080	5523
2012	413.4	30	704	5576
2013	417.9	31	723	4009
2014	411.0	77	766	4558
2015	404	52	701	5935

Table 2. Mean, minimum and maximum fork lengths (mm) and total number sampled of Spanish mackerel aged through Prg. 930.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	378.6	254	683	291
2007	379.3	265	805	297
2008	362.6	196	684	328
2009	387.9	235	638	317
2010	377.5	174	645	411
2011	383.3	155	712	430
2012	367.5	159	670	557
2013	385.1	188	699	370
2014	373.7	192	656	515
2015	375.5	183	701	412

Table 3. Mean, minimum and maximum fork lengths (mm) and total number sampled of Spanish mackerel from fishery independent sampling programs.

Year	Mean Length	Minimum Length	Maximum Length	Total Number Measured
2006	357.1	176	542	47
2007	291.2	55	553	164
2008	328.7	80	680	371
2009	356.6	110	568	547
2010	344.6	75	550	378
2011	356.5	52	520	132
2012	340.9	38	580	122
2013	301.1	117	608	80
2014	266.0	42	483	45
2015	316	43	680	2667

Table 4. Summary of management strategies by North Carolina for Spanish Mackerel

Management Strategy	Outcome
12” minimum size limit	Rule 3M.0301(a)(1)
15 fish creel limit	Rule 3M.0301(a)(2)
15 fish creel limit outside 3 miles only with a NMFS Commercial Vessel Permit	Rule 3M.0301(a)(3)
Charter vessels or head boats with NMFS Commercial Vessel Permit must comply with possession limits when fishing with more than 3 persons	Rules 3M.0301(c)
Commercial trip limit of 3,500 lb of Spanish, King or aggregate	Rule 3M.0301(d)
Prohibits Purse Gill Nets when taking king or Spanish mackerel	Rule 3M.0302

FIGURES

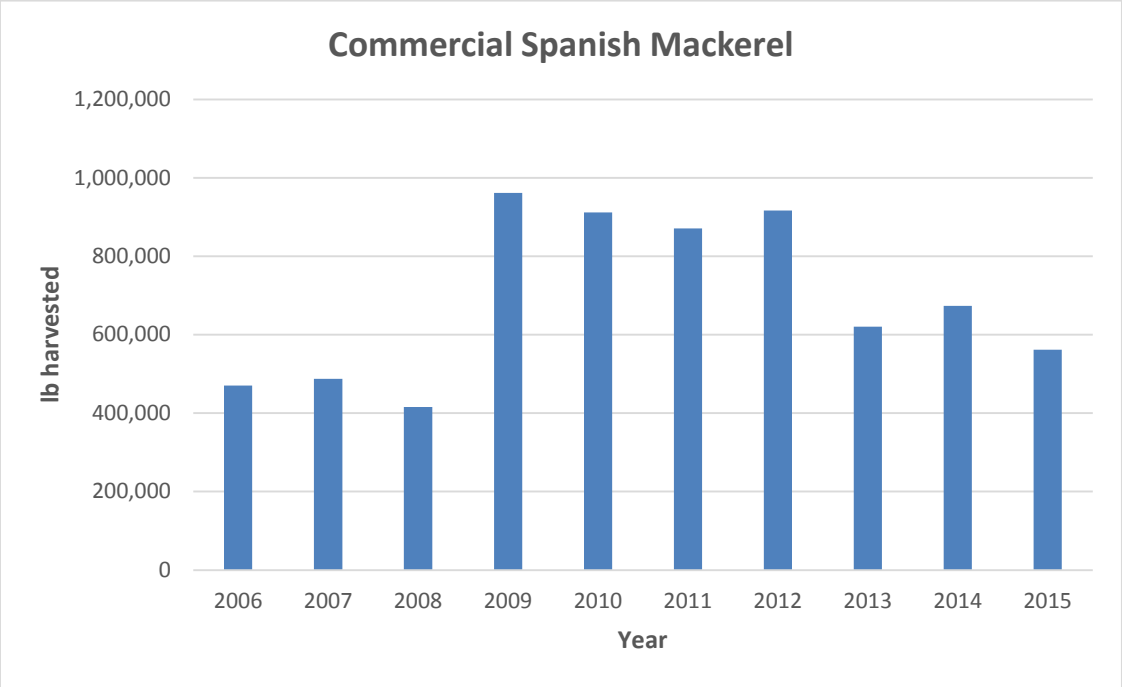

Figure 1. Commercial landings of Spanish mackerel in North Carolina from 2006 - 2015.

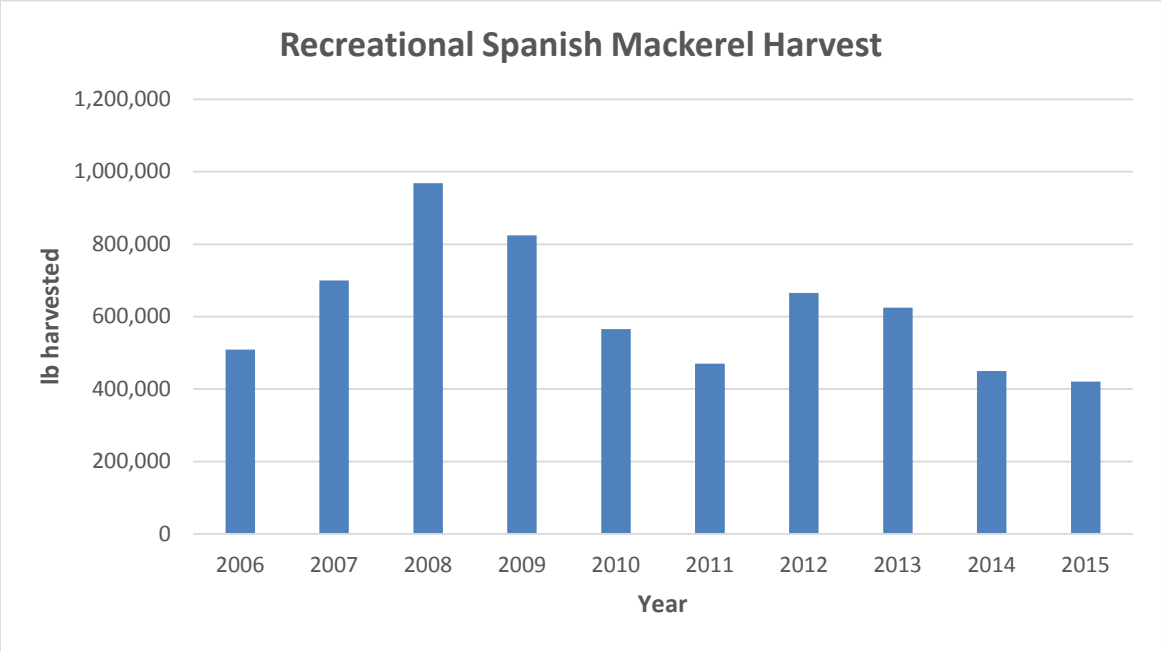

Figure 2. Estimated recreational harvest of Spanish Mackerel in North Carolina from 2006 – 2015.

FISHERY MANAGEMENT PLAN UPDATE
SPINY DOGFISH
AUGUST 2016

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

Original FMP Adoption:	November 2002
Amendments:	None
Revisions:	Addendum I November 2005 Addendum II October 2008 Addendum III April 2011 Addendum IV August 2012 Addendum V October 2014
Supplements:	None
Information Updates:	None
Schedule Changes:	None
Next Benchmark Review:	None

The Interstate Fishery Management Plan for Spiny Dogfish (FMP) was approved by the Atlantic States Marine Fishery Commission (ASMFC) in November 2002 with implementation for the 2003/2004 fishing year. The 2002 FMP established the annual quota and possession limit system. The Spiny Dogfish and Coastal Shark Management Board (Board), Advisory Panel, Technical Committee, and Plan Review Team oversee the management of spiny dogfish in state waters. The management unit includes the entire coast-wide (Maine-Florida) distribution of the resource from the estuaries eastward to the inshore boundary of the EEZ.

There are no amendments to the interstate FMP but there are four addenda. Addendum I approved in November 2005 allowed the Board to set multi-year specifications. Addendum II approved October 2008 established regional allocation of the annual quota with 58% to states from Maine to Connecticut. Addendum III established state shares for New York to North Carolina. For these southern region states, Addendum III also allowed for quota transfer between states, rollovers of up to 5%, state-specified possession limits, and included a three-year reevaluation of the measures. North Carolina is allocated 14.036% of the southern quota. Addendum IV approved in August 2012 addressed the differences in the definitions of overfishing between the New England Fishery Management Council (NEFMC), Mid-Atlantic Fishery Management Council (MAFMC) and the ASMFC. The Board adopted the fishing mortality threshold to be consistent with the federal plan. Addendum V, approved in 2014, ensured consistency in spiny dogfish management with the Shark Conservation Act of 2010 by prohibiting processing at-sea, including the removal of fins.

Management Unit

The entire coastwide distribution of the resource in the Atlantic from the estuaries eastward to the inshore boundary of the Exclusive Economic Zone (EEZ), is managed by the ASMFC, NEFMC and MAFMC. North Carolina is allotted a state specific share of the coastwide quota and allowed to specify possession limits in state waters.

Goal and Objectives

The goal of the ASMFC FMP for spiny dogfish is to promote stock rebuilding and management of the spiny dogfish fishery in a manner that is biologically, economically, socially, and ecologically sound. In support of this goal, the following objectives are recommended:

1. Reduce fishing mortality and rebuild the female portion of the spawning stock biomass to prevent recruitment failure and support a more sustainable fishery.

2. Coordinate management activities between state, federal and Canadian waters to ensure complementary regulations throughout the species range.

3. Minimize the regulatory discards and bycatch of spiny dogfish within state waters.

4. Allocate the available resource in biologically sustainable manner that is equitable to all the fishers.

5. Obtain biological and fishery related data from state waters to improve the spiny dogfish stock assessment that currently depends upon data from the federal bottom trawl survey.

STATUS OF THE STOCK

Stock Status

N.C. Division of Marine Fisheries 2015 Stock Status Report classifies the spiny dogfish stock as viable because they are not overfished and overfishing is not occurring.

Stock Assessment

The 2015 stock assessment update, conducted by the Northeast Fisheries Science Center (NEFSC), estimates spiny dogfish are not overfished and not experiencing overfishing. Female spawning stock biomass estimates from 2009 to 2015 exceeded the biomass reference point (Figure 1).

The NEFSC report also provides the most recent estimate of F (fishing mortality). F was 0.21 in 2014 and is below the fishing mortality 40% (F=0.24. As such, spiny dogfish are not overfished and overfishing is not occurring. Unfortunately, record low pup production from 1997 to 2003 has left a recruitment deficit that will cause SSB to drop soon. The amplitude of this drop increases as fishing mortality increases and still occurs when fishing mortality is hypothetically zero.

Spiny dogfish was declared 'rebuilt' in 2008 when SSB exceeded the target for the first time since the ASMFC began managing spiny dogfish in 2002. Prior to the 'rebuilt' status, quotas were based on the short term target Frebuild = 0.11. The FMP allows for quotas based on Ftarget (as opposed to the more conservative Frebuild) "once the mature female portion of the spawning stock has reached the target".

STATUS OF THE FISHERY

Current Regulations

Spiny dogfish are primarily harvested commercially with no recreational regulations in effect. Commercial harvest of spiny dogfish is quota managed with harvest periods and trip limits in federal waters and through regional and state quota allocations in state waters. The ASMFC Spiny Dogfish Board approved a 50.61 million pounds quota for the 2015/2016 fishing season (May 1 – April 30). The quota is subdivided into a northern region share of 58% and state-specific shares for the southern region from New York to North Carolina. North Carolina receives 14.0036 % of the annual quota. For the 2015/2016 fishing season North Carolina was allocated 7,103,900 lb of the southern regions quota. The NCDMF set the trip limit at 20,000 lb effective January 1, 2016.

Commercial Landings

Prior to the Fishery Conservation and Management Act of 1976 (now known as the Magnuson-Stevens Reauthorization Act), foreign fleets caught the majority of dogfish in U.S. waters but U.S. fishermen have had uncontested access ever since the Act's passage. The National Marine Fisheries Service (NMFS) encouraged commercial fishermen to target the bountiful stocks of spiny dogfish in the 1980s and 1990s when stocks of other commercially valuable fish in the Northeast declined. Then in 1998, NMFS determined that spiny dogfish were overfished and implemented stringent harvest restrictions in federal waters to allow the stock to rebound. The states followed shortly after with complementary regulations for state waters.

Coastwide landings were approximately 37.2 million pounds in 1992, gradually increasing to a peak of about 60 million pounds in 1996. In the late 1990s, landings declined to an average of around 40 million. After federal and state regulations were implemented in the early 2000s, landings declined to less than five million pounds in 2001 and 2002. They then ranged between two and eight million pounds between 2003 and 2009. As the stock began to improve, landings were increased to 21 million pounds in 2011. Commercial landings continue to be mostly female dogfish, with female landings comprising about 95% of the total commercial catch. Poor market conditions have led to lower landings in recent years. Commercial landings totaled 23 million pounds in 2014, a slight increase in recent years. Discards have remained fairly stable, around 31 million pounds over the past decade and are expected to remain near that level in the future.

The coastwide commercial quota was set at 50,612,000 lb for fishing year 2015. The fishing year runs from May 1, 2015 to April 30, 2016. The quota is subdivided into a northern region (Maine - Connecticut) share of 58% and state-specific shares for the southern region, allocated as follows New York (2.707%); New Jersey (7.644%); Delaware (0.896%); Maryland (5.92%); Virginia (10.795%; and North Carolina (14.036%). Any overages from the previous fishing seasons will be paid back by the region or state in the following season, as has been done in the past. Landings in North Carolina have been increasing correlating to the increase in quota (Figure 2). Primarily, landings occur from ocean gill nets (Table 1 and Figure 3). While estuarine

gill nets do not target spiny dogfish, landings increased for the gear the last three years possibly due to the season opening earlier and the marketability of the incidental catch of spiny dogfish when targeting flounder or American shad.

Recreational Landings

Recreational landings are insignificant for 2006 through 2015 (Table 2) and were obtained from the Marine Recreational Information Program (MRIP). As a source of total mortality, recreational catch can be considered negligible (Rago and Sosebee 2015).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Fishery-dependent monitoring programs for beach seine, estuarine gill net, ocean gill net and ocean trawl sampled spiny dogfish from 2006 to 2015. Samples were taken at fish packing houses while the catches were being offloaded. Captain or crew members were interviewed to obtain information including area fished, gear specifications and water depth. Samples were collected and recorded in metric units (kilograms and millimeters). Each sample was weighed to the nearest 0.1 kg, individual spiny dogfish were measured to the nearest millimeter for both total and fork length, and sex determined. The total catch weight was obtained from the fish house dealer's records. Table 3 summarizes all the length data collected from fishery-dependent sampling from 2006to 2015. Tables 4 through 7 summarize the fishery-dependent length data by gear from 2006 to 2015. The majority of spiny dogfish are sampled from the ocean gill net fishery, the primary gear used to target spiny dogfish in North Carolina. The number of trips sampled and spiny dogfish measured increased since 2012 while the mean total length has stayed between 850 to 899 millimeters. Total length has ranged from 470 to 1,080 millimeters in the ocean gill net fishery. Mean length of spiny dogfish harvested from this gear has remained constant, only dropping below 850 millimeters in 2011 to an average of 847 millimeters.

Numbers of spiny dogfish measured have ranged from 82 in 2006 to 2,461 in 2012. Female spiny dogfish contribute to the majority of the harvest and samples collected. Female fish are larger and more abundant in the nearshore areas where most fishing occurs. Tables 8 and 9 summarize the length data for male and female spiny dogfish collected from fishery-dependent sampling from 2006 to 2015. Figure 4 illustrates the female to male sampling composition.

Fishery-Independent Monitoring

The NCDMF initiated a fisheries independent gill net survey in 2001 and expanded its coverage in 2008 to include the Cape Fear River and the near shore (0-3 miles) Atlantic Ocean from New River Inlet south to the South Carolina state line. The objective of this project is to provide annual, independent, relative-abundance indices for key estuarine species in the near shore Atlantic Ocean, Pamlico Sound, Pamlico, Pungo, Neuse, and Cape Fear rivers. These indices can also be incorporated into stock assessments and used to improve bycatch estimates, evaluate management measures, and evaluate habitat usage. Results from this project will be used by the NCDMF and other Atlantic coast fishery management agencies to evaluate the effectiveness of current management measures and to identify additional measures that may be necessary to conserve marine and estuarine stocks. Developing fishery independent indices of abundance for target species allows the NCDMF to assess the status of these stocks without

relying solely on commercial and recreational fishery dependent data. The survey employs a stratified random sampling design and utilizes multiple mesh gill nets (3.0 inch to 6.5 inch stretched mesh, by ½ inch increments). A total of 784 spiny dogfish were caught in the Pamlico Sound portion of the independent gill net study from 2001 to present. Total length ranged from 511 to 1,010 millimeters and averaged 840 millimeters. The nearshore, ocean gill net component of the survey caught 1,457 spiny dogfish from 2008 to 2015. Total length ranged from 569 to 1,024 and averaged 867 millimeters (Table 10).

MANAGEMENT STRATEGY

The spiny dogfish fishery is managed complementarily by the MAFMC and NEFMC in federal waters, and ASMFC in state waters. In order to set the annual quota a joint meeting between the ASMFC Technical Committee (TC) and MAFMC Monitoring Committee (MC) occurs each fall. The TC and MC review the best available science and make quota recommendations to the Spiny dogfish and Coastal Shark Management Board (Board) and MAFMC for the following fishing year's quota. The first step to making a quota recommendation is to calculate a harvest level that coincides with the appropriate F rate. In 2002, ASMFC adopted the MAFMC's target, and threshold, fishing mortality rates in the original FMP. In 2009, the MAFMC revised status determinations criteria to define Fthreshold as "Fmsy (or a reasonable proxy thereof) as a function of productive capacity, and based upon the best scientific information consistent with National Standards 1 and 2" and did not include and Ftarget value. In 2012, the ASMFC adopted the MAFMC's Fthreshold definition to be consistent with the federal plan through Addendum IV to the FMP. Overfishing is defined as an F rate that exceeds the Fthreshold. The Board retains the authority to set an Ftarget based on the TC's recommendations. While the federal plan does not specify an Ftarget and quotas are calculated based on Fmsy. The Board is not required to specify an Ftarget and if specified, an Ftarget would apply to one fishing season.

- Fmsy = 0.244; allows for the production of 1.5 female pups per female that will recruit to the spawning stock biomass (SSB).

- SSBtarget = 159,288 mt (351 million pounds); level of biomass that would maximize recruitment to the population (100% SSBmax).

- SSBthreshold = 79,644 mt (175 million pounds); 50% of SSBtarget

The NEFSC conducts a spring bottom trawl survey to gather data used to update population abundance estimates. Due to mechanical problems in 2014 critical strata in the Mid-Atlantic region were unable to be sampled. For this reason, it was not possible to update population abundance estimates in 2014 nor was it possible to provide updated estimates of fishing mortality rates, or conduct projections of stock size under varying fishing mortality rates. Instead the total estimated catch of spiny dogfish in 2013 was summarized and compared to catch projections from previous years.

U.S. landings decreased about 46% from 7,312 mt in 2013to 10,641 mt in 2014. Recreational landings and distant water fleet landings are negligible. Canadian landings have averaged about 77 mt from 2009 and 2012. Total discards increased slightly from 12,820 mt in 2013 to 15,327 mt in 2014. The 2014 estimate is higher than the average of the previous 5 years. Similar patterns were observed for dead discards. Total dead discards have been relatively stable since 2000. The ratio of dead discards to landings in 2014 decreased slightly to 0.54.

The 3-year average of female SSB swept area biomass in 2015 of 135,500 mt was the lowest since 2011. Pup production in 2015 was slightly below the long-term average. Female SSB estimates for 2015 was below the target biomass reference point, but well above the biomass threshold reference point. Fishing mortality was estimated to be 0.214 in 2014, below the plan's threshold (0.244).

MANAGEMENT AND RESEARCH NEEDS

Continuing research priorities from the ASMFC FMP include:

- Determine area, season, and gear specific discard mortality estimates coast wide in the recreational, commercial, and non-directed (bycatch) fisheries.
- Monitor the level of effort and harvest in other fisheries as a result of no directed fishery for spiny dogfish.
- Characterize and quantify bycatch of spiny dogfish in other fisheries.
- Increase observer trips to document the level of incidental capture of spiny dogfish during the spawning stock rebuilding period.
- Conduct a coast wide tagging study to explore stock structure, migration, and mixing rates.
- Standardize age determination along the entire East Coast. Conduct an ageing workshop for spiny dogfish, encouraging participation by NEFSC, NCDMF, Canada DFO, other interested agencies, academia, and other international investigators with an interest in dogfish ageing.

LITERATURE CITED

NMFS 2016. Personal communication from the National Marine Fisheries Service, Fisheries Statistics Division May 17, 2016.

Rago P.J. and K.A. Sosebee. 2015. Update on the Status of Spiny Dogfish in 2015 and Projected Harvests at the Fmsy Proxy and Pstar of 40%. Report to MAFMC SSC August 26, 2015. 65 pp.

TABLES

Table 1. Commercial spiny dogfish landings (lb) by gear 2006-2015 (NCDMF Trip Ticket. Program)

Year	Ocean Gill Net	Beach Seine	Ocean Trawl	Ocean Hook N-Line	Ocean Long-line	Estuarine Gill Net	Other Estuarine Gears	Annual Total
2006	11,547					27		11,574
2007	148,147	800		162		434		149,543
2008	158,562					165		158,727
2009	1,405,549	10,486				327		1,416,362
2010	1,695,878	11,170	1,273			116		1,708,437
2011	2,553,293		4,500			130		2,557,923
2012	2,663,008	65,645				229		2,728,882
2013	3,000,602					10,356		3,010,958
2014	5,643,146		1,800			5,339		5,650,285
2015	4,223,979	4,090			10,000	9,139	5	4,247,213

Table 2. Recreational spiny dogfish harvest and discards from MRIP survey for 2006-2015 (NMFS 2016).

Year	Harvest Number (A+B1)	PSE (Num)	Weight (lb), (A+B1)	PSE (lb)	Number Released	PSE
2006	430	100.0	1,752	100.0	20,934	38.5
2007					12,573	50.8
2008					10,139	58.4
2009					8,854	73.2
2010	1,070	64.7	5,399	69.7	31,644	37.7
2011	1,247	73.3	8,294	75.9	39,908	41.1
2012	140	71.2	712	71.2	25,515	36.9
2013	3,404	75.4	6,134	67.4	135,333	47.5
2014	853	72.1	4,296	79.4	80,131	37.1
2015	8,140	77.6	43,797	88.1	75,189	53.1
10-Yr Average	**2,183**		**10,055**		**44,022**	

Table 3. Summary table of spiny dogfish trips sampled, sample weight (kg) and length data collected from dependent sampling 2006-2015.

Year	Number of Trips Sampled	Total Number Measured	Sample Weight (kg)	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)
2006	2	82	231.7	886	765	1,045
2007	27	1,201	3,273.7	855	675	1,020
2008	10	545	1,369.2	859	724	995
2009	28	1,048	2,650.1	864	704	1,080
2010	23	843	2,227.1	861	712	1,015
2011	24	686	1,893.2	847	661	1,005
2012	67	2,461	7,030.7	876	681	1,074
2013	66	2,373	6,765.1	877	668	1,035
2014	63	2,168	6,025.4	878	470	1,065
2015	41	1,365	3,730.7	873	634	1,021

Table 4. Spiny dogfish length data collected from the commercial beach seine fishery 2006-2015.

Year	Number of Trips Sampled	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Number Male	Number Female	Total Number Measured
2006							
2007							
2008							
2009	1	873	805	1,010		14	14
2010	2	856	713	997	7	90	97
2011							
2012	1	869	771	982	4	39	43
2013	4	850	735	959	11	119	130
2014							
2015							

Table 5. Spiny dogfish length data collected from the commercial estuarine gill net fishery 2006-2015.

Year	Number of Trips Sampled	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Number Male	Number Female	Total Number Measured
2006	1	864	825	888		6	6
2007							
2008							
2009							
2010							
2011							
2012							
2013							
2014	2	864	800	907		9	9
2015	1	936	936	936	1		1

Table 6. Spiny dogfish length data collected from the commercial ocean gill net fishery 2006-2015.

Year	Number of Trips Sampled	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Number Male	Number Female	Total Number Measured
2006	1	888	765	1,045	1	75	76
2007	27	855	675	1,020	184	1,017	1,201
2008	10	859	724	995	18	527	545
2009	27	864	704	1,080	54	980	1,034
2010	21	861	712	1,015	42	704	746
2011	24	847	661	1,005	34	647	698
2012	65	877	681	1,074	83	2,296	2,380
2013	62	879	668	1,035	77	2,166	2,243
2014	61	878	470	1,065	74	2,085	2,159
2015	40	872	634	1,021	82	1,281	1,364

Table 7. Spiny dogfish length data collected from the commercial ocean trawl fishery 2006-2015.

Year	Number of Trips Sampled	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Number Male	Number Female	Total Number Measured
2006	2					11	11
2007							
2008							
2009							
2010							
2011							
2012	1	881	797	970		38	38
2013							
2014							
2015							

Table 8. Length data collected from male spiny dogfish sampled from all gears 2006-2015.

Year	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Total Number Measured
2006	765	765	765	1
2007	764	675	930	184
2008	792	741	937	18
2009	786	721	940	54
2010	785	712	895	49
2011	765	700	829	34
2012	769	702	882	87
2013	779	670	896	88
2014	776	641	844	74
2015	795	640	968	84

Table 9. Length data collected from female spiny dogfish sampled from all gears 2006-2015.

Year	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Total Number Measured
2006	888	786	1,045	81
2007	871	740	1,020	1,017
2008	862	724	995	527
2009	868	704	1,080	994
2010	865	715	1,015	794
2011	852	661	1,005	647
2012	880	681	1,074	2,373
2013	881	668	1,035	2,285
2014	882	470	1,065	2,094
2015	878	634	1,021	1,281

Table 10. Fisheries independent assessment programs length data for spiny dogfish.

Program	Time Series	Mean Total Length (mm)	Minimum Total Length (mm)	Maximum Total Length (mm)	Total Number Measured
Pamlico Sound Independent Gill Net Survey-915	2001-2015	840	511	1,010	784
Ocean Gill Net Independent Survey-916	2008-2015	867	569	1,024	1,457

FIGURES

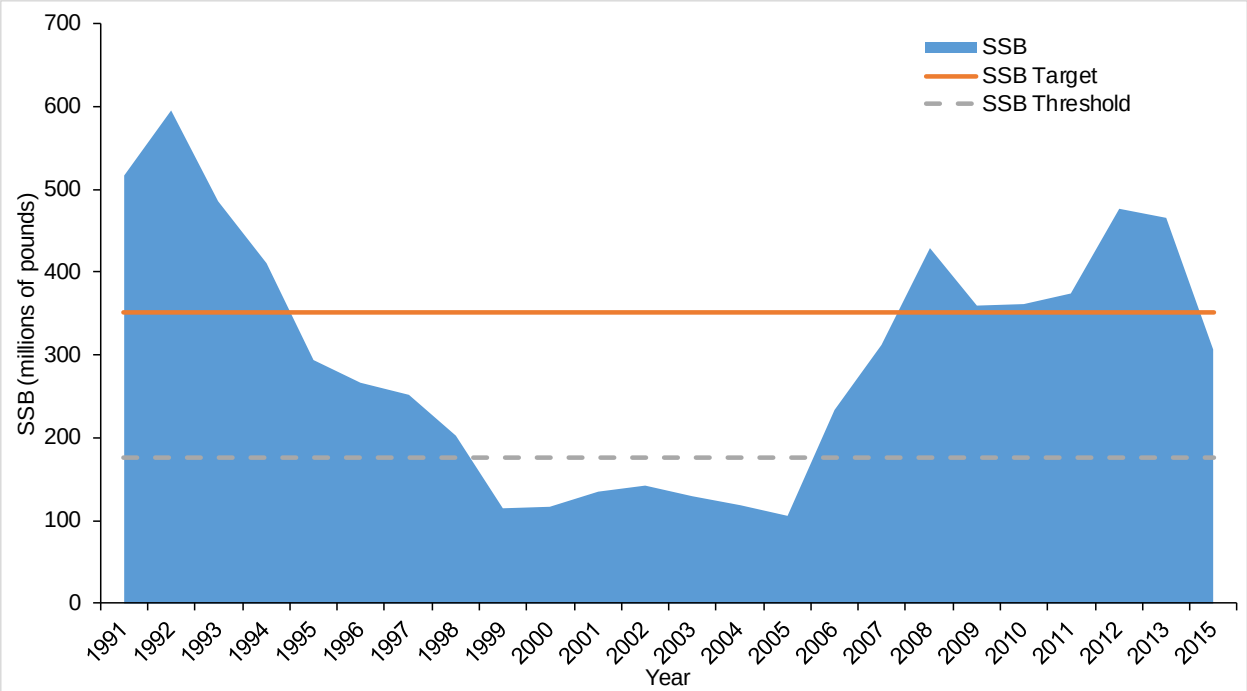

Figure 1. NEFSC Spiny Dogfish Spawning Stock Biomass 1991-2015 (Note: 2014 was not included in the 2015 update due to a mechanical breakdown in the NEFSC trawl survey.)

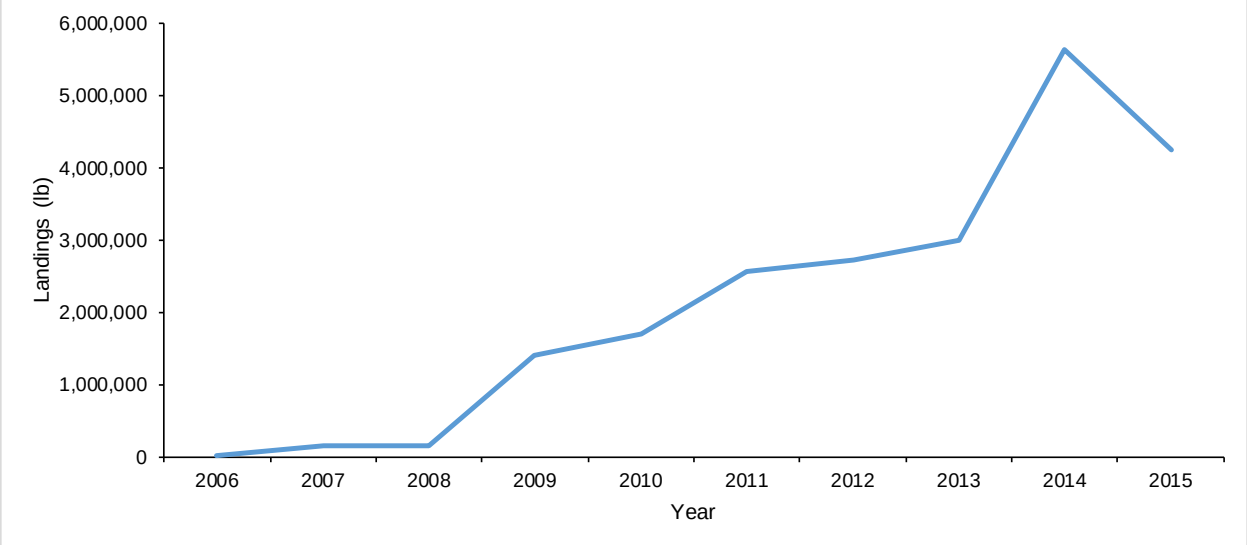

Figure 2. Annual commercial spiny dogfish landings (lb) 2006-2015 (NCDMF Trip Ticket Program).

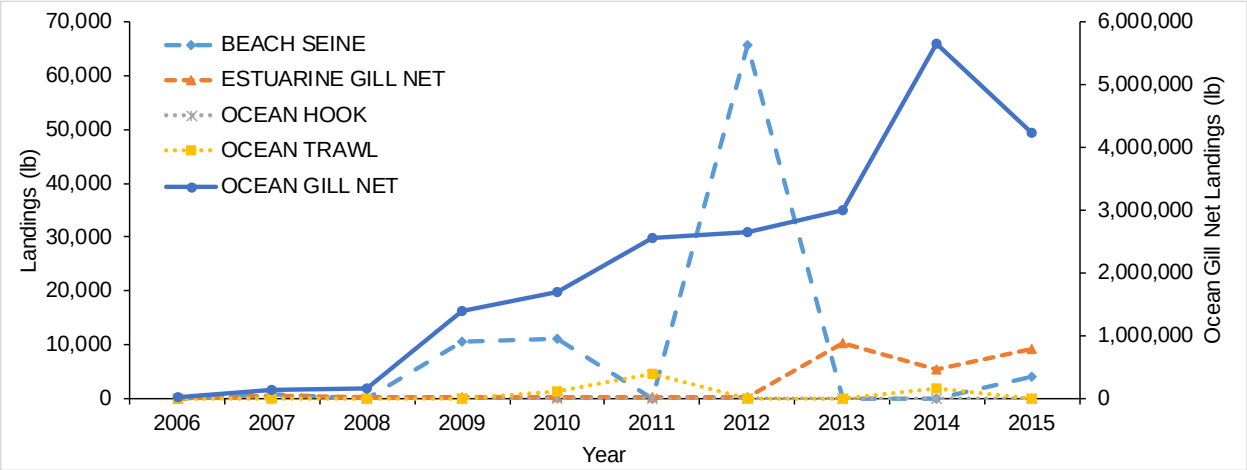

Figure 3. Annual commercial spiny dogfish landings (lb) by gear 2006-2015 (NCDMF Trip Ticket Program).

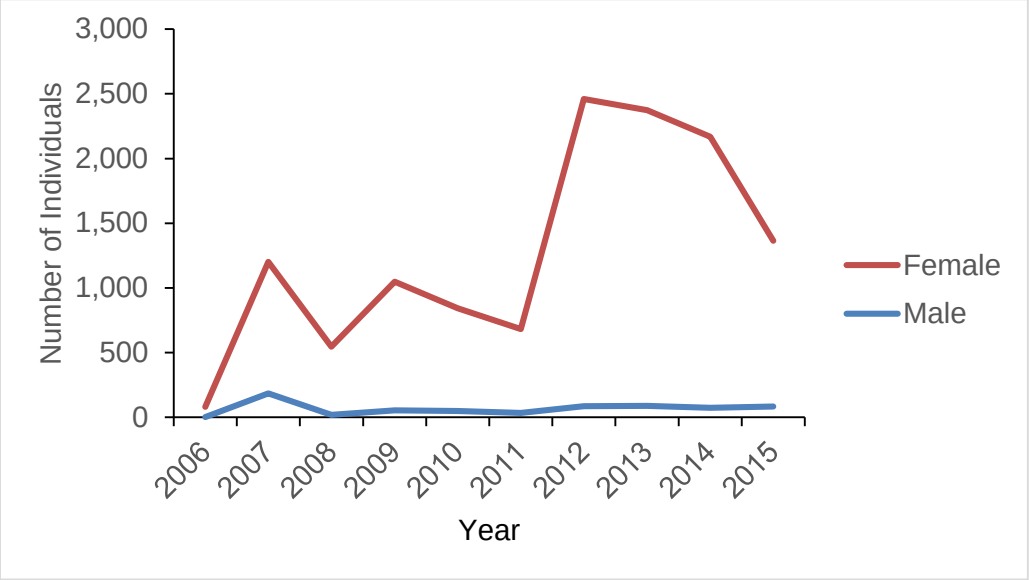

Figure 4. Number of individuals measured by year and sex 2006-2015.

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **Rules 8-16**

TO: Marine Fisheries Commission

FROM: Catherine Blum, Fishery Management Plan and Rulemaking Coordinator

SUBJECT: Rulemaking Update

This memo describes the rulemaking materials for the August 2016 commission meeting. There are four sections of materials; the first three are for information and the fourth is scheduled for the commission to take action. Each section is summarized below:

July 2016 Rulebook Supplement

A single commission rule became effective in June 2016 following final outcome by the General Assembly. The memo included in this section was previously sent to interested parties for commission rulemaking and describes the rule change that is now included in the July 11, 2016 supplement to the commission's 2015 rulebook. The supplement is available on the division web site and was previously distributed to commissioners.

2016/2017 Rulemaking Cycle

This section includes a table that shows the steps of the process for the commission's 2016/2017 annual rulemaking cycle. The dates in the table are adjusted to accommodate the delay in starting the package due to reconsideration of an issue from the Oyster and Hard Clam Fishery Management Plans. Later in the meeting, the commission will be asked to consider approval to begin the rulemaking process for these two fishery management plans as well as for issues that originated for other reasons. Instead of the usual intended effective date of April 1 of a given year for the rules to be complete, staff will make every effort to find efficiencies at the end of the process so the rules can become effective either May 1 or June 1, 2017.

Issue Paper Review

Over the past couple of years, the majority of proposed commission rules have originated from fishery management plans. This year, several issues have originated for other reasons. To describe these issues, staff provides issue papers to the commission as they are completed in preparation for the annual rulemaking package. This minimizes the need to present a large amount of information at a single meeting. This section includes a table summarizing three recently completed issues, in preparation for beginning the rulemaking process.

The first issue paper is entitled “Modify Fisheries Director’s Proclamation Authority for the Protection of Public Health.” In 2015, the U.S. Food and Drug Administration evaluated the division’s Shellfish Control of Harvest Program. The division was found to be in non-conformance with the control of harvest requirements of the National Shellfish Sanitation Program Model Ordinance. The deficiencies were due to North Carolina not mandating certain sanitary shellfish harvest and handling practices of harvesters such as preventing contamination of shellfish with bilge water and preventing animals on harvest vessels, as well as lacking the legal authority to enforce those requirements.

Additionally, division staff observed that rule 15A NCAC 03H .0103 “Proclamation Authority of Fisheries Director” lacks a specific variable condition for the protection of public health. This rule includes a list of possible variable conditions for those commission rules that grant proclamation authority to the fisheries director, but do not set forth specific variable conditions, a requirement for proclamation authority to be established. The addition of “protection of public health” as a possible variable condition would make this rule more comprehensive in light of the transfer of the Shellfish Sanitation and Recreational Water Quality Section from the Division of Environmental Health to the Division of Marine Fisheries via N. C. Session Law 2011-145 and the associated power and duty for the commission to protect the public health under its jurisdiction.

The division recommends amending the rules for North Carolina to come into compliance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance. This will also allow the authority of the commission to be more comprehensively addressed as it pertains to its delegation of authority to the fisheries director to issue proclamations to address variable conditions.

The second issue paper is entitled “Establish Spotted Seatrout Rule.” The rule would provide an alternate mechanism for the director to manage spotted seatrout in anticipation of the loss of the current authority under rule 15A NCAC 03M .0512, due to the planned removal of spotted seatrout as a managed species from the Atlantic States Marine Fisheries Commission. The division recommends adopting the rule to ensure sufficient authority is in place for the commission to manage spotted seatrout under the North Carolina Spotted Seatrout Fishery Management Plan, independent of the Atlantic States Marine Fisheries Commission’s fishery management plan (via the North Carolina Fishery Management Plan for Interjurisdictional Fisheries). The proposed rule adoption will only change the mechanism by which measures are implemented. Current management measures will remain in place in accordance with the North Carolina Spotted Seatrout Fishery Management Plan.

The final issue paper is entitled “Align Method for Commencement of License, Permit, and Certificate Suspension/Revocation Process.” The method for commencement of proceedings to suspend or revoke a fishing license, permit, or certificate currently includes an opportunity for an informal meeting with division staff. This is inconsistent with the method required for other similar administrative proceedings by the division to submit information in writing. The division recommends amending the rule to align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the division and commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division staff.

2016/2017 Notice of Text for Rulemaking

Material in this section is before the commission for action at its business meeting. There are nine fiscal analyses describing 15 proposed rules; a summary table is provided followed by the corresponding analyses.

Each analysis contains an appendix with the proposed rules. Some rules are proposed for change for more than one analysis. The commission must vote to approve these items for the rulemaking process to begin. None of the analyses meet the impact threshold of $1 million in aggregate costs and benefits in a 12-month period to be considered rule changes with substantial economic impact.

There are six proposed rules in support of the Hard Clam Fishery Management Plan Amendment 2 and Oyster Fishery Management Plan Amendment 4. The fiscal analysis of the proposed rules indicates the rules will have state and private impact.

Proposed amendments for clams:

- Remove the clam mechanical harvest area on public bottom in Pamlico Sound that is no longer opened to harvest.

Proposed amendments for oysters:

- Reduce the culling tolerance from 10 percent to five percent for the possession of accumulated dead shell, oyster cultch material, a shell length less than that specified by proclamation, or in any combination for oysters possessed from public bottom.
- Reduce the daily commercial possession limit for oysters from 50 bushels to 20 bushels to align it with current management.

Proposed amendments for leases and franchises:

- Add convictions of theft on shellfish leases and franchises to the rule which subjects licensees with convictions to license suspension and revocation, putting in place stricter penalties as a deterrent to theft on shellfish leases and franchises.
- Clarify how the production and marketing rates are calculated for shellfish bottom leases and franchises and water column leases, including calculations for an extension period.
- Expand the maximum proposed (potential) initial lease area from five to 10 acres in all waters.
- Specify criteria that allow a single extension period for shellfish leases of no more than two years per contract period to meet production and marketing requirements.

To establish the Permit for Weekend Trawling for Live Shrimp, there are four proposed rules. The fiscal analysis of the proposed rules indicates the rules will have private and minimal state impact. In accordance with the North Carolina Shrimp Fishery Management Plan Amendment 1, proposed amendments establish the Permit for Weekend Trawling for Live Shrimp, require the permit holder to hold a valid Standard or Retired Standard Commercial Fishing License, clarify the responsible party for an assigned license and a corporation, and set specific conditions of the permit. Additional amendments provide an exception for the permit holder to take shrimp and use trawl nets in Internal Coastal Waters during weekends in accordance with the permit conditions.

One rule change is proposed for the Spiny Dogfish Dealer Permit. The fiscal analysis of the proposed rule indicates the rule will have state and private impact. Proposed amendments relocate a 2003 requirement for a permit for dealers transacting in spiny dogfish from proclamation into rule. Spiny dogfish are monitored under a quota and dealers are required to report daily landings during the open season. Placing the permit requirement in rule has no real impact on holders of the permit as the reporting requirements, application process, and cost of the permit will not change. Seasonal openings as well as trip limits will continue to be stipulated in proclamation due to the variable nature of the provisions for the fishery.

In support of increasing penalties for gear larceny, a single rule is proposed. The fiscal analysis of the proposed rule indicates the rule will have state and private impact. Proposed amendments provide for an appropriate penalty against a licensee for convictions of G.S. 14-72 “Larceny of property; receiving stolen goods or

possessing stolen goods" when related to fishing gear or G.S. 113-268 "Injuring, destroying, stealing or stealing from nets, seines, buoys, pots, etc." to serve as a deterrent to theft of fishing gear, vandalism to fishing gear, and theft of fish from fishing gear. These penalties would be consistent with penalties under other similar marine fisheries laws.

A single rule is proposed to correct a coordinate in a boundary for Wade Creek. The fiscal analysis of the proposed rule indicates a *de minimus* rule change. Proposed amendments correct a coordinate error for the Wade Creek primary nursery area made when the coordinate format changed in 2004.

To clarify license requirements for leaseholder designees, a single rule is proposed. The fiscal analysis of the proposed rule indicates the rule will have state and private impact. Proposed amendments clarify the requirement to hold a Standard or Retired Standard Commercial Fishing License with a Shellfish Endorsement to obtain a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises. Additional proposed amendments provide an exemption from license requirements for certain designees of the holder of a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises in accordance with G.S. 113-169.2.

A single rule is proposed to establish a spotted seatrout rule. The fiscal analysis of the proposed rule indicates a *de minimus* rule change. This rule is proposed for adoption to establish a rule of the commission for the management of spotted seatrout, independent of the authority for interjurisdictional management under the Atlantic States Marine Fisheries Commission. The rule delegates proclamation authority to the fisheries director to specify time, area, means and methods, season, size, and quantity of spotted seatrout harvested in North Carolina. Current management measures will remain in place in accordance with the North Carolina Spotted Seatrout Fishery Management Plan. The proposed rule adoption will only change the mechanism by which those same measures are implemented.

To modify the fisheries director's proclamation authority for the protection of public health, there are two proposed rules. The fiscal analysis of the proposed rules indicates the rules will have private impact. In accordance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance and to protect public health, proposed amendments provide the authority for the division to set sanitary harvest and handling practices for harvesters and enforce issues relating to the contamination of shellfish (oysters, clams, scallops, and mussels) during harvest. Additional proposed amendments add a variable condition for the protection of public health to the list of variable conditions for the use of the fisheries director's proclamation authority that is set forth in other rules of the commission. This more comprehensively addresses the authority of the commission following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality section of the Division of Environmental Health to the Division of Marine Fisheries.

A single rule is proposed to align the method for commencement of the license, permit, and certificate suspension or revocation process. The fiscal analysis of the proposed rule indicates a *de minimus* rule change. Proposed amendments align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the division and commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division staff.

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

MEMORANDUM

TO: Rules Interested Parties

FROM: Catherine Blum, Fishery Management Plan and Rulemaking Coordinator

DATE: July 11, 2016

RE: North Carolina Marine Fisheries Commission Rules

In February 2015, the Marine Fisheries Commission gave final approval to Amendment 2 to the North Carolina River Herring Fishery Management Plan. Several rule changes were required to implement the amendment. One of these rules was subject to legislative review during the 2016 legislative session for a final outcome.

As a result of that review, amendments to 15A NCAC 03M .0513, River Herring, became effective June 13, 2016 as originally proposed. The changes allow for possession of river herring from sources other than North Carolina Coastal Fishing Waters aboard a vessel or while engaged in fishing, as long as they are less than or equal to six inches total length. The head and tail must also be attached per a change to 15A NCAC 03M .0101, Mutilated Finfish, that already became effective in 2015. These changes allow for the use of legally-obtained river herring as bait in the striped bass fishery.

A copy of the amended rule is enclosed for your convenience as part of the July 11, 2016 supplement to the *North Carolina Marine Fisheries Commission Rules May 1, 2015*. A copy of all Marine Fisheries Commission rules can be downloaded from the Division of Marine Fisheries web site at http://portal.ncdenr.org/web/mf/rules-and-regulations.

In an effort to reduce costs to the State while still providing information, the division continues to transition to electronic distribution of rules information to interested parties. If you would like to join the rules interested parties email distribution list for Marine Fisheries Commission rulemaking information, please send an email to denr.dmf.mfcrules-subscribe@lists.ncmail.net. After you send an email you will automatically be added to the list. Please be advised you will not receive a confirmation email.

If you have any questions, please contact me at catherine.blum@ncdenr.gov or 252-808-8014. Thank you for your continued interest and participation in the rulemaking process.

Enclosure

NORTH CAROLINA
MARINE FISHERIES COMMISSION
RULES

MAY 1, 2015

SUPPLEMENT – JULY 11, 2016

MARINE FISHERIES COMMISSION
Sammy Corbett, Chairman

DEPARTMENT OF ENVIRONMENTAL QUALITY
Donald R. van der Vaart, Secretary

DIVISION OF MARINE FISHERIES
Braxton C. Davis, Director
http://portal.ncdenr.org/web/mf

MARINE FISHERIES COMMISSION

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NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALITY
CHAPTER 03 – MARINE FISHERIES

THE FOLLOWING RULES ARE AMENDED EFFECTIVE APRIL 1, 2016 OR JUNE 13, 2016

PAGE

SUBCHAPTER 03I – GENERAL RULES

SECTION .0100 – GENERAL RULES

SUBCHAPTER 03J – NETS, POTS, DREDGES, AND OTHER FISHING DEVICES

SECTION .0100 – NET RULES, GENERAL

SUBCHAPTER 03M – FINFISH

SECTION .0500 – OTHER FINFISH

SUBCHAPTER 03R – DESCRIPTIVE BOUNDARIES

SECTION .0100 – DESCRIPTIVE BOUNDARIES

[*] Only the history note of the rule was updated; the rule text is unchanged.

NORTH CAROLINA ADMINISTRATIVE CODE
TITLE 15A – ENVIRONMENTAL QUALTIY
CHAPTER 03 - MARINE FISHERIES

SUBCHAPTER 03I - GENERAL RULES

SECTION .0100 - GENERAL RULES

15A NCAC 03I .0113 BIOLOGICAL SAMPLING

It is unlawful for any licensee under Chapter 113, Subchapter IV, of the General Statutes to refuse to allow the Fisheries Director or his agents to obtain biological data, harvest information, or other statistical data necessary or useful to the conservation and management of marine and estuarine resources from fish in the licensee's possession. Such data shall include, but is not limited to, species identification, length, weight, age, sex, number, area of catch, harvest method, and quantity of catch.

History Note: *Authority G.S. 113-134; 113-170.3; 113-170.4; 113-174.1; 113-182;*
Eff. October 1, 1992;
Recodified from 15A NCAC 3I .0013 Eff. December 17, 1996.

SUBCHAPTER 03J - NETS, POTS, DREDGES, AND OTHER FISHING DEVICES

SECTION .0100 - NET RULES, GENERAL

15A NCAC 03J .0103 GILL NETS, SEINES, IDENTIFICATION, RESTRICTIONS

(a) It is unlawful to use gill nets:
- (1) with a mesh length less than two and one-half inches; and
- (2) in Internal Coastal Waters from April 15 through December 15, with a mesh length five inches or greater and less than five and one-half inches.

(b) The Fisheries Director may, by proclamation, limit or prohibit the use of gill nets or seines in Coastal Fishing Waters, or any portion thereof, or impose any or all of the following restrictions on gill net or seine fishing operations:
- (1) specify time;
- (2) specify area;
- (3) specify means and methods, including:
  - (A) gill net mesh length, but the maximum length specified shall not exceed six and one-half inches in Internal Coastal Waters; and
  - (B) net number and length, but for gill nets with a mesh length four inches or greater, the maximum length specified shall not exceed 2,000 yards per vessel in Internal Coastal Waters regardless of the number of individuals involved; and
- (4) specify season.

(c) It is unlawful to use fixed or stationary gill nets in the Atlantic Ocean, drift gill nets in the Atlantic Ocean for recreational purposes, or any gill nets in Internal Coastal Waters unless nets are marked by attaching to them at each end two separate yellow buoys which shall be of solid foam or other solid buoyant material no less than five inches in diameter and no less than five inches in length. Gill nets that are not connected together at the top line are considered as individual nets, requiring two buoys at each end of each individual net. Gill nets connected together at the top line are considered as a continuous net requiring two buoys at each end of the continuous net. Any other marking buoys on gill nets used for recreational purposes shall be yellow except one additional buoy, any shade of hot pink in color, constructed as specified in this Paragraph, shall be added at each end of each individual net. Any other marking buoys on gill nets used in commercial fishing operations shall be yellow except that one additional identification buoy of any color or any combination of colors, except any shade of hot pink, may be used at either or both ends. The owner shall be identified on a buoy on each end either by using engraved buoys or by attaching engraved metal or plastic tags to the buoys. Such identification shall include owner's last name and initials and if a vessel is used, one of the following:
- (1) owner's N.C. motor boat registration number; or
- (2) owner's U.S. vessel documentation name.

(d) It is unlawful to use gill nets:
- (1) within 200 yards of any flounder or other finfish pound net set with lead and either pound or heart in use, except from August 15 through December 31 in all Coastal Fishing Waters of the Albemarle Sound, including its tributaries to the boundaries between Coastal and Joint Fishing Waters, west of a line beginning at a point 36° 04.5184' N - 75° 47.9095'

W on Powell Point; running southerly to a point 35° 57.2681' N - 75° 48.3999' W on Caroon Point, it is unlawful to use gill nets within 500 yards of any pound net set with lead and either pound or heart in use; and

(2) from March 1 through October 31 in the Intracoastal Waterway within 150 yards of any railroad or highway bridge.

(e) It is unlawful to use gill nets within 100 feet either side of the center line of the Intracoastal Waterway Channel south of the entrance to the Alligator-Pungo River Canal near Beacon "54" in Alligator River to the South Carolina line, unless such net is used in accordance with the following conditions:

(1) no more than two gill nets per vessel may be used at any one time;

(2) any net used must be attended by the fisherman from a vessel who shall at no time be more than 100 yards from either net; and

(3) any individual setting such nets shall remove them, when necessary, in sufficient time to permit unrestricted vessel navigation.

(f) It is unlawful to use runaround, drift, or other non-stationary gill nets, except as provided in Paragraph (e) of this Rule:

(1) to block more than two-thirds of any natural or manmade waterway, sound, bay, creek, inlet, or any other body of water; or

(2) in a location where it will interfere with navigation.

(g) It is unlawful to use unattended gill nets with a mesh length less than five inches in a commercial fishing operation in the gill net attended areas designated in 15A NCAC 03R .0112(a).

(h) It is unlawful to use unattended gill nets with a mesh length less than five inches in a commercial fishing operation from May 1 through November 30 in the Internal Coastal Waters and Joint Fishing Waters of the state designated in 15A NCAC 03R .0112(b).

(i) It is unlawful for any portion of a gill net with a mesh length five inches or greater to be within 10 feet of any point on the shoreline while set or deployed, unless the net is attended from June through October in Internal Coastal Waters.

(j) For the purpose of this Rule and 15A NCAC 03R .0112, "shoreline" is defined as the mean high water line or marsh line, whichever is more seaward.

History Note: *Authority G.S. 113-134; 113-173; 113-182; 113-221.1; 143B-289.52;*
Eff. January 1, 1991;
Amended Eff. August 1, 1998; March 1, 1996; March 1, 1994; July 1, 1993; September 1, 1991;
Temporary Amendment Eff. October 2, 1999; July 1, 1999; October 22, 1998;
Amended Eff. April 1, 2001;
Temporary Amendment Eff. May 1, 2001;
Amended Eff. April 1, 2016; April 1, 2009; December 1, 2007; September 1, 2005; August 1, 2004; August 1, 2002.

SUBCHAPTER 03M – FINFISH

SECTION .0500 – OTHER FINFISH

15A NCAC 03M .0513 RIVER HERRING

It is unlawful to take or possess river herring from North Carolina Coastal Fishing Waters. Possession of river herring from sources other than North Carolina Coastal Fishing Waters shall be limited to fish less than or equal to six inches total length aboard a vessel or while engaged in fishing.

History Note: *Authority G.S. 113-134; 113-182; 113-221; 143B-289.52;*
Eff. March 1, 1995;
Amended Eff. August 1, 1998;
Temporary Amendment Eff. May 1, 2000; August 1, 1999; July 1, 1999; March 1, 1999;
Amended Eff. June 13, 2016; October 1, 2008; December 1, 2007; April 1, 2001.

SUBCHAPTER 03R - DESCRIPTIVE BOUNDARIES

SECTION .0100 - DESCRIPTIVE BOUNDARIES

15A NCAC 03R .0108 MECHANICAL METHODS PROHIBITED TO TAKE OYSTERS

The dredges and mechanical methods prohibited areas to take oysters referenced in 15A NCAC 03K .0204 are delineated in the following Internal Coastal Waters:

(1) In Roanoke Sound and tributaries, south of a line beginning at a point 35° 55.1461' N – 75° 39.5618' W on Baum Point, running easterly to a point 35° 55.9795' N - 75° 37.2072' W and north and east of a line beginning at a point 35° 50.8315' N - 75° 37.1909' W on the west side of the mouth of Broad Creek, running easterly to a point 35° 51.0097' N - 75° 36.6910' W near Beacon "17", running southerly to a point 35° 48.6145' N - 75° 35.3760' W near Beacon "7", running easterly to a point 35° 49.0348' N - 75° 34.3161' W on Cedar Point.

(2) In Pamlico Sound and tributaries:

(a) Outer Banks area, within the area described by a line beginning at a point 35° 46.0638' N - 75° 31.4385' W on the shore of Pea Island; running southwesterly to a point 35° 42.9500' N - 75° 34.1500' W; running southerly to a point 35° 39.3500' N - 75° 34.4000' W; running southeasterly to a point 35° 35.8931' N - 75° 31.1514' W in Chicamacomico Channel near Beacon "ICC"; running southerly to a point 35° 28.5610' N - 75° 31.5825' W on Gull Island; running southerly to a point 35° 22.8671' N - 75° 33.5851' W in Avon Channel near Beacon "1"; running southwesterly to a point 35° 18.9603' N - 75° 36.0817' W in Cape Channel near Beacon "2"; running westerly to a point 35° 16.7588' N - 75° 44.2554' W in Rollinson Channel near Beacon "42RC"; running southwesterly to a point 35° 14.0337' N - 75° 45.9643' W southwest of Oliver Reef near the quick-flashing beacon; running westerly to a point 35° 09.3650' N - 76° 00.6377' W in Big Foot Slough Channel near Beacon "14BF"; running southwesterly to a point 35° 08.4523' N - 76° 02.6651' W in Nine Foot Shoal Channel near Beacon "9"; running westerly to a point 35° 07.1000' N - 76° 06.9000; running southwesterly to a point 35° 01.4985' N - 76° 11.4353' W near Beacon "HL"; running southwesterly to a point 35° 00.2728' N - 76° 12.1903' W near Beacon "2CS"; running southerly to a point 34° 59.4383' N - 76° 12.3541' W in Wainwright Channel immediately east of the northern tip of Wainwright Island; running easterly to a point 34° 58.7853' N - 76° 09.8922' W on Core Banks; running northerly along the shoreline and across the inlets following the COLREGS Demarcation lines to the point of beginning;

(b) Stumpy Point Bay, north of a line beginning at a point 35° 40.9719' N - 75° 44.4213' W on Drain Point; running westerly to a point 35° 40.6550' N - 75° 45.6869' W on Kazer Point;

(c) Pains Bay, east of a line beginning at a point 35° 35.0666' N - 75° 51.2000' W on Pains Point, running southerly to a point 35° 34.4666' N – 75° 50.9666' W on Rawls Island; running easterly to a point 35° 34.2309' N - 75° 50.2695' W on the east shore;

(d) Long Shoal River, north of a line beginning at a point 35° 35.2120' N - 75° 53.2232' W at the 5th Avenue Canal, running easterly to a point 35° 35.0666' N - 75° 51.2000' W on the east shore on Pains Point;

(e) Wysocking Bay:

(i) Wysocking Bay, north of a line beginning at a point 35° 25.2741' N - 76° 03.1169' W on Mackey Point, running easterly to a point 35° 25.1189' N - 76° 02.0499' W at the mouth of Lone Tree Creek;

(ii) Mount Pleasant Bay, west of a line beginning at a point 35° 23.8652' N - 76° 04.1270' W on Browns Island, running southerly to a point 35° 22.9684' N - 76° 03.7129' W on Bensons Point;

(f) Juniper Bay, north of a line beginning at a point 35° 22.1384' N - 76° 15.5991' W near the Caffee Bay ditch, running easterly to a point 35° 22.0598' N - 76° 15.0095' W on the east shore;

(g) Swan Quarter Bay:

(i) Caffee Bay, east of a line beginning at a point 35° 22.1944' N - 76° 19.1722' W on the north shore, running southerly to a point 35° 21.5959' N - 76° 18.3580' W on Drum Point;

(ii) Oyster Creek, east of a line beginning at a point 35° 23.3278' N - 76° 19.9476' W on the north shore, running southerly to a point 35° 22.7018' N - 76° 19.3773' W on the south shore;

(h) Rose Bay:

(i) Rose Bay, north of a line beginning at a point 35° 25.7729' N - 76° 24.5336' W on Island Point, running southeasterly and passing near Beacon "5" to a point 35° 25.1854' N - 76° 23.2333' W on the east shore;

(ii) Tooleys Creek, west of a line beginning at a point 35° 25.7729' N - 76° 24.5336' W on Island Point, running southwesterly to a point 35° 25.1435' N - 76° 25.1646' W on Ranger Point;

(i) Spencer Bay:

(i) Striking Bay, north of a line beginning at a point 35° 23.4106' N - 76° 26.9629' W on Short Point, running easterly to a point 35° 23.3404' N - 76° 26.2491' W on Long Point;

(ii) Germantown Bay, north of a line beginning at a point 35° 24.0937' N - 76° 27.9348' W; on the west shore, running easterly to a point 35° 23.8598' N - 76° 27.4037' W on the east shore;

(j) Abel Bay, northeast of a line beginning at a point 35° 23.6463' N - 76° 31.0003' W on the west shore, running southeasterly to a point 35° 22.9353' N - 76° 29.7215' W on the east shore;

(k) Pungo River, Fortescue Creek, east of a line beginning at a point 35° 25.9213' N - 76° 31.9135' W on Pasture Point; running southerly to a point 35° 25.6012' N - 76° 31.9641' W on Lupton Point;

(l) Pamlico River:

(i) North Creek, north of a line beginning at a point 35° 25.3988' N - 76° 40.0455' W on the west shore, running southeasterly to a point 35° 25.1384' N - 76° 39.6712' W on the east shore;

(ii) Campbell Creek (off of Goose Creek), west of a line beginning at a point 35° 17.3600' N - 76° 37.1096' W on the north shore; running southerly to a point 35° 16.9876' N - 76° 37.0965' W on the south shore;

(iii) Eastham Creek (off of Goose Creek), east of a line beginning at a point 35° 17.7423' N - 76° 36.5164' W on the north shore; running southeasterly to a point 35° 17.5444' N - 76° 36.3963' W on the south shore;

(iv) Oyster Creek-Middle Prong, southwest of a line beginning at a point 35° 19.4921' N - 76° 32.2590' W on Cedar Island; running southeasterly to a point 35° 19.1265' N - 76° 31.7226' W on Beard Island Point; and southwest of a line beginning at a point 35° 19.5586' N - 76° 32.8830' W on the west shore, running easterly to a point 35° 19.5490' N - 76° 32.7365' W on the east shore;

(m) Mouse Harbor, west of a line beginning at a point 35° 18.3915' N - 76° 29.0454' W on Persimmon Tree Point, running southerly to a point 35° 17.1825' N - 76° 28.8713' W on Yaupon Hammock Point;

(n) Big Porpoise Bay, northwest of a line beginning at a point 35° 15.6993' N - 76° 28.2041' W on Big Porpoise Point, running southwesterly to a point 35° 14.9276' N - 76° 28.8658' W on Middle Bay Point;

(o) Middle Bay, west of a line beginning at a point 35° 14.8003' N - 76° 29.1923' W on Deep Point, running southerly to a point 35° 13.5419' N - 76° 29.6123' W on Little Fishing Point;

(p) Jones Bay, west of a line beginning at a point 35° 14.0406' N - 76° 33.3312' W on Drum Creek Point, running southerly to a point 35° 13.3609' N - 76° 33.6539' W on Ditch Creek Point;

(q) Bay River:

(i) Gales Creek-Bear Creek, north and west of a line beginning at a point 35° 11.2833' N - 76° 35.9000' W on Sanders Point, running northeasterly to a point 35° 11.9000' N - 76° 34.2833' W on the east shore;

(ii) Bonner Bay, southeast of a line beginning at a point 35° 09.6281' N - 76° 36.2185' W on the west shore; running northeasterly to a point 35° 10.0888' N - 76° 35.2587' W on Davis Island Point;

(r) Neuse River:

(i) Lower Broad Creek, west of a line beginning at a point 35° 05.8314' N - 76° 35.3845' W on the north shore; running southwesterly to a point 35° 05.5505' N - 76° 35.7249' W on the south shore;

(ii) Greens Creek - north of a line beginning at a point 35° 01.3476' N - 76° 42.1740' W on the west shore of Greens Creek; running northeasterly to a point 35° 01.4899' N - 76° 41.9961' W on the east shore;

(iii) Dawson Creek, north of a line beginning at a point 34° 59.5920' N - 76° 45.4620' W on the west shore; running southeasterly to a point 34° 59.5800' N – 76° 45.4140' W on the east shore;

(iv) Clubfoot Creek, south of a line beginning at a point 34° 54.5424' N - 76° 45.7252' W on the west shore, running easterly to a point 34° 54.4853' N - 76° 45.4022' W on the east shore;

(v) Turnagain Bay, south of a line beginning at a point 34° 59.4065' N - 76° 30.1906' W on the west shore; running easterly to a point 34° 59.5668' N - 76° 29.3557' W on the east shore;

(s) West Bay:

(i) Long Bay-Ditch Bay, west of a line beginning at a point 34° 57.9388' N - 76° 27.0781' W on the north shore of Ditch Bay; running southwesterly to a point 34° 57.2120' N - 76° 27.2185' W on the south shore of Ditch Bay; then south of a line running southeasterly to a point 34° 56.7633' N - 76° 26.3927' W on the east shore of Long Bay;

(ii) West Thorofare Bay, south of a line beginning at a point 34° 57.2199' N - 76° 24.0947' W on the west shore; running easterly to a point 34° 57.4871' N - 76° 23.0737' W on the east shore;

(iii) Merkle Bay, east of a line beginning at a point 34° 58.2286' N - 76° 22.8374' W on the north shore, running southerly to a point 34° 57.5920' N - 76° 23.0704' W on Merkle Bay Point;

(iv) North Bay, east of a line beginning at a point 35° 01.8982' N - 76° 21.7135' W on Point of Grass, running southeasterly to a point 35° 01.3320' N - 76° 21.3353' W on Western Point.

(3) In Core Sound and its tributaries, southwest of a line beginning at a point 35° 00.1000' N - 76° 14.8667' W near Hog Island Reef; running easterly to a point 34° 58.7853' N - 76° 09.8922' W on Core Banks; and in the following waterbodies and their tributaries: Back Bay, the Straits, Back Sound, North River, Newport River, Bogue Sound, and White Oak River.

(4) In Onslow, Pender, New Hanover, and Brunswick counties.

History Note: *Authority G.S. 113-134; 113-182; 143B-289.52;*
Eff. January 1, 1991;
Amended Eff. July 1, 1993; October 1, 1992; September 1, 1991;
Recodified from 15A NCAC 03R .0008 Eff. December 17, 1996;
Amended Eff. April 1, 2016; October 1, 2004.

15A NCAC 03R .0112 ATTENDED GILL NET AREAS

(a) The attended gill net areas referenced in 15A NCAC 03J .0103(g) are delineated in the following areas:

(1) Pamlico River, west of a line beginning at a point 35° 27.5768' N - 76° 54.3612' W on Ragged Point; running southwesterly to a point 35° 26.9176' N - 76° 55.5253' W on Mauls Point;

(2) Within 200 yards of any shoreline in Pamlico River and its tributaries east of a line beginning at a point 35° 27.5768' N - 76° 54.3612' W on Ragged Point; running southwesterly to a point 35° 26.9176' N - 76° 55.5253' W on Mauls Point; and west of a line beginning at a point 35° 22.3622' N - 76° 28.2032' W on Roos Point; running southerly to a point at 35° 18.5906' N - 76° 28.9530' W on Pamlico Point;

(3) Pungo River, east of the northern portion of the Pantego Creek breakwater and a line beginning at a point 35° 31.7198' N - 76° 36.9195' W on the northern side of the breakwater near Tooleys Point; running southeasterly to a point 35° 30.5312' N - 76° 35.1594' W on Durants Point;

(4) Within 200 yards of any shoreline in Pungo River and its tributaries west of the northern portion of the Pantego Creek breakwater and a line beginning at a point 35° 31.7198' N - 76° 36.9195' W on the northern side of the breakwater near Tooleys Point; running southeasterly to a point 35° 30.5312' N - 76° 35.1594' W on Durants Point; and west of a line beginning at a point 35° 22.3622' N - 76° 28.2032' W on Roos Point; running southerly to a point at 35° 18.5906' N - 76° 28.9530' W on Pamlico Point;

(5) Neuse River and its tributaries northwest of the Highway 17 highrise bridge;

(6) Trent River and its tributaries; and

(7) Within 200 yards of any shoreline in Neuse River and its tributaries east of the Highway 17 highrise bridge and south and west of a line beginning on Maw Point at a point 35° 09.0407' N - 76° 32.2348' W; running southeasterly near the Maw Point Shoal Marker "2" to a point 35° 08.1250' N - 76° 30.8532' W; running southeasterly near the Neuse River Entrance Marker "NR" to a point 35° 06.6212' N - 76° 28.5383' W; running southerly to a point 35° 04.4833' N - 76° 28.0000' W near Point of Marsh in Neuse River. In Core and Clubfoot creeks, the Highway 101 Bridge constitutes the attendance boundary.

(b) The attended gill net areas referenced in 15A NCAC 03J .0103(h) are delineated in the following Internal Coastal Waters and Joint Fishing Waters of the state south of a line beginning on Roanoke Marshes Point at a point 35° 48.3693' N - 75° 43.7232' W; running southeasterly to a point 35° 44.1710' N - 75° 31.0520' W on Eagles Nest Bay to the South Carolina State line:

(1) All primary nursery areas described in 15A NCAC 03R .0103, all permanent secondary nursery areas described in 15A NCAC 03R .0104, and no-trawl areas described in 15A NCAC 03R .0106(2), (4), (5), (8), (10), (11), and (12);

(2) In the area along the Outer Banks, beginning at a point 35° 44.1710' N - 75° 31.0520' W on Eagles Nest Bay; running northwesterly to a point 35° 45.1833' N - 75° 34.1000' W west of Pea Island; running southerly to a point 35° 40.0000' N - 75° 32.8666' W west of Beach Slough; running southeasterly and passing near Beacon "2" in Chicamicomico Channel to a point 35° 35.0000' N - 75° 29.8833' W west of the Rodanthe Pier; running southwesterly to a point 35° 28.4500' N - 75° 31.3500' W on Gull Island; running southerly to a point 35° 22.3000' N - 75° 33.2000' W near Beacon "2" in Avon Channel ; running southwesterly to a point 35° 19.0333' N - 75° 36.3166' W near Beacon "2" in Cape Channel; running southwesterly to a point 35° 15.5000' N - 75° 43.4000' W near Beacon "36" in Rollinson Channel; running southeasterly to a point 35° 14.9386' N - 75° 42.9968' W near Beacon "35" in Rollinson Channel; running southwesterly to a point 35° 14.0377' N - 75° 45.9644' W near a "Danger" Beacon northwest of Austin Reef; running southwesterly to a point 35° 11.4833' N - 75° 51.0833' W on Legged Lump; running southeasterly to a point 35° 10.9666' N - 75° 49.7166' W south of Legged Lump; running southwesterly to a point 35° 09.3000' N - 75° 54.8166' W near the west end of Clarks Reef; running westerly to a point 35° 08.4333' N - 76° 02.5000' W near Nine Foot Shoal Channel; running southerly to a point 35° 06.4000' N - 76° 04.3333' W near North Rock; running southwesterly to a point 35° 01.5833' N - 76° 11.4500' W near Beacon "HL"; running southerly to a point 35° 00.2666' N - 76° 12.2000' W; running southerly to a point 34° 59.4664' N - 76° 12.4859' W on Wainwright Island; running easterly to a point 34° 58.7853' N - 76° 09.8922' W on Core Banks; running northerly along the shoreline and across the inlets following the COLREGS Demarcation Line to the point of beginning;

(3) In Core and Back sounds, beginning at a point 34° 58.7853' N - 76° 09.8922' W on Core Banks; running northwesterly to a point 34° 59.4664' N - 76° 12.4859' W on Wainwright Island; running southerly to a point 34° 58.8000' N - 76°

12.5166' W; running southeasterly to a point 34° 58.1833' N - 76° 12.3000' W; running southwesterly to a point 34° 56.4833' N - 76° 13.2833' W; running westerly to a point 34° 56.5500' N - 76° 13.6166' W; running southwesterly to a point 34° 53.5500' N - 76° 16.4166' W; running northwesterly to a point 34° 53.9166' N - 76° 17.1166' W; running southerly to a point 34° 53.4166' N - 76° 17.3500' W; running southwesterly to a point 34° 51.0617' N - 76° 21.0449' W; running southwesterly to a point 34° 48.3137' N - 76° 24.3717' W; running southwesterly to a point 34° 46.3739' N - 76° 26.1526' W; running southwesterly to a point 34° 44.5795' N - 76° 27.5136' W; running southwesterly to a point 34° 43.4895' N - 76° 28.9411' W near Beacon "37A"; running southwesterly to a point 34° 40.4500' N - 76° 30.6833' W; running westerly to a point 34° 40.7061' N - 76° 31.5893' W near Beacon "35" in Back Sound; running westerly to a point 34° 41.3178' N -76° 33.8092' W near Buoy "3"; running southwesterly to a point 34° 39.6601' N - 76° 34.4078' W on Shackleford Banks; running easterly and northeasterly along the shoreline and across the inlets following the COLREGS Demarcation lines to the point of beginning;

(4) Within 200 yards of any shoreline in the area upstream of the 76° 28.0000' W longitude line beginning at a point 35° 22.3752' N - 76° 28.0000' W near Roos Point in Pamlico River; running southeasterly to a point 35° 04.4833' N - 76° 28.0000' W near Point of Marsh in Neuse River; and

(5) Within 50 yards of any shoreline east of the 76° 28.0000' W longitude line beginning at a point 35° 22.3752' N - 76° 28.0000' W near Roos Point in Pamlico River; running southeasterly to a point 35° 04.4833' N - 76° 28.0000' W near Point of Marsh in Neuse River, except from October 1 through November 30, south and east of Highway 12 in Carteret County and south of a line from a point 34° 59.7942' N - 76° 14.6514' W on Camp Point; running easterly to a point at 34° 58.7853' N - 76° 09.8922' W on Core Banks; to the South Carolina State Line.

History Note: *Authority G.S. 113-134; 113-173; 113-182; 113-221; 143B-289.52;*
Eff. August 1, 2004;
Amended Eff. April 1, 2016; June 1, 2013; April 1, 2011; April 1, 2009.

INDEX

A "♦" symbol is used in the index of the rulebook as a visual sign to alert readers there may be a public notice, or proclamation, for a subject. The Marine Fisheries Commission has the authority to delegate to the Fisheries Director the ability to issue proclamations, suspending or implementing particular commission rules that may be affected by variable conditions. For example, the index entry "species, sheepshead♦" indicates there may be a proclamation outlining harvest restrictions or other information for that species. Proclamations are not included in the rulebook because they change frequently.

Go to http://portal.ncdenr.org/web/mf/proclamations to view proclamations and learn about the restrictions. If you do not have Internet access, please call 252-726-7021 or 800-682-2632 to find out how to receive proclamation information. It is imperative that persons affected by proclamations keep themselves informed.

Please note: entries for fishing gear and equipment are listed alphabetically under the heading **"gear." Other major headings** in the index include **"lease," "license," "permit,"** and **"species."** For example, to look up information about a shellfish lease, see "lease, shellfish."

THE ORIGINAL AND OFFICIAL COPY OF TITLE 15A, CHAPTER 03 AND CHAPTER 18A OF THE N.C. ADMINISTRATIVE CODE ARE ON FILE IN THE OFFICE OF ADMINISTRATIVE HEARINGS AND ARE AVAILABLE FOR PUBLIC INSPECTION DURING NORMAL WORKING HOURS.

THIS DOCUMENT IS AVAILABLE FROM:
N.C. DIVISION OF MARINE FISHERIES
P.O. BOX 769
3441 ARENDELL STREET
MOREHEAD CITY, NC 28557
1-800-682-2632 or 252-726-7021
http://portal.ncdenr.org/web/mf

CERTIFICATION

PURSUANT TO G.S. 113-221 (B) AND G.S. 113-221 (G), THIS IS TO CERTIFY THAT THE PRECEDING "NORTH CAROLINA MARINE FISHERIES COMMISSION RULES MAY 1, 2015, SUPPLEMENT - JULY 11, 2016" IS THE OFFICIAL CODIFICATION OF THE RULES OF THE N.C. MARINE FISHERIES COMMISSION EFFECTIVE AS OF JULY 11, 2016.

BRAXTON C. DAVIS, DIRECTOR
N.C. DIVISION OF MARINE FISHERIES

North Carolina Marine Fisheries Commission
2016-2017 Annual Rulemaking Cycle

August 2016

Time of Year	Action
April 2016	Last opportunity for a new issue to be presented to Division of Marine of Fisheries Rules Advisory Team
May 2016	Second review by Division of Marine Fisheries Rules Advisory Team
May-July 2016	Fiscal analysis of rules prepared by Division of Marine Fisheries staff and approved by Office of State Budget and Management
August 2016	Marine Fisheries Commission considers approval of Notice of Text for Rulemaking
October 2016	Publication of proposed rules in the North Carolina Register
October 2016	Public hearing held *
(January 2017)	(Last opportunity for a new issue to be presented to Division of Marine Fisheries Rules Advisory Team for next annual cycle)
(February 2017)	(Second review by Division of Marine Fisheries Rules Advisory Team)
February 2017	Marine Fisheries Commission considers approval of permanent rules
April 2017	Rules reviewed by Office of Administrative Hearings Rules Review Commission
April 15, 2017	Commercial license sales begin
April/May 2017	New rulebook drafted and sent to vendor for publication
May 1, 2017	Earliest possible effective date of rules
May or June 1, 2017	Actual effective date of new rules
May or June 1, 2017	Rulebook available online and for distribution

* Wednesday, Oct. 26, 2016, 6 p.m.
Division of Marine Fisheries
5285 Highway 70 West
Morehead City, NC 28557

Issue Paper Review for August 2016 Marine Fisheries Commission Meeting

Issue Paper Title	Issue	Origination	Proposed Rules	Division of Marine Fisheries Recommendation
MODIFY FISHERIES DIRECTOR'S PROCLAMATION AUTHORITY FOR THE PROTECTION OF PUBLIC HEALTH	Address deficiencies identified as a result of North Carolina not mandating certain sanitary shellfish harvest and handling practices of harvesters. Also, make the list of potential variable conditions for the use of the Fisheries Director's proclamation authority inclusive of the protection of public health.	U.S. Food and Drug Administration's Program Element Evaluation Report for the Shellfish Control of Harvest Element in 2015	• 15A NCAC 03H .0103 • 15A NCAC 03K .0110	Amend the rules for North Carolina to come into compliance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance; also, so the authority of the Marine Fisheries Commission is more comprehensively addressed as it pertains to its delegation of authority to the Fisheries Director to have the ability to issue proclamations to address variable conditions.
ESTABLISH SPOTTED SEATROUT RULE	Re-establish a particular rule of the Marine Fisheries Commission for the management of spotted seatrout to prepare for the Atlantic States Marine Fisheries Commission to retire its interstate fishery management plan.	Atlantic States Marine Fisheries Commission and N.C. Division of Marine Fisheries	• 15A NCAC 03M .0522	Adopt the rule to ensure sufficient authority is in place for the Marine Fisheries Commission to manage spotted seatrout under the North Carolina Spotted Seatrout Fishery Management Plan, independent of the Atlantic States Marine Fisheries Commission's fishery management plan via the North Carolina Fishery Management Plan for Interjurisdictional Fisheries.
ALIGN METHOD FOR COMMENCEMENT OF LICENSE, PERMIT, AND CERTIFICATE SUSPENSION/ REVOCATION PROCESS	The method for commencement of proceedings to suspend or revoke a fishing license, permit, or certificate currently includes an opportunity for an informal meeting with division staff. This is inconsistent with the method required for other similar administrative proceedings by the Division of Marine Fisheries to submit information in writing.	Division of Marine Fisheries	• 15A NCAC 03P .0101	Amend the rule to align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the Division of Marine Fisheries and Marine Fisheries Commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division staff.

Establish a Spotted Seatrout Rule Issue Paper

May 6, 2016

I. ISSUE

Adopt a particular N.C. Marine Fisheries Commission (NCMFC) rule for the management of spotted seatrout that grants proclamation authority to the N.C. Division of Marine Fisheries (NCDMF) director to address variable conditions of the fishery. The rule would provide another mechanism for the director to manage spotted seatrout in the event that current authority under rule 15A NCAC 03M .0512 is lost due to the removal of spotted seatrout as a managed species from the Atlantic States Marine Fisheries Commission (ASMFC).

II. ORIGINATION

ASMFC's South Atlantic State/Federal Fisheries Management Board

III. BACKGROUND

At its Nov. 5, 2015 meeting, the ASMFC's South Atlantic State/Federal Fisheries Management Board (Management Board) agreed with a state proposal that given spotted seatrout's limited migratory range, species management would be best left to the individual states rather than being managed through an interstate fishery management plan (FMP.) Therefore, the Management Board recommended to the ASMFC Interstate Fisheries Management Program Policy Board (Policy Board) that spotted seatrout be removed from ASMFC management authority. At its Feb. 3, 2016 meeting, the Management Board revisited its November motion given that some states' regulations for spotted seatrout are tied to the ASMFC FMP; North Carolina is one of those states. Even with this concern, the Management Board reiterated the appropriateness of state management given the largely non-migratory nature of the species. As a result, the Management Board decided to indefinitely postpone the recommendation to the Policy Board until states have the authority to implement regulations independent of the ASMFC plan.

Spotted seatrout (*Cynoscion nebulosus*) in North Carolina are managed under state and interstate FMPs. The three FMPs in effect include the ASMFC Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot and Spotted Seatrout (ASMFC 2011); the N.C. FMP for Interjurisdictional Fisheries (NCDMF 2015); and the N.C. Spotted Seatrout FMP (NCDMF 2012). The original ASMFC Spotted Seatrout FMP (ASMFC1984) recommended a 12-inch minimum size limit and comparable mesh sizes in directed fisheries. Amendment 1 to the ASMFC Spotted Seatrout FMP (ASMFC 1990) also added a recommendation to manage the stock at a 20% spawning potential ratio (SPR) to reduce the possibility of recruitment failure. SPR is the number of eggs that could be produced by an average recruit in a fished stock divided by the number of eggs that could be produced by an average recruit in an unfished stock. This is mirrored in the ASMFC Omnibus amendment (ASMFC 2011) as well as a recommendation to incorporate the use of bycatch reduction devices in fisheries to reduce the bycatch of spotted seatrout. The Omnibus amendment updated the spotted seatrout plan with requirements of the ASMFC Interstate FMP Charter. The N.C. Spotted Seatrout FMP, including Supplement A requires a 14-inch minimum size, four-fish recreational bag limit, and 75-fish commercial limit (NCDMF 2014). The adopted management strategy from the state FMP is the basis for current regulations for the N.C. spotted seatrout fishery. However, this management strategy is implemented under the authority of NCMFC rule 15A NCAC 03M .0512, Compliance With Fishery Management Plans, which was adopted in 1996 and amended in 2008 as part of the N.C. IJ FMP. This rule gives the Fisheries Director authority over size, season, area, quantity, and means and methods for species listed in the current IJ FMP and is the basis for proclamation authority to manage spotted seatrout in North Carolina.

Prior to the adoption of the original N.C. Spotted Seatrout FMP, the NCMFC had a particular rule for spotted seatrout, 15A NCAC 03M .0504, Trout. The rule set a minimum size of 12 inches total length and a 10-fish bag limit for recreational anglers and did not provide proclamation authority to the division director. The intent of the rule was to set a 12-inch minimum size limit for spotted seatrout to be compliant with the minimum requirements of the ASMFC spotted seatrout FMP. When the N.C. Spotted Seatrout FMP was adopted in 2012, implementing rule changes included the repeal of 15A NCAC 03M .0504. Given spotted seatrout was included in the IJ FMP, the choice was made to rely on the authority of 15A NCAC 03M .0512 to manage spotted seatrout in North Carolina for the state and interstate FMPs. The lack of proclamation authority in 15A NCAC 03M .0504 did not provide the regulatory mechanism to implement all of the management recommendations from the N.C. Spotted Seatrout FMP which included the need for flexibility to adjust regulations within an adaptive management framework, in response to variable conditions. Now that ASMFC is moving towards management of spotted seatrout at the state level (not interstate), it is clear that

authority to manage spotted seatrout is needed in a state-specific rule with the flexibility of proclamation authority to address variable conditions.

In North Carolina, removal of the species from ASMFC purview would remove the species from the N.C. IJ FMP and thus also eliminate the NCDMF director's proclamation authority for the species through rule 15A NCAC 03M .0512. Since there is no other rule specific to spotted seatrout in the N.C. Administrative Code, there would be no mechanism in place for the management of spotted seatrout in North Carolina.

IV. AUTHORITY

N.C. General Statutes
113-134. Rules.
113-182. Regulation of fishing and fisheries.
113-221.1. Proclamations; emergency review.
143B-289.52. Marine Fisheries Commission – power and duties.

North Carolina Marine Fisheries Commission Rules (May 1, 2015)
15A NCAC 03M .0512 Compliance with Fishery Management Plans

V. DISCUSSION

Rule 15A NCAC 03M .0512 provides that the NCDMF director may take actions to specify size, season, area, quantity, and means and methods for species listed in the N.C. IJ FMP. The goal of the IJ FMP is to "adopt FMPs, consistent with N.C. law, approved by the Councils or ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future." As long as spotted seatrout is managed by the ASMFC, implementation of regulations of the species falls under the umbrella of authority granted by rule 15A NCAC 03M .0512 for interjurisdictional species, since no other spotted seatrout rule is in place.

As a management option, status quo for the current regulatory mechanism for spotted seatrout has the potential to jeopardize the conservation of the species and the NCMFC regulatory authority over it. Even though the motion to remove spotted seatrout from the managed species list of the ASMFC was postponed indefinitely at the February 2016 meeting, representatives from all member states expressed interest in retiring the spotted seatrout FMP from ASMFC. Because of the desire of the ASMFC member states to eventually retire the interstate spotted seatrout FMP, the potential exists for North Carolina to lose existing management authority to put in place requirements for spotted seatrout through rule 15A NCAC 03M .0512; therefore, another regulatory mechanism must be implemented for continuity of spotted seatrout management in North Carolina.

Generally, to harmonize federal and state regulations for effective interstate management, another potential option for this type of issue could be to amend the ASMFC FMP to mirror the plans of the member states and diminish the disparity in state and federal regulations. This would maintain the NCDMF director's proclamation authority for spotted seatrout through rule 15A NCAC 03M .0512. However, all member states do not share the same regulations due to regional differences in abundance and life history of spotted seatrout (Table 1), so broad regional regulations may not be in the best interest of all states. Also, as aspects of the stocks and fisheries for spotted seatrout change, adjustment of management strategies would require either an addendum or amendment of the ASMFC FMP. Going through the ASMFC procedures for adjusting the management of spotted seatrout may be inadequate for addressing acute, regional management issues. Management needs of other member states may not align with the goals and objectives of the N.C. FMP for spotted seatrout and create the potential to have regulations that could negatively impact N.C. fishermen and the state's spotted seatrout stock. Additionally, the ASMFC's South Atlantic State/Federal Fisheries Management Board has twice stated that given spotted seatrout's limited migratory range, species management would be best left to the individual states rather than being managed through an interstate FMP. For these reasons, amending the ASMFC FMP is not a viable option.

Another option to be considered is the re-establishment of a rule specific to spotted seatrout. This would provide a safety net for regulatory authority if spotted seatrout is removed from the managed species list of the ASMFC. This would not affect the N.C. Spotted Seatrout FMP because the proposed rule would not change the management

strategies contained in the FMP or in Supplement A to the FMP. The proposed rule would simply provide another mechanism for proclamation authority to implement FMP management strategies.

The previous spotted seatrout rule (15A NCAC 03M .0504) set a minimum size length and bag limit but did not give the NCMFC flexibility to readily change or implement regulations to address management considerations from the spotted seatrout FMP or other variable conditions. To provide needed management flexibility, adoption of a new spotted seatrout rule could provide the proclamation authority granted to the Division director just like in 15A NCAC 03M .0512 over size, season, area, quantity, and means and methods. The new rule would also provide authority over times when fishing can occur in case regulations over time of day are deemed necessary for future management. This would also be consistent with other similar rules providing proclamation authority to the NCDMF director. Adoption of this new rule provides the same proclamation authority of the NCDMF director as is provided in 15A NCAC 03M .0512 to implement regulations in a timely manner to comply with changing management objectives should spotted seatrout be removed from the jurisdiction of ASMFC.

Table 1. Recreational and commercial spotted seatrout size and creel limits for Atlantic coast states.

State	Recreational	Commercial
New Jersey*	13" TL; 1 fish possession *(Managed as a group with weakfish therefore, all regulations pertaining to weakfish apply to spotted seatrout)*	13" TL; 100 lb possession limit during open season; 100 lb possession allowed during closed season as bycatch if equal or greater poundage of other species is also harvested *Gill nets: minimum mesh size of 3.25" stretched Season closed May 21 – Sept. 2 and Oct. 20 – 26* *Trawl: minimum mesh size of 3.75" stretched diamond mesh or 3.375" stretched square mesh Season closed Aug. 1 – Oct. 12* *Pound net: Season closed June 7 – June 30* *(Managed as a group with weakfish therefore, all regulations pertaining to weakfish apply to spotted seatrout)*
Delaware*	12" TL; no possession limit	*No commercial regulations*
Maryland	14" TL; 4 fish/day	14" TL; 150 lbs/day or trip, whichever is longer *Gill net: minimum mesh size of 3" stretched* *Trawl: minimum mesh size of 3.75" stretched diamond mesh or 3.375" stretched square mesh*
Virginia	14" TL; 5 fish limit with only one > 24" TL *Season closed March 1 – July 31*	14" TL *Commercial landings limited to 51,104 lbs for each 12-month period of Spt. 1 – Aug. 31. When 80% of the quota has been harvested, fisherman may only possess up to 100 lbs of bycatch as long as total landings is at least an equal amount of other fish species.* *Pound net and haul seine: the catch of spotted seatrout may consists of up to 5.0%, by weight, of fish < 14" TL* *Commercial hook and line: 5 fish possession limit only 1 fish > 24" TL; Season closed March 1 – July 31*
North Carolina	14" TL; 4 fish possession	14" TL; 75 fish possession
South Carolina	14" TL, 10 fish bag limit *Only hook and line and gig with gigging closed Dec – Feb.*	No commercial harvest
Georgia	13" TL, 15 fish bag limit	13" TL, 15 fish bag limit
Florida	15" – 20" TL, only one > 20" TL; 6 fish bag limit in Northeast management area and 4 fish bag limit in Southeast and Southwest management areas	15" – 24" TL; 75 fish/person/day or vessel, whichever is less, commercial vessel limit of 150 fish with two or more licensed fisherman *Gear restriction: only hook and line and cast net* *Season: June 1 – Nov. 30 in Northeast management zone, May 1 – Sept. 30 Southeast management zone, June 1 – Oct. 31 in Southwest management zone*

*These states currently have *de minimus* status at the ASMFC level for spotted seatrout and are not required to monitor stock status within their jurisdictional waters.

VI. PROPOSED RULE(S)

15A NCAC 03M .0522 SPOTTED SEATROUT

The Fisheries Director may, by proclamation, impose any of the following requirements on the taking of spotted seatrout:

(1) Specify time;
(2) Specify area;
(3) Specify means and methods;
(4) Specify season;
(5) Specify size; and
(6) Specify quantity.

History Note: *Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52; Eff. May 1, 2017.*

[15A NCAC 03M .0512 is provided for information only. There are no proposed changes.]

15A NCAC 03M .0512 COMPLIANCE WITH FISHERY MANAGEMENT PLANS

(a) In order to comply with management requirements incorporated in Federal Fishery Management Council Management Plans or Atlantic States Marine Fisheries Commission Management Plans or to implement state management measures, the Fisheries Director may, by proclamation, take any or all of the following actions for species listed in the Interjurisdictional Fisheries Management Plan:

(1) Specify size;
(2) Specify seasons;
(3) Specify areas:
(4) Specify quantity;
(5) Specify means and methods; and
(6) Require submission of statistical and biological data.

(b) Proclamations issued under this Rule shall be subject to approval, cancellation, or modification by the Marine Fisheries Commission at its next regularly scheduled meeting or an emergency meeting held pursuant to G.S. 113-221.1.

History Note: *Authority G.S. 113-134; 113-182; 113-221; 113-221.1; 143B-289.52; Eff. March 1, 1996; Amended Eff. October 1, 2008.*

VII. PROPOSED MANAGEMENT OPTIONS

1. Status Quo
   - \+ No rule change required
   - – Potential to lose authority to set regulations for spotted seatrout if ASMFC removes the species from its purview of management
   - – Potential for overfishing the stock since no authority is in place to set regulations if the species is removed from ASMFC management

2. Adopt rule to give proclamation authority to the division director over time, area, means and methods, season, size, and quantity of spotted seatrout harvested in North Carolina
   - \+ Provides authority for management of spotted seatrout that is unaffected if ASMFC removes the species from its purview of management
   - \+ Creates mechanism where management measures can be quickly changed to adapt to variable stock, environmental, and other conditions
   - \+ Current management measures for spotted seatrout remain in place; rule adoption only provides mechanism to maintain current management strategy.
   - – Requires rule change

VIII. RECOMMENDATION

The NCDMF recommends proposed management option 2.

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April 5, 2016

Revised: April 8, 2016
May 6, 2016

IX. LITERATURE CITED

ASMFC (Atlantic States Marine Fisheries Commission).1984 Fishery Management Plan for Spotted Seatrout. Washington (DC): ASMFC. Fisheries Management Report #4. 101 p.

ASMFC. 1990. Proceedings of the Atlantic States Fisheries Commission 49th annual meeting—ISFMP Policy Board meeting. ASMFC, Washington, D.C. 15 p.

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NCDMF. 2012. North Carolina Spotted Seatrout Fishery Management Plan. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 344 pp.

NCDMF. 2014. Supplement A to the N.C. Spotted Seatrout Fishery Management Plan. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 344 pp.

North Carolina Division of Marine Fisheries (NCDMF). 2015. North Carolina Fishery Management Plan Interjurisdictional Fisheries Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. 127 pp.

NOTICE OF TEXT ATTACHMENT

15A NCAC 03M .0522 SPOTTED SEATROUT

This rule is proposed for adoption to establish a rule of the Marine Fisheries Commission for the management of spotted seatrout, independent of the authority for interjurisdictional management under the Atlantic States Marine Fisheries Commission. The rule delegates proclamation authority to the Fisheries Director to specify time, area, means and methods, season, size, and quantity of spotted seatrout harvested in North Carolina. Current management measures will remain in place in accordance with the N.C. Spotted Seatrout Fishery Management Plan. The proposed rule adoption will only change the mechanism by which those same measures are implemented.

Ancillary Items

Update proclamations FF-38-2014 and FF-39-2014 with new rule authority if needed.

MFC Rulebook Index Worksheet

Rule	Rulebook Page #	Subject	Index Entry (**Bold** major headings)	Add/Delete
03M .0522	N/A	spotted seatrout	**species:**seatrout, spotted♦	Add
03M .0512	52	spotted seatrout	**species:**seatrout, spotted♦	Delete

MODIFY FISHERIES DIRECTOR'S PROCLAMATION AUTHORITY FOR THE PROTECTION OF PUBLIC HEALTH ISSUE PAPER

May 6, 2016

I. ISSUE

In 2015, the U.S. Food and Drug Administration (FDA) evaluated the N.C. Division of Marine Fisheries (DMF) Shellfish Control of Harvest Program. The DMF was found to be in non-conformance with the control of harvest requirements of the National Shellfish Sanitation Program (NSSP) Model Ordinance. The deficiencies were due to North Carolina not mandating certain sanitary shellfish harvest and handling practices of harvesters such as preventing contamination of shellfish with bilge water and preventing animals on harvest vessels, as well as lacking the legal authority to enforce those requirements.

Additionally, DMF staff observed that N.C. Marine Fisheries Commission (MFC) Rule 15A NCAC 03H .0103 "PROCLAMATION AUTHORITY OF FISHERIES DIRECTOR" lacks a specific variable condition for the "protection of public health". This rule includes a list of possible variable conditions for those MFC rules that grant proclamation authority to the Fisheries Director, but do not set forth specific variable conditions, a requirement for proclamation authority to be used. The addition of "protection of public health" as a possible variable condition would make this rule more comprehensive in light of the transfer of the Shellfish Sanitation and Recreational Water Quality Section from the Division of Environmental Health to the Division of Marine Fisheries via N. C. Session Law 2011-145 and the associated power and duty for the Marine Fisheries Commission to protect the public health under its jurisdiction.

II. ORIGINATION

N.C. Division of Marine Fisheries staff as a result of the FDA's Program Element Evaluation Report (PEER) for the Shellfish Control of Harvest Element in 2015.

III. BACKGROUND

The NSSP is a federal/state cooperative program recognized by the FDA and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish sold and produced for human consumption. In 1984, the FDA entered into a Memorandum of Understanding (MOU) with the ISSC which allows the ISSC to provide a formal structure for state regulatory authorities to participate in establishing continuing updated regulatory guidelines and procedures. The purpose of the NSSP is to promote and improve the sanitation of shellfish moving in interstate commerce through federal/state cooperation and uniformity of state shellfish programs. Participants in the NSSP include agencies from shellfish-producing and non-producing states, the FDA, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, MOU countries such as New Zealand, Canada, Mexico and Korea, and the shellfish industry. Through the NSSP and membership in the ISSC, states and MOU countries agree to enforce the NSSP Guide for the Control of Molluscan Shellfish, Section II: Model Ordinance (commonly referred to as the Model Ordinance) as the requirements which are minimally necessary for the sanitary control of molluscan shellfish. This includes all species of raw or frozen oysters, clams, mussels, and scallops, except when the final product form is the adductor muscle only.

Chapter VIII of the NSSP Model Ordinance lists the shellfish harvesting requirements for harvesters and the state authority. Specifically, Chapter VIII .02 C (1) requires that "The operator shall assure that all vessels used to harvest and transport shellstock are properly constructed, operated, and maintained to prevent contamination, deterioration, and decomposition of the shellstock." Additional language further details that "Decks and storage bins shall be constructed and located to prevent bilge water or polluted overboard water from coming into contact with the shellstock."

According to the 2015 FDA PEER for the Shellfish Control of Harvest, field observations revealed several harvest vessels as being improperly constructed. These vessels lacked false bottoms and/or lacked areas where shellfish could be safely stowed away to prevent contamination from bilge water, gas, and motor oil.

The FDA report also noted that a small harvest "vessel had a pet dog on board during harvest activities." Chapter VIII .02 C (2) of the Model Ordinance requires that "Cats, dogs, and other animals shall not be allowed on vessels." This requirement is for the protection of shellstock from pet waste contamination.

According to the FDA report, previous evaluations also expressed concerns over vessel construction and the protection of shellstock from contamination by bilge water, oil, or gas. The FDA recommends that N.C. Marine Patrol have the authority to enforce potential contamination issues related to vessel construction and pets on harvest vessels. N.C. Marine Patrol currently lacks the legal authority to enforce contamination issues related to the harvest of shellfish.

The FDA recognizes that it will take time to address these two issues and Marine Patrol's authority to enforce them. Due to the time necessary for regulatory changes to be made, the FDA did not request a formal action plan as is normally required according to ISSC's bylaws and procedures for non-conformity. The FDA's expectations are that the findings will be addressed. Program deficiency follow-up will be conducted during the 2016 annual evaluation.

Procedure IX of the ISSC's Constitution, Bylaws and Procedures lists actions that shall be taken in the event that an FDA program evaluation indicates a state program is not meeting the minimum requirements of the NSSP Model Ordinance. If the FDA considers the action (or lack of action) taken by the state to be inadequate to resolve the item(s), it shall be considered an unresolved issue and may be referred to the Unresolved Issues Committee. After considering the committee's recommendation, the ISSC Executive Board shall take action as appropriate. Actions available include the removal of all state certified shellfish dealers from the Interstate Certified Shellfish Shippers List. This would remove the ability of certified shellfish dealers to ship shellfish in interstate commerce and would be extremely detrimental to the economic viability and infrastructure of the state's shellfish industry.

For the issue regarding MFC Rule 15A NCAC 03H .0103 and variable conditions required to be in place for the use of the Fisheries Director's proclamation authority, a 2015 DMF information paper on proclamation authority can be referenced. That information paper was written in order to facilitate consistent implementation of proclamation authority delegated to the Fisheries Director by the Marine Fisheries Commission.

There are three required elements involved in delegation of proclamation authority to the Fisheries Director by the Marine Fisheries Commission. The Marine Fisheries Commission must specifically authorize the Fisheries Director the ability to issue a proclamation, there must be a particular rule in place, and the rule must be affected by a variable condition. These three elements apply when there is the potential for the Fisheries Director to issue a proclamation suspending a rule and when there is the potential for the Fisheries Director to issue a proclamation implementing a management measure.

The third required element for a proclamation to be issued is the particular rule must be affected by a variable condition. In some cases, a specific variable condition is listed in the particular rule. If a variable condition is not provided in the particular rule, a list of variable conditions is provided in 15A NCAC 03H .0103. Regardless of whether the variable condition is provided in a particular rule or in 15A NCAC 03H .0103, there must be a variable condition that needs to be addressed for the Fisheries Director's proclamation authority to be used.

Although the proposed changes to Rule 15A NCAC 03K .0110 contain a specific variable condition due to the frequent changes to the NSSP Model Ordinance, the addition of the "protection of public health" as a possible variable condition in Rule 15A NCAC 03H .0103 would cover other MFC rules that provide proclamation authority to the Fisheries Director, but do not specify a variable condition. This would help ensure that any future situations regarding public health are able to be adequately addressed.

IV. AUTHORITY

North Carolina General Statutes

113-221.1. Proclamations; emergency review.

113-221.2 Additional rules to establish sanitation requirement for scallops, shellfish, and crustacea; permits and permit fees authorized.

V. DISCUSSION

MFC Rule 15A NCAC 03K .0110 became effective April 1, 2014. This rule was adopted in order to give the DMF Director proclamation authority to implement the minimum state requirements of the NSSP. It was determined that proclamation authority was the most efficient way to address existing and future changes to the NSSP Model Ordinance in order to remain in compliance with the national program. This rule only gives the authority to implement the minimum state requirements adopted by the NSSP for public health protection and cannot be used for addressing resource or management issues.

MFC Rule 15A NCAC 03K .0110 specifies seven components of the shellfish program where restrictions can be imposed in order to protect public health. These include shellfish harvest time and temperature controls, tagging and labeling requirements, and training requirements for shellfish harvesters and dealers, among others.

Although Rule 15A NCAC 03K .0110 was adopted to protect public health by ensuring that shellfish have not been adulterated during harvest (in addition to other areas such as processing, storage and transport), none of the seven components of the rule cover restrictions on harvest practices that may contaminate shellfish. The recommended action to resolve this likely oversight is to amend Rule 15A NCAC 03K .0110 to provide the Fisheries Director the authority to set sanitary harvest and handling practices, as well as enforce issues relating to the contamination of shellfish during harvest. This would allow DMF to come back into compliance with the NSSP Model Ordinance.

Proposed amendments to Rule 15A NCAC 03H .0103 add the variable condition of "protection of public health" to the list of possible variable conditions required to be in place for the use of the Fisheries Director's proclamation authority that is set forth in other particular rules of the Marine Fisheries Commission. This more comprehensively addresses the authority of the Marine Fisheries Commission following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health to the Division of Marine Fisheries. Additional proposed amendments clarify that the mere presence of a variable condition is not sufficient to "trigger" the use of the Fisheries Director's proclamation authority, as the other aforementioned elements must also be in place.

VI. PROPOSED RULE(S)

15A NCAC 03H .0103 ~~PROCLAMATION AUTHORITY OF FISHERIES DIRECTOR~~PROCLAMATIONS, GENERAL

(a) It is unlawful to violate the provisions of any proclamation issued by the authority of Marine Fisheries Commission ~~Rule.~~rule.

(b) ~~Unless~~ If specific variable conditions are not set forth in a rule ~~granting~~ of the Marine Fisheries Commission that grants proclamation authority to the Fisheries Director, possible variable conditions ~~triggering the use of the Fisheries Director's proclamation authority~~ may include any of the following:

(1) compliance with changes mandated by the Fisheries Reform Act and its amendments;
(2) biological impacts;
(3) environmental conditions;
(4) compliance with Fishery Management Plans;
(5) user conflicts;
(6) bycatch issues;~~ and~~
(7) variable spatial ~~distributions.~~distributions; and
(8) protection of public health related to the public health programs that fall under the authority of the Marine Fisheries Commission.

History Note: *Authority G.S. 113-134; 113-135; 113-182; 113-221.1; 113-221.2; 113-221.3; 143B-289.52;*
Eff. January 1, 1991;
Amended Eff. March 1, 1994; September 1, 1991;
Temporary Amendment Eff. July 1, 1999;
Amended Eff. May 1, 2017; April 1, 2011; August 1, 2000.

15A NCAC 03K .0110 PUBLIC HEALTH AND CONTROL OF OYSTERS, CLAMS, ~~SCALLOPS~~ SCALLOPS, AND MUSSELS

~~(a) To protect public health, the Fisheries Director may, by proclamation, impose any or all of the following restrictions on oysters, clams, scallops, and mussels to ensure the sale or distribution of shellfish from approved areas or shellstock dealers as defined in Rule 15A NCAC 18A .0301 and to ensure that shellfish have not been adulterated or mislabeled during cultivation, harvesting, processing, storage and transport, in compliance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance:~~

(a) The National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance (Model Ordinance) includes minimum requirements for the sale or distribution of shellfish from approved areas or shellstock dealers, as defined in 15A NCAC 18A .0301, and to ensure that shellfish have not been adulterated or mislabeled during:

(1) cultivation;
(2) harvesting;
(3) processing;
(4) storage; and
(5) transport.

(b) To protect public health and to address variable conditions of the Model Ordinance, the Fisheries Director may, by proclamation, impose requirements as set forth in Paragraph (c) of this Rule on any of the following:

(1) oysters;
(2) clams;
(3) scallops;
(4) mussels;
(5) areas used to store shellfish;
(6) means and methods to take shellfish;
(7) vessels used to take shellfish; and
(8) shellstock conveyances as defined in 15A NCAC 18A .0301.

(c) Proclamations issued under this Rule may impose any of the following requirements:

(1) specify time and temperature controls;
(2) specify sanitation requirements to prevent a food safety hazard, as defined in 15A NCAC 18A .0301, or cross-contamination or adulteration of shellfish;
~~(2)~~(3) specify sanitation control procedures as specified in 21 Code of Federal Regulations (CFR) Part 123.11;
~~(3)~~(4) specify Hazard Analysis Critical Control Point (HACCP) requirements as specified in 21 CFR Part:
  (A) 123.3 Definitions;
  (B) 123.6 HACCP Plan;
  (C) 123.7 Corrective Actions;
  (D) 123.8 Verification;
  (E) 123.9 Records; and
  (F) 123.28 Source Controls;
~~(4)~~(5) specify tagging and labeling requirements;
~~(5)~~(6) implement the National Shellfish Sanitation Program's training requirements for shellfish harvesters and certified shellfish dealers;
~~(6)~~(7) require sales records and collection and submission of information to provide a mechanism for shellfish product to be traced back to the water body of origin; and
~~(7)~~(8) require implicated product recall and specify recall procedures.

~~(b)~~(d) Proclamations issued under this Rule shall suspend appropriate rules or portions of rules under the authority of the Marine Fisheries Commission as specified in the proclamation. The provisions of 15A NCAC 03I .0102 terminating suspension of a rule pending the next Marine Fisheries Commission meeting and requiring review by the Marine Fisheries Commission at the next meeting shall not apply to proclamations issued under this Rule.

History Note: *Authority G.S. 113-134; 113-182; 113-201; 113-221.1; 113-221.2; 143B-289.52;*
Eff. April 1, 2014;
Amended Eff. May 1, 2017.

VII. PROPOSED MANAGEMENT OPTIONS

(+ Potential positive impact of action)
(- Potential negative impact of action)

A. Status quo

+ No extra cost incurred by harvesters to provide proper vessel construction to prevent contamination
- Decreased level of food safety to the shellfish consumer due to not requiring sanitary harvest and handling practices and lack of enforcement authority related to shellfish contamination
- North Carolina not in compliance with Model Ordinance, potentially resulting in rejection of N.C. product by another member state
- Continued non-compliance could result in disciplinary action by the ISSC, jeopardizing all N.C. shellfish product shipments.

B. Amend the rules

+ Provides an increased level of food safety to the shellfish consumer due to requiring sanitary harvest and handling practices and also having enforcement authority related to shellfish contamination
+ North Carolina would come into compliance with the Model Ordinance.
+ North Carolina shellfish dealers would be able to continue shipments of shellfish in interstate commerce.
- Some harvesters may incur costs to retrofit vessel construction in order to prevent shellfish contamination.

VIII. RECOMMENDATION

The DMF Rules Advisory Team recommends amending the rules (Option B.)

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Feb. 2, 2016
Amended: March 15, 2016
April 11, 2016
May 2, 2016
May 6, 2016

IX. LITERATURE CITED

NCDMF (North Carolina Division of Marine Fisheries). 2015. Proclamation Authority Information Paper. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, North Carolina.

NOTICE OF TEXT ATTACHMENT

#6 – Explain Reason for Proposed Action:

15A NCAC 03H .0103 PROCLAMATIONS, GENERAL

Proposed amendments add a variable condition for the protection of public health to the list of variable conditions for the use of the Fisheries Director's proclamation authority that is set forth in other rules of the Marine Fisheries Commission. This more comprehensively addresses the authority of the Marine Fisheries Commission following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality section of the Division of Environmental Health to the Division of Marine Fisheries.

15A NCAC 03K .0110 PUBLIC HEALTH AND CONTROL OF OYSTERS, CLAMS, SCALLOPS, AND MUSSELS

In accordance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance and to protect public health, proposed amendments provide the authority for the Division of Marine Fisheries to set sanitary harvest and handling practices for harvesters and enforce issues relating to the contamination of shellfish (oysters, clams, scallops, and mussels) during harvest.

Ancillary items: Update "Proclamation Authority Resource Manual" upon effective date of the rule change to add this issue paper as an appendix to the manual.

MFC Rulebook Index Worksheet

Rule	Rulebook Page #	Subject	Index Entry (**Bold** major headings)	Add/Delete
03H .0103	1	proclamation authority	Fisheries Director, proclamation authority	No change
			proclamation:authority	
03K .0110	34	public health and shellfish	temperature:storage:requirements♦	No change
			species:clam:tag, harvest, requirements♦	
			species:mussel:tag, harvest, requirements♦	
			species:oyster:tag, harvest, requirements♦	
			shellfish:tag, requirements♦	
			tag:shellfish♦	
			labeling:shellfish:shellstock♦	
			species:oyster:restrictions:harvest♦	
			species:clam:restrictions:harvest♦	
			species:scallop, bay:restrictions♦	
			species:mussel:restrictions♦	
			shellfish:restrictions:harvest♦	
			recall♦	

ALIGN METHOD FOR COMMENCEMENT OF LICENSE, PERMIT, AND CERTIFICATE SUSPENSION/REVOCATION PROCESS
ISSUE PAPER

July 12, 2016

I. ISSUE

The method for commencement of proceedings to suspend or revoke a fishing license, permit, or certificate currently includes an opportunity for an informal meeting with division personnel. This is inconsistent with the method required for other similar administrative proceedings by the Division of Marine Fisheries to submit information in writing.

II. ORIGINATION

North Carolina Division of Marine Fisheries

III. BACKGROUND

Chapter 150B of the North Carolina General Statutes is the Administrative Procedure Act. G.S. 150B-1(a) states the purpose of the chapter is to establish "a uniform system of administrative rule making and adjudicatory procedures for agencies. The procedures ensure that the functions of rule making, investigation, advocacy, and adjudication are not all performed by the same person in the administrative process." Several rules of the North Carolina Marine Fisheries Commission set requirements for fishermen to hold certain licenses, permits, and certificates to participate in various fishing activities. The requirements are set under the authority of the Marine Fisheries Commission and administered and enforced by the Division of Marine Fisheries. When those requirements are not met, the Administrative Procedure Act governs the proceedings to suspend or revoke the license, permit, or certificate that originally extended the privilege to a fisherman to engage in a particular activity. It is important to note that while commission rules distinguish between licenses, permits, and certificates, G.S. 150B-2(3) defines a "license" as "any *certificate, permit* or other evidence, by whatever name called, of a right or privilege to engage in any activity, except licenses issued under Chapter 20 and Subchapter I of Chapter 105 of the General Statutes and occupational licenses [emphasis added]." So, for the administrative proceedings governed by the Administrative Procedure Act, licenses, permits, and certificates are synonymous. For simplicity, general references to "license" in this paper include permits, certifications, and certificates of compliance.

G.S. 150B-3 provides special provisions on licensing. Subsection (b) requires that before "the commencement of proceedings for the suspension, revocation, annulment, withdrawal, recall, cancellation, or amendment of any license other than an occupational license . . . the licensee shall be given an opportunity to show compliance with all lawful requirements for retention of the license . . . " Currently, Marine Fisheries Commission Rule 15A NCAC 03P .0101, License/Permit Denial: Informal Hearing Procedures, provides this opportunity to a license holder via an informal meeting with division personnel.

There are several other processes involving administrative proceedings of the Division of Marine Fisheries and Marine Fisheries Commission that require information in writing in order to begin. Some of these include:

- Requests for license reinstatement following revocation (15A NCAC 03O .0114(f));
- Requests for a declaratory ruling (15A NCAC 03P .0202(a));
- Requests for a petition for rulemaking (15A NCAC 03P .0301(a));
- Requests for hardship relative to failing to fish commercial crab pots within at least five days (15A NCAC 03I .0105(b)(2)); and
- Requests for user conflict resolution (15A NCAC 03I .0122(b)).

The process of commencement of proceedings to suspend or revoke a license currently begins with providing the license holder an opportunity to show compliance with all lawful requirements of the license in an informal meeting with division personnel. For consistency with other parallel proceedings and for improved documentation of proceedings, a change to the process could be made to align it with other similar administrative processes that begin with submitting information in writing to the division.

IV. AUTHORITY

North Carolina General Statutes
113-134. Rules.
113-171. Suspension, revocation, and reissuance of licenses.
113-221.2. Additional rules to establish sanitation requirements for scallops, shellfish, and crustacea; permits and permit fees authorized.
150B-2. Definitions.
150B-3. Special provisions on licensing.
150B-23. Commencement; assignment of administrative law judge; hearing required; notice; intervention.

North Carolina Marine Fisheries Commission Rules (15A NCAC)
03O .0114. Suspension, Revocation and Reissuance of Licenses.
03O .0504. Suspension/Revocation of Permits.

V. DISCUSSION

In order to comply with the requirements of G.S. 150B-3, the Division of Marine Fisheries and Marine Fisheries Commission must provide a license holder an opportunity to show compliance with all lawful requirements for retention of a license. Except in cases where G.S. 113-171 is applicable or in cases of summary suspension, the division and commission must extend this opportunity to a license holder prior to commencement of proceedings to suspend or revoke a license. G.S. 113-171 applies when there is a conviction of a criminal offense pertaining to a license to take resources under the jurisdiction of the Marine Fisheries Commission. Per G.S. 150B-3, summary (or immediate) suspension of a license may occur when the public health, safety, or welfare requires emergency action. The terms of suspension, revocation, and reissuance of licenses and permits are set forth in G.S. 113-171 and Marine Fisheries Commission rules 15A NCAC 03O .0114 and .0504.

Since at least Jan. 1, 1991, when 15A NCAC 03P .0101 was adopted, this opportunity to show compliance prior to commencement of proceedings has been extended to a license holder via a request by the license holder for an informal meeting with division personnel responsible for the initiation of the action to suspend or revoke the license. Since by its very nature there are no records of an informal meeting, it is unknown how many times a license holder has made such a request, but anecdotal information from division staff shows the requests are rarely made.

The very fact that there is no documentation for an informal meeting is cause for reconsideration of these proceedings since they potentially impact the continued privilege for a fisherman to engage in a particular activity. Since other similar administrative proceedings are undertaken by requiring information from affected stakeholders to be submitted in writing, those proceedings demonstrate an alternate way to still comply with the statutory requirements while yielding a better record of events. Additionally, for fairness to all involved stakeholders and for improved understanding of required division and commission processes, rule 15A NCAC 03P .0101 could be amended to change the process from requesting an informal meeting to submitting information in writing to division personnel. The license holder's written statement to show compliance with all lawful requirements for retention of the license could include material changes made enabling the license holder to conduct the operations for which the license is held in accord with all applicable laws and rules. The request could also include a processing error made by the division.

There are several additional items contained in 15A NCAC 03P .0101 that also need to be corrected. Existing paragraph (a) of the rule simply restates requirements already set out in statute, so it is proposed to be deleted since it is redundant. Proposed new paragraph (a) clarifies the rule applies to licenses, permits, and certifications or certificates of compliance and that for simplicity, references to "license" throughout the rule are inclusive of all of the named types of documents. Currently, paragraph (c) of the rule directs a license holder to make a request for an administrative hearing to division personnel. The correct recipient for these requests is the Office of Administrative Hearings, per G.S. 150B-23. Also, paragraph (e) is proposed to be deleted, since the very nature of the need to summarily suspend a license does not allow sufficient time to consider a request from a license holder to show compliance prior to license suspension. The proposed rule reflects the aforementioned changes, an updated title, as well as minor changes to grammar and punctuation. Additional text also provides the current mailing address of the Division of Marine Fisheries and lists subparagraphs in a sequence that matches the sequence of corresponding subsections in statute.

VI. PROPOSED RULE(S)

15A NCAC 03P .0101 ~~LICENSE/PERMIT~~ LICENSE, PERMIT, OR CERTIFICATE DENIAL: ~~INFORMAL HEARING PROCEDURES~~ REQUEST FOR REVIEW

~~(a) If the Division decides to deny or limit a renewal of a license or permit for an activity of a continuing nature, the license sought to be renewed shall continue in effect as provided in G.S. 150B-3.~~

(a) For the purpose of this rule and in accordance with G.S. 150B-2, "license" includes "permit" as well as "certification" and "certificate of compliance".

(b) Except in cases where G.S. 113-171 is applicable, before the Division may commence proceedings for suspension, revocation, annulment, withdrawal, recall, cancellation, or amendment of a ~~license or permit,~~ license, notice shall be given to the license ~~or permit~~ holder ~~notifying him~~ that:

(1) the license holder has a right through filing a request for a contested case hearing in the Office of Administrative Hearings to a hearing before an administrative law judge and a final agency decision by the Marine Fisheries Commission; and

~~(1)~~(2) ~~He~~ the license holder may request an opportunity to show compliance with all lawful requirements for retention of the license ~~in an informal meeting with Division personnel responsible for the initiation of the action to revoke the license; and~~by submitting a statement in writing to the personnel designated in the notice for the initiation of the action.

~~(2) He has a right through filing a request for a contested case hearing in the Office of Administrative Hearings to a hearing before an administrative law judge and a final agency decision by the Marine Fisheries Commission.~~

(c) Any ~~requests~~ statements submitted by the license holder ~~for an informal meeting or administrative hearings shall be made to the person designated in the notice.~~to show compliance with all lawful requirements for retention of the license shall be postmarked within 15 days of receipt of the notice for the initiation of the action. Statements and any supporting documentation shall be addressed to the personnel designated in the notice and mailed to the Division of Marine Fisheries, 3441 Arendell Street, P.O. Box 769, Morehead City, NC 28557.

(d) Upon receipt of a statement and any supporting documentation from the license holder, the Division shall review the statement and within 15 days, notify the license holder in writing with the Division's determination of whether the license holder demonstrated compliance with all lawful requirements for retention of the license. In making this determination, the Division may consider criteria including, but not limited to material changes made enabling the license holder to conduct the operations for which the license is held in accord with all applicable laws and rules, and processing errors made by the Division.

~~(d)~~(e) The Division may order summary suspension of a license ~~or permit~~ if it finds that the public health, safety, or welfare requires emergency action. Upon such ~~determination~~ determination, the Fisheries Director shall issue an order giving the reasons for the emergency action. The effective date of the order shall be the date specified on the order or the date of service of a certified copy of the order at the last known address of the license ~~or permit holder~~ holder, whichever is later.

~~(e) When a license is summarily suspended and a request is made for an informal meeting or a hearing, the proceeding shall be promptly commenced and determined.~~

History Note: *Authority G.S. 113-134; 113-171; 113-221.2; 150B-3; 150B-23;*
Eff. January 1, 1991;
Amended Eff. May 1, 2017; August 1, 1999.

[Note: The following North Carolina General Statutes are provided for information only; no changes are suggested.]

G.S. 150B-3. Special provisions on licensing.

(a) When an applicant or a licensee makes a timely and sufficient application for issuance or renewal of a license or occupational license, including the payment of any required license fee, the existing license or occupational license does not expire until a decision on the application is finally made by the agency, and if the application is denied or the terms of the new license or occupational license are limited, until the last day for applying for judicial review of the agency order. This subsection does not affect agency action summarily suspending a license or occupational license under subsections (b) and (c) of this section.

(b) Before the commencement of proceedings for the suspension, revocation, annulment, withdrawal, recall, cancellation, or amendment of any license other than an occupational license, the agency shall give notice to the licensee, pursuant to the provisions of G.S. 150B-23. Before the commencement of such proceedings involving an

occupational license, the agency shall give notice pursuant to the provisions of G.S. 150B-38. In either case, the licensee shall be given an opportunity to show compliance with all lawful requirements for retention of the license or occupational license.

(c) If the agency finds that the public health, safety, or welfare requires emergency action and incorporates this finding in its order, summary suspension of a license or occupational license may be ordered effective on the date specified in the order or on service of the certified copy of the order at the last known address of the licensee, whichever is later, and effective during the proceedings. The proceedings shall be promptly commenced and determined.

Nothing in this subsection shall be construed as amending or repealing any special statutes, in effect prior to February 1, 1976, which provide for the summary suspension of a license.

(d) This section does not apply to the following:

(1) Revocations of occupational licenses based solely on a court order of child support delinquency or a Department of Health and Human Services determination of child support delinquency issued pursuant to G.S. 110-142, 110-142.1, or 110-142.2.

(2) Refusal to renew an occupational license pursuant to G.S. 87-10.1, 87-22.2, 87-44.2, or 89C-18.1, based solely on a Department of Revenue determination that the licensee owes a delinquent income tax debt. (1973, c. 1331, s. 1; 1985, c. 746, s. 1; 1995, c. 538, s. 2(i); 1997-443, s. 11A.118(a); 1998-162, s. 8.)

G.S. 150B-23. Commencement; assignment of administrative law judge; hearing required; notice; intervention.

(a) A contested case shall be commenced by paying a fee in an amount established in G.S. 150B-23.2 and by filing a petition with the Office of Administrative Hearings and, except as provided in Article 3A of this Chapter, shall be conducted by that Office. The party who files the petition shall serve a copy of the petition on all other parties and, if the dispute concerns a license, the person who holds the license. A party who files a petition shall file a certificate of service together with the petition. A petition shall be signed by a party, an attorney representing a party, or other representative of the party as may specifically be authorized by law, and, if filed by a party other than an agency, shall state facts tending to establish that the agency named as the respondent has deprived the petitioner of property, has ordered the petitioner to pay a fine or civil penalty, or has otherwise substantially prejudiced the petitioner's rights and that the agency:

(1) Exceeded its authority or jurisdiction;

(2) Acted erroneously;

(3) Failed to use proper procedure;

(4) Acted arbitrarily or capriciously; or

(5) Failed to act as required by law or rule.

The parties in a contested case shall be given an opportunity for a hearing without undue delay. Any person aggrieved may commence a contested case hereunder.

A local government employee, applicant for employment, or former employee to whom Chapter 126 of the General Statutes applies may commence a contested case under this Article in the same manner as any other petitioner. The case shall be conducted in the same manner as other contested cases under this Article.

A business entity may represent itself using a nonattorney representative who is one or more of the following of the business entity: (i) officer, (ii) manager or member-manager, if the business entity is a limited liability company, (iii) employee whose income is reported on IRS Form W-2, if the business entity authorizes the representation in writing, or (iv) owner of the business entity, if the business entity authorizes the representation in writing and if the owner's interest in the business entity is at least twenty-five percent (25%). Authority for and prior notice of nonattorney representation shall be made in writing, under penalty of perjury, to the Office on a form provided by the Office.

(a1) Repealed by Session Laws 1985 (Regular Session, 1986), c. 1022, s. 1(9).

(a2) An administrative law judge assigned to a contested case may require a party to the case to file a prehearing statement. A party's prehearing statement must be served on all other parties to the contested case.

(a3) A Medicaid enrollee, or network provider authorized in writing to act on behalf of the enrollee, who appeals a notice of resolution issued by an LME/MCO under Chapter 108D of the General Statutes may commence a contested case under this Article in the same manner as any other petitioner. The case shall be conducted in the same manner as other contested cases under this Article. Solely and only for the purposes of contested cases commenced as Medicaid managed care enrollee appeals under Chapter 108D of the General Statutes, an LME/MCO is considered an agency as defined in G.S. 150B-2(1a). The LME/MCO shall not be considered an agency for any other purpose.

(a4) If an agency fails to take any required action within the time period specified by law, any person whose rights are substantially prejudiced by the agency's failure to act may commence a contested case in accordance with this section seeking an order that the agency act as required by law. If the administrative law judge finds that the agency has failed to act as required by law, the administrative law judge may order that the agency take the required action within a specified time period.

(b) The parties to a contested case shall be given a notice of hearing not less than 15 days before the hearing by the Office of Administrative Hearings. If prehearing statements have been filed in the case, the notice shall state the date, hour, and place of the hearing. If prehearing statements have not been filed in the case, the notice shall state the date, hour, place, and nature of the hearing, shall list the particular sections of the statutes and rules involved, and shall give a short and plain statement of the factual allegations.

(c) Notice shall be given by one of the methods for service of process under G.S. 1A-1, Rule 4(j) or Rule 4(j3). If given by registered or certified mail, by signature confirmation as provided by the United States Postal Service, or by designated delivery service authorized pursuant to 26 U.S.C. § 7502(f)(2) with delivery receipt, notice shall be deemed to have been given on the delivery date appearing on the return receipt, copy of the proof of delivery provided by the United States Postal Service, or delivery receipt. If giving of notice cannot be accomplished by a method under G.S. 1A-1, Rule 4(j) or Rule 4(j3), notice shall then be given in the manner provided in G.S. 1A-1, Rule 4(j1).

(d) Any person may petition to become a party by filing a motion to intervene in the manner provided in G.S. 1A-1, Rule 24. In addition, any person interested in a contested case may intervene and participate in that proceeding to the extent deemed appropriate by the administrative law judge.

(e) All hearings under this Chapter shall be open to the public. Hearings shall be conducted in an impartial manner. Hearings shall be conducted according to the procedures set out in this Article, except to the extent and in the particulars that specific hearing procedures and time standards are governed by another statute.

(f) Unless another statute or a federal statute or regulation sets a time limitation for the filing of a petition in contested cases against a specified agency, the general limitation for the filing of a petition in a contested case is 60 days. The time limitation, whether established by another statute, federal statute, or federal regulation, or this section, shall commence when notice is given of the agency decision to all persons aggrieved who are known to the agency by personal delivery or by the placing of the notice in an official depository of the United States Postal Service wrapped in a wrapper addressed to the person at the latest address given by the person to the agency. The notice shall be in writing, and shall set forth the agency action, and shall inform the persons of the right, the procedure, and the time limit to file a contested case petition. When no informal settlement request has been received by the agency prior to issuance of the notice, any subsequent informal settlement request shall not suspend the time limitation for the filing of a petition for a contested case hearing.

(g) Where multiple licenses are required from an agency for a single activity, the Secretary or chief administrative officer of the agency may issue a written determination that the administrative decision reviewable under Article 3 of this Chapter occurs on the date the last license for the activity is issued, denied, or otherwise disposed of. The written determination of the administrative decision is not reviewable under this Article. Any licenses issued for the activity prior to the date of the last license identified in the written determination are not reviewable under this Article until the last license for the activity is issued, denied, or otherwise disposed of. A contested case challenging the last license decision for the activity may include challenges to agency decisions on any of the previous licenses required for the activity. (1973, c. 1331, s. 1; 1975, 2nd Sess., c. 983, s. 65; 1985, c. 746, s. 1; 1985 (Reg. Sess., 1986), c. 1022, ss. 1(9), (10), 6(2), (3); 1987, c. 878, ss. 3-5; c. 879, s. 6.1; 1987 (Reg. Sess., 1988), c. 1111, s. 5; 1991, c. 35, s. 1; 1993 (Reg. Sess., 1994), c. 572, s. 2; 2009-451, s. 21A.1(a); 2011-332, s. 2.1; 2011-398, s. 16; 2012-187, s. 6; 2013-397, s. 4; 2014-120, ss. 7(a), 48, 59(a).)

VII. PROPOSED MANAGEMENT OPTIONS

(+ Potential positive impact of action)
(- Potential negative impact of action)

A. Status quo

- Inconsistent with method for other similar administrative proceedings
- No formal documentation of information communicated

+/- Permissible under Administrative Procedure Act, G.S. 150B

B. Amend the rule

+ Consistent with method for other similar administrative proceedings
+ Information communicated is formally documented
+/- Permissible under Administrative Procedure Act, G.S. 150B

VIII. RECOMMENDATION

The Division of Marine Fisheries recommends amending rule 15A NCAC 03P .0101 to align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the Division of Marine Fisheries and Marine Fisheries Commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division personnel.

Prepared by: Catherine Blum; catherine.blum@ncdenr.gov; 252-808-8014
Date: June 29, 2016
Revised: July 6, 2016
July 8, 2016
July 12, 2016

NOTICE OF TEXT ATTACHMENT

#8 – Explain Reason for Proposed Action:

15A NCAC 03P .0101 LICENSE, PERMIT, OR CERTIFICATE DENIAL: REQUEST FOR REVIEW
Proposed amendments align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the Division of Marine Fisheries and Marine Fisheries Commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division personnel.

Ancillary Item: Update license, permit, and certificate suspension letters to reflect modified requirements upon effective date of rule.

MFC Rulebook Index Worksheet

Rule	Rulebook Page #	Subject	Index Entry (**Bold** major headings)	Add/Delete
03P .0101	79	license and permit suspension/revocation process	hearing procedures	No change
			license:renewal:denial, appeal	
			license:suspension:appeal	
			license:revocation:appeal	
			permit:renewal, denial, appeal	
			permit:suspension:appeal	
			permit:revocation:appeal	
(b)(2)			contested case	
			Marine Fisheries Commission:contested case	

2016-2017 Marine Fisheries Commission Proposed Rules

7/29/2016

Subject	Affected Rule	Title of Affected Rule	Summary of Fiscal Impact: state government, local government, private, substantial, *de minimus*
Hard Clam Fishery Management Plan Amendment 2/ Oyster Fishery Management Plan Amendment 4	15A NCAC 03K .0201	OYSTER HARVEST MANAGEMENT	
	15A NCAC 03K .0202	CULLING REQUIREMENTS FOR OYSTERS	
	15A NCAC 03K .0302	MECHANICAL HARVEST OF CLAMS FROM PUBLIC BOTTOM	
	15A NCAC 03O .0114	SUSPENSION, REVOCATION, AND REISSUANCE OF LICENSES	
	15A NCAC 03O .0201	STANDARDS AND REQUIREMENTS FOR SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES	
	15A NCAC 03O .0208	TERMINATION OF SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES	State government and private
Permit for Weekend Trawling for Live Shrimp	15A NCAC 03J .0104	TRAWL NETS	
	15A NCAC 03L .0102	WEEKEND SHRIMPING PROHIBITED	
	15A NCAC 03O .0501	PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS	
	15A NCAC 03O .0503	PERMIT CONDITIONS; SPECIFIC	Minimal state government; private
Spiny Dogfish Dealer Permit	15A NCAC 03O .0503	PERMIT CONDITIONS; SPECIFIC	State government and private
Increase Penalties for Gear Larceny	15A NCAC 03O .0114	SUSPENSION, REVOCATION, AND REISSUANCE OF LICENSES	State government and private
Wade Creek Coordinate Correction	15A NCAC 03R .0103	PRIMARY NURSERY AREAS	*de minimus* rule change
Clarification of License Requirements for Leaseholder Designees	15A NCAC 03O .0501	PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS	State government and private
Modify Fisheries Director's Proclamation Authority for Protection of Public Health	15A NCAC 03H .0103	PROCLAMATIONS, GENERAL	
	15A NCAC 03K .0110	PUBLIC HEALTH AND CONTROL OF OYSTERS, CLAMS, SCALLOPS, AND MUSSELS	Private
Establish Spotted Seatrout Rule	15A NCAC 03M .0522	SPOTTED SEATROUT	*de minimus* rule change
Align Method for Commencement of License Suspension	15A NCAC 03P .0101	LICENSE, PERMIT, OR CERTIFICATE DENIAL: REQUEST FOR REVIEW	*de minimus* rule change

FISCAL NOTE FOR PROPOSED AMENDMENTS TO THE OYSTER AND HARD CLAM FISHERY MANAGEMENT PLANS

Rule Amendments: 15A NCAC 03K .0201 OYSTER HARVEST MANAGEMENT
15A NCAC 03K .0202 CULLING REQUIREMENTS FOR OYSTERS
15A NCAC 03K .0302 MECHANICAL HARVEST OF CLAMS FROM PUBLIC BOTTOM
15A NCAC 03O .0114 SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES
15A NCAC 03O .0201 STANDADRDS AND REQUIREMENTS FOR SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES
15A NCAC 03O .0208 TERMINATION OF SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: Catherine Blum, Rule Making Coordinator
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Impact Summary:

State government:	Yes
Local government:	No
Private impact:	Yes
Substantial impact:	No

Authority: 113-134. Rules.
113-182. Regulation of Fishing and Fisheries.
113-182.1. Fishery Management Plans.
113-221.1. Proclamations; Emergency Review.
143B-289.52. Marine Fisheries Commission – Powers and Duties.

Necessity: In accordance with G.S. 113-182.1 (b) and (d), the proposed rule changes (see proposed rule text in Appendix 1) are necessary to amend and update the N.C. Oyster Fishery Management Plan Amendment 4 and Hard Clam Fishery Management Plan Amendment 2 to ensure adequate management of the oyster and hard clam resource and fisheries in state waters. Specifically, the rule changes address five separate issues and propose to:

1) Amend 15A NCAC 03K .0201 to set the maximum harvest limit for oysters at 20 bushels per commercial operation to align with current management, as well as make the rule language consistent with other rules containing proclamation authority;

2) Amend 15A NCAC 03K .0202 to reduce the culling tolerance for sublegal oysters, oyster shell, and cultch material from 10 percent to five percent;

3) Amend 15A NCAC 03K .0302 to remove the clam mechanical harvest area on public bottom in Pamlico Sound that is no longer opened to harvest and make the rule consistent with other rules containing proclamation authority;

4) Amend 15A NCAC 03O .0114 to add convictions of theft on shellfish leases and franchises to the rule which subjects licensees with convictions to license suspension and revocation, thereby putting in place stricter penalties as a deterrent to theft on shellfish leases and franchises; and

5) Amend 15A NCAC 03O .0201 and 03O .0208 to clarify how production and marketing rates are calculated for shellfish leases and franchises, expand the maximum lease area from five to 10 acres, specify criteria that allows a single extension period for shellfish leases of no more than two years per contract period to meet minimum production and marketing requirements, and reorganize the rules for improved clarity.

The anticipated effective date of the proposed rule changes is May 1, 2017.

1. Daily Possession Limit for Oysters (15A NCAC 03K .0201)

I. Summary

In accordance with the N.C. Oyster Fishery Management Plan Amendment 4, the proposed rule amendment reduces the maximum allowable daily harvest limit for oysters that can be set by proclamation from 50 bushels to 20 bushels to align it with current management. In most recent years the harvest limit is set by proclamation at no more than 15 bushels per commercial operation and limits have not exceeded 20 bushels per commercial operation in over 25 years. Additional proposed amendments make the rule consistent with other rules containing proclamation authority. These limits are set with the intention of protecting oyster resources and habitat from the effects of excessive harvest while still allowing flexible harvest limits.

II. Introduction and Purpose of Rule Changes

In 1984, the oyster harvest limit was set via proclamation at 50 bushels per vessel per day. An addition to the proclamation authority in 1989 placed an upper harvest limit of 50 bushels of oysters per commercial fishing operation, but allowed the director to set lower harvest limits. Harvest limits for the mechanical harvest fishery were reduced to 20 bushels per fishing operation from 1990 through the spring 1992. Mechanical harvest oyster limits were then set at 15 bushels per fishing operation from the 1992-93 season through the 2015-16 season except for a brief period during the 2004-05 season when the limit was increased to 20 bushels due primarily to large increases in fuel costs. Setting the lower oyster harvest limit at 15 bushels for mechanical harvesters (and five bushels for hand harvesters) was in response to low population levels observed due to *Perkinsus marinus* (Dermo) parasite-induced mortalities and to protect the long-term viability of the oyster resource and fishery from overharvest.

Rule 15A NCAC 03K .0201 contains regulations for oyster harvest management. The rule is proposed for amendment to reduce the upper mechanical harvest limit from 50 bushels to 20 bushels. Setting the upper mechanical harvest limit at 20 bushels is the highest limit supported

by biological data and is the highest limit used in the oyster fishery in over two decades[1]. Additional proposed changes to the rule clarify the Fisheries Director's proclamation authority of allowing the director to specify a minimum size of two and one-half inches for harvest to prevent loss of oysters due to predators, pests or disease. The rule changes align with the original intent of the provision currently in the rule that allows for a minimum size limit as small as two and one-half inches, as well as the minimum size limit of three inches that is intended in the absence of predators, pests or disease. Any other catastrophic environmental conditions affecting oysters would be rare events that can be managed under Rule 15A NCAC 03I .0102 which allows the Fisheries Director to suspend in whole or in part, any rule regarding oysters which may be affected by variable conditions, and Rule 15A NCAC 03H .0103 which provides the variable conditions (Appendix 2). Removing redundant language in Rule 03K .0201 simplifies the rule, making it more easily understood by the public and enforced.

Additional rule changes to the proclamation authority for the management of the oyster fishery are proposed as part of an ongoing attempt to standardize rule language granting proclamation authority across North Carolina Marine Fisheries Commission rules. The North Carolina Division of Marine Fisheries (NCDMF) staff has identified that the wording for proclamation authority across several rules differs from rule to rule. In an attempt to improve consistency across rules and public understanding of proclamation authority, NCDMF seeks to standardize rule language describing proclamation authority when possible.

III. Costs

Lowering the harvest limit for oysters from a maximum of 50 bushels per commercial fishing operation to 20 bushels does not change the management of the oyster fishery, but aligns with current management and removes the ability to raise limits beyond what is biologically justifiable (Table 1). Without the proposed rule change, fishery participants would still be capped at or below 20 bushels per commercial operation under the authority of the Oyster Fishery Management Plan and using the existing rule and proclamation authority. Therefore, the rule change has no material impact on participants in the fishery and is not expected to impose any quantifiable costs. Additional clarifying changes made to the proclamation authority language are not intended to alter the current authority or management, and are not expected to incur any costs.

[1] North Carolina Division of Marine Fisheries (NCDMF). 2010. Supplement A to Amendment II of the NC Oyster Fishery Management Plan. Changing Management Measures for Harvest Limits in the Mechanical Harvest Oyster Fishery. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. Morehead City, NC. 14 p.

Table 1. Landings and effort information for the public bottom mechanical harvest oyster fishery 2004/05 through 2009/10. During the 2004/05 season the limit was increased to 20 bushels due primarily to large increases in fuel costs. For all other years, the maximum daily harvest limit was 15 bushels.

OYSTER SEASON	VESSELS	TRIPS	POUNDS of meat	BUSHELS	CPUE Bu./trip	Crew % 1 crew/% 2 crew
2004/05	131	1,769	114,587	21,661	12	49/51
2005/06	155	2,476	137,646	26,020	11	45/55
2006/07	134	1,783	98,090	18,543	10	42/58
2007/08	138	2,038	127,669	24,134	12	45/55
2008/09	160	2,918	176,307	33,328	11	44/56
2009/10	325	8,623	594,015	112,290	13	43/57

IV. Benefits

There are no quantifiable benefits from this rule change, but the public will benefit from a rule that more accurately reflects the current management of the oyster fishery and rule language that is consistent with other rules granting proclamation authority. Consistency among rules granting proclamation authority aids in public awareness of what type of fisheries management measures may and may not be implemented.

2. Culling Tolerance for Oysters (15A NCAC 03K .0202)

I. Summary

Proposed rule amendments reduce the culling tolerance for oyster harvest from 10 percent to five percent for the possession of accumulated dead shell, oyster cultch material, and sublegal oysters from public bottom. This change is expected to improve and protect the oyster resource by reducing the amount of sublegal oysters incidentally harvested and increasing the amount of cultch material left by harvesters on oyster reefs, thereby providing substrate for oyster spat to adhere to and grow.

II. Introduction and Purpose of Rule Changes

North Carolina's oyster stocks are composed of both intertidal and subtidal populations. Due to the reef-building life history of oysters, legal-sized oysters, which are at least three inches in length will typically have several smaller sublegal adults, or juvenile “spat” adhered to their shells. To account for this trait, there is presently a 10-percent by volume culling tolerance of sublegal oysters allowed per bushel landed, and culled material is required to immediately be returned to the area being fished (Rule 15A NCAC 03K .0202). Marine Patrol Officers inspect fishermen for exceeding the tolerance limit by using a certified metric bushel tub and a keeler which is 10 percent of the tub by volume. A bushel of oysters is dumped into the metric bushel tub. The officer culls sublegal oysters from the bushel and places them into the 10-percent

keeler. If the keeler becomes full before the metric bushel is empty, the catch is over the 10-percent tolerance level and a citation may be written for the violation.

There is growing concern over the extent of oyster harvest pressure and its impact on the long-term sustainability of the oyster fishery occurring in some parts of coastal North Carolina. The N.C. Marine Fisheries Commission has proposed to reduce the culling tolerance from 10 percent to five percent for the possession of accumulated dead shell, oyster cultch material, and sublegal oysters. This is being implemented with the intention of reducing the amount of sublegal oysters incidentally harvested and to increase the amount of cultch material left on harvested oyster reefs for oyster spat to adhere to and grow.

The current three-inch minimum size limit is intended to prevent excessive habitat damage by allowing sublegal mature oysters to remain uncollected and encouraging harvesters to move to more productive areas. This allows live oysters to remain and serve as broodstock or settlement sites for future spat recruitment. With increasing participation and pressure on the fishery, harvesters are forced to more thoroughly break up clusters of oysters and multiple individuals may work in an area for a longer period of time. Each bushel of landed oysters has an allowance of up to 10 percent by volume of sublegal oysters, oyster shells, and cultch material. With this culling tolerance, there is the possibility that as a particular oyster reef is fished by multiple individuals, a substantial portion of sublegal oysters and cultch material can be removed. The reduction to a five percent culling tolerance would reduce the possibility of removing a substantial amount of sublegal oysters and shell material, and require harvesters to more carefully inspect or cull their catch.

III. Costs

To properly enforce the new culling tolerance, Marine Patrol will need to buy new keelers that represent five percent of a bushel instead of the current 10 percent of a bushel. It is anticipated that 44 keelers will be purchased, costing approximately $60 per keeler or $2,640 overall. If a fisherman's catch is over the current 10-percent tolerance level, resulting in a citation for the violation and it is a first violation that is upheld in court, the fisherman would be charged $180 in court costs. In addition, if the undersize portion of the catch is less than 20 percent, the fisherman would be charged a fee of $35; greater than 20 percent would result in a $50 fee (second and subsequent offenses are at the judge's discretion). During the 2013/14, 2014/15 and 2015/16 oyster seasons, an average of 24 citations were issued each year for undersize oysters. Citations can be issued to recreational fishermen, commercial fishermen, and fish dealers. If every citation was upheld in court, and assuming half of all citations were for undersize oysters comprising less than 20 percent of the catch [($180 + $35) x 12] and half greater than 20 percent [($180 + $50) x 12], the average cost of all citations in a given year would be $5,340. An average of 24 citations issued per year represents an unknown percentage of overall participants harvesting or transacting in oysters who committed a violation for undersize oysters. While information is available about the overall number of dealers and the commercial participants in the oyster fishery, since no license is required for the recreational harvest of oysters, there is no mechanism by which to identify recreational participants. In the commercial fishery, from 2012-2014, an average of 946 participants per year sold oysters[2]. Using only the average number of commercial participants, assuming all citations issued were issued to commercial fishermen, the average number of citations issued represents 0.025% of commercial participants. Adding in the dealers

[2] North Carolina Division of Marine Fisheries License and Statistics Section 2015 Annual Report, p. II-32. Retrieved from http://portal.ncdenr.org/c/document_library/get_file?uuid=868c91b9-e27c-412f-b204-7580b4c88639&groupId=38337.

and unknown number of recreational participants, of which a few may have been issued a citation yields a determination that the overall percentage of all oyster fishermen and dealers receiving a citation for undersize oysters is less than 0.025%. Within this framework, even if the number of citations issued were to increase under a five-percent culling tolerance, it would still affect a low number of the overall participants.

Costs imposed on fishermen will be highly variable between individuals, areas, from year to year, and even within a year, depending on the condition of the oyster resource being harvested. Oysters typically grow in clusters and are "knocked" or broken into individuals, and legal sized (three inches or greater) oysters are retained. Due to the reef building life history of oysters, legal sized oysters will typically have several smaller sublegal adult or juvenile "spat" adhered to their shells. Culled material is required to immediately be returned to the area being fished (Rule 15A NCAC 03K .0202). The three-inch minimum size limit is intended to prevent excessive habitat damage by allowing sub-legal mature oysters to remain uncollected, encouraging harvesters to move to more productive areas. This would allow live oysters to remain and serve as broodstock or settlement sites for future spat recruitment. Typically, during the beginning of the open harvest season, more legal-sized oysters are present in the system and less time is needed for the fishermen to inspect and cull their catch. As the season progresses, less legal sized oysters may become available, and more time and effort is needed to cull the material and undersized oysters from the harvest. The five percent reduction in culling tolerance may not impact some fishermen at all. Other fishermen may need to spend more time inspecting and culling harvested oysters to ensure that the lower culling tolerance is not exceeded. Some fishermen may also need to spend more time fishing to reach the regional daily trip limit for oysters in their area or travel to areas where oyster abundance is greater. This increased effort and handling could have a detrimental impact on the oyster resource, particularly when mechanical gear is used. Due to the great degree of variability, these costs are very difficult to quantify with any certainty, but there is the overall potential to make oyster fishing operations less efficient.

IV. Benefits

The proposed rule change may improve and protect the oyster resource and the sustainability of the commercial oyster industry and the recreational fishery by increasing the amount of cultch material left by harvesters on oyster reefs, providing substrate for oyster spat to adhere to and grow. The reduction in culling tolerance may also decrease the amount of sublegal oysters harvested, thereby allowing them to grow to legal size the following year and continue to provide ecosystem services such as water filtration, nutrient reduction, shoreline stabilization, and as habitat for multiple other economically important species of fish and crustaceans. These ecosystem services are not quantifiable. A more stable population of legal-sized oysters would ensure continued revenues for oyster harvesters. DMF estimated the value of the oysters harvested commercially from state waters in 2015 to be $3.9 million.[3] The long-term difference in the value of the commercial oyster fishery harvests that will result from this rule change is not quantifiable due to the number of locally-specific and variable factors that affect oyster populations. For the recreational fishery, since no license is required for the recreational harvest of oysters, there is no mechanism by which to identify recreational participants. A mail survey began in October 2011 to develop catch and effort estimates for the recreational harvest of shellfish, including oysters; however, despite a relatively high response rate, the number of responses with reported oyster harvesting activity is too low to produce precise estimates of

[3] North Carolina Department of Environmental Quality, Division of Marine Fisheries (2015). *Marine Commercial Finfish and Shellfish Harvest Statistics.* Retrieved from http://portal.ncdenr.org/web/mf/statistics/comstat/2015.

catch.[4] The proposed rule change will likely have a qualified benefit to the recreational oyster fishery that would come from a more stable population of legal-sized oysters.

3. Removal of Mechanical Clam Harvest Area on Public Bottom in the Pamlico Sound (15A NCAC 03K .0302)

I. Summary

The proposed rule amendment seeks to remove the clam mechanical harvest area on public bottom in Pamlico Sound that is no longer opened to harvest and make the rule consistent with other rules containing proclamation authority language. This rule change is being implemented to minimize user conflicts with the commercial crab fishery, protect oyster and submerged aquatic vegetation (SAV) resources, and more clearly reflect the current management of this area. The rule change is also proposed to address rule clarity and improve consistency with other marine fisheries-related rules for proclamation authority.

II. Introduction and Purpose of Rule Changes

Mechanical methods for clamming are defined as dredges, hydraulic clam dredges, stick rakes and other rakes when towed by engine power, patent tongs, kicking with propellers or deflector plates with or without trawls, and any other method that utilizes mechanical means to harvest clams (15A NCAC 03I .0101(3)(l)). The two types of mechanical harvest gears currently used in North Carolina are hydraulic escalator dredges and a clam trawl or "clam kicking" vessel. Hydraulic escalator dredges have an escalator or conveyor located on the side of the vessel. A sled is connected to the front end of the escalator. When the front end of the escalator is lowered to the bottom, the sled slides over the bottom. A blade on the sled penetrates the bottom to a depth of about four inches (10 cm) and collects the clams as they are forced from the bottom by water pressure. In clam trawling or "kicking", clams are dislodged from the bottom with propeller backwash and a heavily chained trawl with a cage attached at the cod end is towed behind the boat and gathers the clams.

Mechanical methods are both effective and efficient because they allow the harvest of clams that would otherwise not be accessible by hand gears due to water depth, weather, or bottom type. These mechanical harvest methods can also negatively impact SAV and oyster resources. The public mechanical clam fishery has been heavily managed for quite some time to reduce the potential negative ecological impacts caused by disturbances to the bottom with these gears. Due to the severe disturbance to the bottom, mechanical clam harvest is restricted to open sand and mud bottoms.

An area in Pamlico Sound was added to the list of areas in rule that could be opened in the 2001 Hard Clam Fishery Management Plan to initiate a two-year open and closed harvest rotation with an area in northern Core Sound (NCDMF 2001). During the first year of rotation (2001/2002), larger boats fished Pamlico Sound successfully with the average catch of 15 bags a trip, although the majority of the fishermen were catching their 20-bag limit in the beginning of the season. There were 195 trips made in Pamlico Sound landing over 3,000 bags of clams. The second year of the rotation plan (2002/2003) had much lower trips and lower landings in

[4]North Carolina Division of Marine Fisheries License and Statistics Section 2015 Annual Report, p. V1-23. Retrieved from http://portal.ncdenr.org/c/document_library/get_file?uuid=868c91b9-e27c-412f-b204-7580b4c88639&groupId=38337.

Pamlico Sound. Only 45 trips were made landing 700 bags of clams. By the time of the start of the second rotation with Pamlico Sound, the channel by Wainwright Island had filled in making it impossible for the larger boats to get to the Pamlico Sound kicking area. There were no landings made from Pamlico Sound during the 2005/2006 season. The 2006/2007 season suffered from low clam prices and high fuel prices. Only two fishermen were reported mechanically harvesting that season, landing only 40 bags of clams.

The mechanical harvest area for clams in the Pamlico Sound may be opened by proclamation, but has not been opened since 2007. In Amendment 1 of the Hard Clam Fishery Management Plan, the Marine Fisheries Commission selected to discontinue rotation of Pamlico Sound with northern Core Sound, but keep the Pamlico Sound area for mechanical clam harvest in rule (NCDMF 2008). Running time for those boats fishing in Pamlico Sound decreased the work day from eight hours a day to five or six hours a day. Deep water and weather conditions also limited the area to the larger vessels. Crab pot fishermen also complained about impacts to the blue crab fishery in that area because of mechanical harvest. The mechanical clam harvest area in Pamlico Sound also overlaps with the no trawl area (15A NCAC 03R .0106). This area has remained closed due to several factors: little to no use in the years preceding 2008 by commercial clam harvesters, potential user conflicts with commercial crab fishermen, division concerns that clam recruitment is not high enough to sustain mechanical harvest in the area, difficulties in vessels travelling to the open area, low clam prices and high fuel costs, and to protect oyster and SAV resources in the area. These conditions and concerns remain and it is unlikely that the mechanical harvest area in the Pamlico Sound would be opened in the future; therefore, the proposed rule change seeks to remove this portion of Pamlico Sound from the list of areas that may be opened by proclamation to mechanical harvest of clams.

Additional rule changes to the proclamation authority for the management of the clam fishery are put forth as part of an ongoing attempt to standardize rule language granting proclamation authority across marine fisheries rules. The NCDMF staff has identified that the wording for proclamation authority across several rules differs from rule to rule. In an attempt to improve consistency across rules and public understanding of proclamation authority, NCDMF seeks to standardize rule language describing proclamation authority when possible.

III. Costs

Commercial fishermen may face some potential forgone harvest, but no realized costs from removing this area of the Pamlico Sound to potential mechanical clam harvest. The area has not been opened since 2007 to mechanical clam harvest and is unlikely to be opened in the future, should the rule change not occur. It is the understanding of the NCDMF that the years prior to the closure exhibited little to no effort or landings for clams taken with mechanical gear from this area, so the potential forgone commercial landings are likely minimal. Additional clarifying changes made to the proclamation authority language are not intended to alter the current authority or management, and are not expected to incur any cost.

IV. Benefits

There are no quantifiable benefits from this rule change, but the change will continue to minimize conflicts with the commercial blue crab fishery and provide protection for oyster and SAV resources in the area. Clarifications to proclamation authority will benefit the public by providing a rule that more accurately reflects the current management of the clam fishery and makes the rule language consistent with other rules granting proclamation authority. Consistency among

rules granting proclamation authority aids in public awareness of what type of fisheries management measures may and may not be implemented.

4. Increase Penalties for Theft of Shellfish or Gear from Leases and Franchises (15A NCAC 03O .0114)

I. Summary

Shellfish growers have voiced concern about the amount of money they invest in the growing of clams and oysters on leases and franchises compared to the amount of money an individual would be fined if found guilty of taking shellfish from a private culture operation. Stricter penalties are expected to assist in reducing lease theft and associated aquaculture equipment damage. Proposed rule changes add convictions of theft on shellfish leases and franchises to the rule (15A NCAC 03O .0114) which subjects licensees with convictions to fishing license suspension and revocation, thereby putting in place stricter penalties as a deterrent to theft on shellfish leases and franchises.

II. Introduction and Purpose of Rule Changes

In North Carolina, the private culture of shellfish is conducted on shellfish leases and franchises. A shellfish lease or franchise provides the opportunity for citizens of North Carolina to hold an area of public estuarine bottom or water column for the commercial production and harvest of shellfish as long as minimum production requirements are met. Grow-out options for both bottom culture and water column exist. Bottom culture refers to shellfish grown on or within the estuarine bottom utilizing natural set, cultch planting, seed plantings or seed within single predator protection bags bedded in the bottom. In operations utilizing the water column, shellfish can be grown in gear which resides from the estuarine bottom to the water surface. In order to use the water column, a bottom lease with a water column amendment is required.

Over 90 percent of all shellfish lease applications from 2012-2014 have been for shellfish culture within the water column. Growing shellfish in the water column requires a substantial amount of investment in gear, as well as the initial investment in seed shellfish. There is a substantial cost to the owners of these leases in the start-up and maintenance of their product and gear. The investment in aquaculture gear and seed to grow out one million oysters in the water column can cost $50,000 or more. Bottom culture lease owners can also have tens of thousands of dollars of shellfish product on a lease. With a sizable amount of capital tied up in a lease or franchise, one of the biggest concerns of shellfish growers is theft and intentional damage of shellfish and/or gear from their grow-out location.

Bottom shellfish leases are susceptible to theft of oysters or clams harvested illegally usually by hand and often during the night. Intensive grow-out methods that utilize the water column are more susceptible to theft because the oysters are grown in floating bags or cages on the surface. Also, the value of water column oysters is usually much higher than traditionally grown bottom or wild caught oysters. Bottom lease or wild caught oysters are usually grown on cultch (shell) and must be culled from other oysters. This product is sold on the bushel market for around $40 per bushel, (approximately 300 oysters). The intensive water column methods utilize hybrid triploid seed for faster growth and oysters are grown as singles commanding as much as 40 to 50 cents for each oyster. These oysters are intended for the half shell market.

Currently there are two statutes that address larceny of shellfish from private bottom and damage to an aquaculture facility or operation:

G.S. 113-208. Protection of private shellfish rights.
G.S. 113-269. Robbing or injuring hatcheries and other aquaculture operations.

Paragraph (a) of G.S 113-208 sets the penalty for unauthorized taking of shellfish from private bottom as follows:

> (a)(2) . . . A violation of this section shall constitute a Class A1 misdemeanor, which may include a fine of not more than five thousand dollars ($5,000). The written authorization shall include the lease number or deed reference, name and address of authorized person, date of issuance, and date of expiration, and it must be signed by the holder of the private shellfish right. Identification signs shall include the lease number or deed reference and the name of the holder.

If an individual steals product or gear from a shellfish growing operation and is convicted of this statute he/she would be guilty of a Class A1 misdemeanor, which may include a fine up to $5,000. Despite the maximum penalty, the actual fine is ultimately up to the discretion of the individual judge, with many fines being minimal or not issued at all. Over a 21-year timeframe (1994-2014), there were 49 citations issued and 39 convictions for stealing shellfish from a growing operation. Fines ranged from $0 to $58.30, with the average fine being approximately $25. These fines are several times less than the market value of the stolen product, creating little deterrent to shellfish theft. The threat of a fine up to $5,000 has done little to deter violators from stealing shellfish from leaseholders.

Convictions under the above-referenced statutes that address larceny of shellfish from private bottom and damage to an aquaculture facility or operation do not count toward license suspension or revocation. Shellfish growers have expressed the need for stricter penalties to discourage theft from shellfish lease and franchises. To address this concern, rule changes are being proposed for shellfish theft violations to fall under 15A NCAC 03O .0114, which allows the Fisheries Director to suspend or revoke fishing licenses. Under this rule change, a violator shall have their fishing license revoked for a period no less than one year upon conviction of theft from a shellfish growing operation. This rule change is proposed to provide a more effective deterrent to theft from shellfish leases. In simple terms, a suspension is when a license is taken away from a license holder for a certain amount of time. At the end of the timeframe, the license is returned to the license holder and he/she can continue to use the license. A revocation is when a license is taken away from the license holder forever; however, the former license holder may, after a specified time (usually one year), petition the director of the NCDMF to reinstate the license. There is no guarantee the license will be reinstated; it is solely in the director's discretion.

From 2013 through 2015, the NCDMF only revoked an average of five fishing licenses per year. Because of the lack of authority, none of these revocations were for stealing product or gear from a shellfish growing operation. The theft of product or gear from a shellfish growing operation often goes undetected and unreported to law enforcement. One reason for this is that fishing gear is often left unattended in the isolated and remote waters of the state where it is vulnerable to theft. In these areas, there is no one around to see the offense being committed; thefts often occur at night. Another reason is that theft in small amounts may not alarm a leaseholder. Factors such as winds, tides, and currents, or damage from passing boats, limbs/logs, and other debris can cause small losses of product or gear that fishermen expect in normal operations. So, if someone is stealing small amounts of product or gear, it would not necessarily "set off an alarm" with a leaseholder. This practice of stealing a little here or there from a fisherman has been referred to

as “plucking” by the fishing community. “Plucking” is hard to catch and goes unreported in most cases. Despite the overall small number of license revocations, the legitimate potential consequence of license revocation for someone considering committing the crime of stealing shellfish product or gear (after the rule change) will serve as a deterrent to committing the crime, a change the shellfish growers support. Even when multiple offenses of laws are combined into a plea agreement, which minimizes the consequences intended to serve as a deterrent, convictions of the above-references statutes would still result in license revocation. This would ensure a meaningful conviction, potentially reducing the number of thefts as well as the destruction of shellfish growing gear that often accompanies theft.

III. Costs

Costs to Convicted Violators

Violators who are found guilty of stealing shellfish from a growing operation will have their fishing licenses revoked. In doing so, commercial fishing license holders or for-hire captains will lose their ability to make income from fishing activities. Recreational fishing license holders will lose their ability to legally catch and harvest marine and estuarine finfish. The extent to which this cost will be realized will be highly variable among individuals.

Over a 21-year timeframe (1994-2014), there were 49 citations issued and 39 convictions for stealing shellfish from a growing operation. Even assuming that the conviction rate remains constant, the number of revocations that will be issued for this crime is unknown. An average of five licenses are currently revoked each year, but the number of revocations that will occur as a result of this rule change is uncertain because current revocations are for crimes other than the theft of shellfish product or gear. Therefore, the number of fishermen who may have their licenses revoked or suspended cannot be quantified due to uncertainty.

Costs to Deterred Violators

Given that offenders have standing in society and any impact on this population is included in the calculation of overall social welfare, individuals who are deterred from stealing or damaging gear or product due to the rule change will incur the cost associated with foregoing the crime. The crime is a transfer from owners to offenders. The cost of deterred crime to would-be violators is calculated as the sum of the value of the goods that would have been stolen less any reduction in the value of those goods (sales value may be less for stolen goods). This impact cannot be quantified because the behavioral response to the new penalties and thus the number of thefts that will be deterred by the rule change is uncertain.

Costs to the State

Assuming the same number of license revocations as the recent annual average of five were to result from convictions of theft of shellfish product or gear under the rule change, and assuming all five licenses were the state license with the highest cost, the Standard Commercial Fishing License at $400/year, the state impact would be $2,000 in the initial year from loss of license renewal fees. This estimate is highly uncertain.

Enforcement processes will not change and the number of revocations are assumed to be low. Therefore, the rule change will not create any new administrative costs to the state. The impact could be variable in following years depending on if a former license holder petitioned for a license to be reinstated, the outcome of the petition, or in the absence of a petition, other factors that may have caused the fisherman to not renew the license for various other reasons.

IV. Benefits

The proposed rule changes are expected to enhance the property rights of shellfish growers. Shellfish leases granted in North Carolina are treated like real property under G.S. 113-202 and can be transferred, willed to heirs, etc. Increased protection of shellfish leases may increase the resale value of an existing lease. The potential revocation of licenses for those convicted of stealing shellfish from a lease is anticipated to decrease the occurrences of theft as well as the destruction of shellfish growing gear that often accompanies theft. The change in the number of thefts and the value of the deterred thefts cannot be quantified due to uncertainty about the behavioral response to the new penalties.

5. Modify Shellfish Lease and Franchise Provisions (15A NCAC 03O .0201 and 03O .0208)

I. Summary

Proposed rule changes modify 15A NCAC 03O .0201 and 03O .0208 to clarify how production and marketing rates are calculated for shellfish leases and franchises to meet minimum production requirements, expand the maximum potential proposed lease size to 10 acres in all areas, specify criteria that allow a single extension period for shellfish leases of no more than two years per contract period to meet production and marketing requirements in the case of unforeseen circumstances, and reorganize the rules for improved clarity. These rule changes are being proposed to address stated concerns of shellfish growers in the state.

II. Introduction and Purpose of Rule Changes

Shellfish growers have expressed concern over the current shellfish lease and franchise provisions mandated by rule, specifically the lease terms, acreage limits, and minimum production requirements. Currently, leases are capped at five acres in areas where mechanical harvest is prohibited and 10 acres in areas where mechanical harvest is allowed. Lease holders must meet minimum production requirements over the five-year term of their lease and can apply for additional leases as long as their current lease or leases are meeting production requirements and do not exceed fifty acres in aggregate. These stipulations are put in place to prevent excessive amounts of public trust bottom and water column from being leased by a single person or entity and to ensure that the areas are being used for the intended purpose of shellfish production in commercial quantities.

The proposed rule changes clarify how production and marketing rates are calculated for shellfish leases and franchises to meet minimum production requirements. This change is being made to improve lease holders' understanding of these requirements and improve the ability to meet and exceed the minimum production targets.

The maximum lease size is also being increased from five to 10 acres in all areas to encourage lease expansion and shellfish production for those wishing to do so in areas where mechanical methods are prohibited. This change does not automatically grant additional acreage to leaseholders; the standard application process still applies, but the maximum acreage for which an application can be submitted is increased. The amount of marketable shellfish capable of being produced is, in part, a factor of acreage and grow-out methods. Larger amounts of acreage may increase the income potential for a lease site and therefore encourage greater investment. This has been the case in states such as Virginia where lease acreage can be as much as 200

acres for a single lease. Applicants with higher capital investments may choose to apply for more acreage to maximize production while incurring a single application fee versus applying for two smaller leases.

To increase flexibility in meeting production requirements under unforeseen circumstances, specific criteria are outlined in the proposed rule changes to allow a single extension period for shellfish leases of no more than two years per contract period to meet production and marketing requirements. Finally, the rules are reorganized for improved clarity and understanding.

III. Costs

There are no costs associated with the proposed rule changes that will be incurred by shellfish growers.

The state incurs administrative costs to process lease applications. The change in the number of lease applications that will occur as a result of this rule is uncertain, but the NCDMF does not expect this rule amendment to create a significant change in the number of lease applications above current trends.[5] Therefore, costs to the state are expected to be minimal. Shellfish growers may already apply for 10-acre leases in the northern part of the state where mechanical harvesting methods are permitted. Traditionally, the larger lease applications are in the more open waters of the Pamlico Sound. NCDMF has only seen one 10-acre application for 2016. This rule affects the central and southern regions of the state where mechanical harvesting is prohibited and lease applications are currently limited to five acres. After the rule change, we do not anticipate a notable number of applications for 10-acre leases in these areas due to limited areas suitable for shellfish aquaculture. Currently, lease applications in the central and southern regions are less than the allowed five acres.

There may be some level of expansion of shellfish aquaculture activities encouraged by the rule changes that has the potential to impact the users of commercial gears for harvest of shellfish from public bottom (wild harvest) and other fisheries due to a prohibition on the use of certain active commercial gears on shellfish leases, such as trawls, long haul seines, or swipe nets. Recreational fishing license-holders would lose some ability to catch and harvest marine and estuarine finfish in areas where floating systems for water column leases are deployed. Boaters may also face some restrictions due to impediments to navigation that can be caused by shellfish leasing activities. Given the relatively small area currently leased for shellfish aquaculture (less than one percent of total fishable area in estuarine waters), an extensive public comment process that is required before a shellfish lease is granted, and cap on maximum acreage per lease and per individual or entity, it is expected that these impacts will be negligible and easily offset should they occur.

IV. Benefits

By expanding the allowable lease acreage from five to 10 acres in the central and southern regions of the state where mechanical harvesting is prohibited, large-scale shellfish growers will benefit from reduced per-acre costs of an application. This rule change may attract more large-scale investment in aquaculture. However, the NCDMF expects few new applications for 10-acre leases in these areas due to the restricted waterways, existing natural shellfish beds and the

[5] The growing interest in shellfish aquaculture has seen a significant increase in lease applications for the 2016 calendar year. Currently, over 24 applications are pending where the past several years have seen an average of 12 applications per year, with around two to three requesting 10-acre leases.

conflicts with recreational and commercial activities. Currently, lease applications in the central and southern regions are less than the allowed five acres.

The rule changes will also add flexibility for shellfish growers to meet minimum production requirements. These changes will be especially beneficial in the event that growers experience personal hardships or “acts of God” that may inhibit their ability to fully cultivate their shellfish lease or franchise. Not meeting production requirements is a common issue in over half of existing shellfish leases. This lack of production is often due to weather events such as hurricanes, freezes or high rainfall that can adversely affect the salinity of a lease site. Also, since shellfish leases are usually small one or two person operations, an illness or family emergency can often affect production. Additional changes to improve the structure and clarity of the rules will benefit the regulated public through better understanding of the rules and ability to adhere to the legal requirements.

Comprehensive Statement of Costs and Benefits

Rule changes associated with the Oyster Fishery Management Plan Amendment 4 and Hard Clam Fishery Management Plan Amendment 2 are expected to have a total cost to the state of $9,980 in FY 2017 and a cost of $7,340 recurring thereafter (Tables 2 and 3). The proposed rules will create unquantified benefits for the private sector. These costs and benefits will not meet the threshold of $1 million in aggregate costs and benefits to be considered rule changes with a substantial economic impact. Specifically:

1) Amendments to 15A NCAC 03K .0201 would align the maximum daily harvest limit for oysters with current management and clarify proclamation authority language. The rule change is expected to improve public clarity of oyster harvest limits and limits of proclamation authority in the fishery. There are no costs expected to be incurred from this rule change.

2) Amendments to 15A NCAC 03K .0202 would reduce the culling tolerance from 10 percent to five percent for the possession of sublegal oysters, oyster shell, and cultch material. This rule is expected to incur approximately $2,640 in initial costs to the NCDMF through purchasing new keelers to measure the sublegal harvest and at least $5,340 annually in costs to fishermen for expected court costs and fines associated with citations issued for exceeding the allowable culling tolerance. Additionally, fishermen may incur some costs due to the possibility of having to spend more time sorting their catch, fishing for a longer period of time to reach the daily oyster harvest limit, or travelling to a different location to find the quality of oysters. These costs will be highly variable from year to year and among individuals, therefore they could not be quantified with any certainty. The oyster resource and the commercial and recreational oyster fisheries are expected to benefit from the reduction in culling tolerance, with fewer sublegal oysters, oyster shell, and cultch material being removed from the water.

3) Amendments to 15A NCAC 03K .0302 would remove the mechanical clam harvest area on public bottom in the Pamlico Sound that may be opened by proclamation and clarify proclamation authority language. This rule change may incur some costs through potential forgone harvest; however, these costs are expected to be minimal as these areas have not been opened since 2007 and will likely continue to remain closed under the Hard Clam Fishery Management Plan should the proposed rule changes not occur. The rule change is expected to continue to minimize user conflicts with the blue crab fishery and protect oyster and submerged aquatic vegetation resources in the area. Additionally, the public will benefit from clarifying proclamation authority for clam harvest restrictions and standardizing the rule language for proclamation authority to match other similar rules.

4) Amendments to 15A NCAC 03O. 0114 would add convictions for theft of shellfish from leases or franchises to the list of convictions that may result in revocation of fishing licenses to implement stronger deterrents to shellfish theft and intentional aquaculture gear damage. This is expected to impose new potential costs to those convicted of stealing shellfish from a lease; however, these costs are expected to be minimal overall. The proposed rule changes will benefit shellfish growers by discouraging theft of their product and intentional damage of aquaculture gear. There would be an estimated cost to the state of $2,000 in the initial year for foregone license renewal fees.

5) Amendments to 15A NCAC 03O .0201 and 03O .0208 would clarify how production and marketing rates are calculated for shellfish leases and franchises, expand the maximum potential lease size to ten acres in all areas, specify criteria for an extension of up to two years to meet production requirements in the event of unforeseen circumstances, and improve the clarity of rule

language. There are no expected costs associated with the proposed rule changes for shellfish growers. Some commercial fishermen may be impacted if leased areas increase or are expanded as a result of limitations placed on some commercial gears that cannot be used in shellfish leases. Due to the limited area that these impacts may occur, extensive public input involved in the leasing process, and cap on maximum lease acreage of 10 acres, these impacts are expected to be negligible and easily offset. The proposed rule changes will benefit shellfish growers by decreasing the per-acre cost of a large lease application (more than five acres) and providing increased flexibility in meeting production requirements.

Table 2. Estimated annual costs and benefits by rule

	COSTS		BENEFITS	
Rule	**FY2017**	**FY2018**	**FY2017**	**FY2018**
15ANCAC03K.0201				
State	-	-	-	-
Private	-	-	+B	+B
15ANCAC03K.0202				
State	(2,640)	-	-	-
Private	(5,340)	(5,340)	+B	+B
15ANCAC03K.0302				
State	-	-	-	-
Private	-	-	+B	+B
15ANCAC03O.0114				
State	(2,000)	(2,000)	-	-
Private	-C	-C	+B	+B
15ANCAC03O.0201and.0208				
State	-	-	-	-
Private	-	-	+B	+B
Total	**$(9,980)**	**$(7,340)**	**+B**	**+B**

"C" and "B" represent unquantified costs or benefits. Please refer to the discussion of the relevant rule change for more details. Neither the unquantified costs nor the unquantified benefits are expected to be substantial (>$1M), either individually or in total.

Table 3. Summary of Estimated Economic Impact

	FY2017	**FY2018**
Costs		
State	(4,640)	(2,000)
Private	(5,340) -C	(5,340) -C
Benefits		
State	-	-
Private	+B	+B
Net Impact	(9,980) -C +B	(7,340) -C +B
NPV (7% discount rate)	**$(15,738) -C +B**	

"C" and "B" represent unquantified costs or benefits. Please refer to the discussion of the relevant rule change for more details. Neither the unquantified costs nor the unquantified benefits are expected to be substantial (>$1M), either individually or in total.

Literature Cited

NCDMF. 2001. North Carolina Hard Clam Fishery Management Plan. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 167 pp.

NCDMF. 2008. North Carolina Hard Clam Fishery Management Plan Amendment 1. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 315 pp.

NCDMF. 2016. North Carolina Oyster Fishery Management Plan Amendment 4 (draft). North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 371 pp.

Appendix 1: Proposed Rule Changes

15A NCAC 03K .0201 ~~OPEN SEASON AND POSSESSION LIMIT~~ OYSTER HARVEST MANAGEMENT

(a) It is unlawful to take or possess oysters from public ~~bottoms~~ bottom except from October 15 through March 31.

(b) The Fisheries Director may, by proclamation, ~~close and open the season within the time period stated herein or close and open any of the various waters to the taking of oysters depending on the need to protect small oysters and their habitat, the amount of saleable oysters available for harvest, the number of days harvest is prevented due to unsatisfactory bacteriological samples and weather conditions, and the need to prevent loss of oysters due to parasitic infections and thereby reduce the transmission of parasites to uninfected oysters or other variable conditions and may~~ impose any or all of the following restrictions on the taking of ~~oyster harvest:~~ oysters:

(1) Specify ~~days of the week harvesting will be allowed;~~ time;

(2) Specify ~~areas;~~ area;

(3) Specify means and ~~methods which may be employed in the taking;~~ methods;

(4) Specify ~~time period;~~ season within the period set forth in Paragraph (a) of this Rule;

~~(5) Specify the quantity, but shall not exceed possession of more than 50 bushels in a commercial fishing operation;and~~

(5) Specify size, but the minimum size specified shall not be less than three inches, except the minimum size specified shall not be less than two and one-half inches to prevent loss of oysters due to predators, pests, or infectious oyster diseases; and

~~(6) Specify the minimum size limit by shell length, but not less than 2 1/2 inches.~~

(6) Specify quantity, but shall not exceed possession of more than 20 standard U.S. bushels in a commercial fishing operation.

Authority G.S. 113-134; 113-182; 113-201; ~~113-221;~~ 113-221.1; 143B-289.52

15A NCAC 03K .0202 ~~SIZE LIMIT AND CULLING TOLERANCE~~CULLING REQUIREMENTS FOR OYSTERS

(a) It is unlawful to possess oysters which have accumulated dead shell, accumulated oyster cultch material, a shell length less than that specified by ~~proclamation,~~ proclamation issued under the authority of 15A NCAC 03K .0201, or any combination thereof that exceeds a ~~10 percent~~ five-percent tolerance limit by volume. In determining whether the tolerance limit is exceeded, the Fisheries Director and his agents may grade all, or any portion, or any combination of portions of the entire quantity being graded, and in cases of violations, may seize and return to public bottom or otherwise dispose of the oysters as authorized by law.

(b) All oysters shall be culled ~~by the catcher~~ where harvested and all oysters of less than legal size, accumulated dead ~~shell~~ shell, and cultch ~~material,~~ material shall be immediately returned to the bottom from which taken.

(c) This Rule shall not apply to oysters imported from out-of-state solely for shucking by shucking and packing plants currently permitted by the ~~Shellfish Sanitation Section of the Division of Environmental Health.~~Division of Marine Fisheries.

Authority G.S. 113-134; 113-182; 143B-289.52

15A NCAC 03K .0302 ~~MECHANICAL HARVEST SEASON~~ MECHANICAL HARVEST OF CLAMS FROM PUBLIC BOTTOM

(a) It is unlawful to take, buy, sell, or possess any clams taken by mechanical methods from public bottom unless the season is open.

(b) ~~except that the~~ The Fisheries Director may, by proclamation, open and close the season at any time in the Atlantic Ocean and only ~~between~~ from December 1 through March 31 in Internal Coastal Waters. ~~internal waters for the use of mechanical clam harvesting gear. The Fisheries Director is further empowered to impose any or all of the following restrictions:~~

~~(1) specify number of days;~~

~~(2) specify areas;~~

~~(3) specify time period;~~

~~(4) specify quantity or size; and~~

~~(5) specify means/methods. Any proclamation specifying means or methods must be approved by the Marine Fisheries Commission prior to issuance.~~

~~(b)~~(c) The Fisheries Director may, by proclamation, open to the taking of clams by mechanical methods from public bottom during open seasons only areas that have been opened at any time from January 1979 through September 1988 in:

(1) Newport, North, White Oak, and New rivers;
(2) Core and Bogue sounds;
(3) the Intracoastal Waterway north of "BC" Marker at Topsail Beach; and
(4) the Atlantic Ocean.

~~in Core and Bogue Sounds, Newport, North, White Oak and New Rivers and the Intracoastal Waterway north of "BC" Marker at Topsail Beach which have been opened at any time from January, 1979, through September, 1988, to the harvest of clams by mechanical methods. The Fisheries Director may, by proclamation, open the Atlantic Ocean and the area or any portion of the area in Pamlico Sound bounded by a line beginning on Portsmouth Island at a point 35° 01.5000' N 76° 06.0000' W; running northerly to a point 35° 06.0000' N 76° 06.0000' W; running westerly to a point 35° 06.0000' N 76° 10.0000' W; running southerly to a point 35° 01.5000' N 76° 10.0000' W; running easterly to the point of beginning to the harvest of clams by mechanical methods.~~ Other areas opened for purposes as set out in 15A NCAC 03K .0301(b) shall open only for those purposes. A list of areas as described in this Paragraph is available upon request at the Division of Marine Fisheries, 3441 Arendell Street, Morehead City, NC 28557.

(d) The Fisheries Director may, by proclamation, impose any or all of the following additional restrictions for the taking of clams by mechanical methods from public bottom during open seasons:

(1) specify time;
(2) specify means and methods;
(3) specify size; and
(4) specify quantity.

Authority G.S. 113-134; 113-182; ~~113-221;~~ 113-221.1; 143B-289.52

15A NCAC 03O .0114 SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES

(a) All commercial and recreational licenses issued under Article 14A, Article 14B, and Article 25A of Chapter 113 are subject to suspension and revocation.

(b) A conviction resulting from being charged by an inspector under G.S. 14-32, 14-33 or 14-399 shall be deemed a conviction for license suspension or revocation purposes.

(c) Upon receipt of notice of a licensee's conviction as specified in G.S. 113-171 or a conviction as specified in Paragraph (b) of this Rule, the Fisheries Director shall determine whether it is a first, a second, a third or a fourth or subsequent conviction. Where several convictions result from a single transaction or occurrence, the convictions shall be treated as a single conviction so far as suspension or revocation of the licenses of a licensee is concerned. For a second conviction, the Fisheries Director shall suspend all licenses issued to the licensee for a period of 30 days; for a third conviction, the Fisheries Director shall suspend all licenses issued to the licensee for a period of 90 days; for a fourth or subsequent conviction, the Fisheries Director shall revoke all licenses issued to the licensee, except:

(1) For a felony conviction under G.S. 14-399, the Fisheries Director shall suspend all licenses issued to the licensee for a period of one year;
(2) For a first conviction under G.S. 113-187(d)(1), the Fisheries Director shall suspend all licenses issued to the licensee for a period of one year; for a second or subsequent conviction under G.S. 113-187(d)(1), the Fisheries Director shall revoke all licenses issued to the licensee;
(3) For a conviction under G.S. 113-208, 113-209, or 113-269, the Fisheries Director shall revoke all licenses issued to the licensee; and
(4) For a conviction under G.S. 14-32 or 14-33, when the offense was committed against a marine fisheries inspector the Fisheries Director shall revoke all licenses issued to the licensee; the former licensee shall not be eligible to apply for reinstatement of a revoked license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 for a period of two years.

(d) After the Fisheries Director determines a conviction requires a suspension or revocation of the licenses of a licensee, the Fisheries Director shall cause the licensee to be served with written notice of suspension or revocation. The written notice may be served upon any responsible individual affiliated with the corporation, partnership, or association where the licensee is not an individual. The notice of suspension or revocation shall be served by an inspector or other agent of the Department or by certified mail, must state the ground upon which it is based, and takes effect immediately upon service. The agent of the Fisheries Director making service shall then or subsequently, as

may be feasible under the circumstances, collect all license certificates and plates and other forms or records relating to the license as directed by the Fisheries Director.
(e) Where a license has been suspended, the former licensee shall not be eligible to apply for reissuance of license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 during the suspension period. Licenses shall be returned to the licensee by the Fisheries Director or the Director's agents at the end of a period of suspension.
(f) Where a license has been revoked, the former licensee shall not be eligible to apply for reinstatement of a revoked license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 for a period of one year, except as provided in Paragraph (c)(4) of this Rule. For a request for reinstatement following revocation, the eligible former licensee shall satisfy the Fisheries Director that the licensee will strive in the future to conduct the operations for which the license is sought in accord with all applicable laws and rules by sending a request for reinstatement in writing to the Fisheries Director, Division of Marine Fisheries, P.O. Box 769, Morehead City, North Carolina 28557. Upon the application of an eligible former licensee after revocation, the Fisheries Director may issue one license sought but not another, as deemed necessary to prevent the hazard of recurring violations of the law.
(g) A licensee shall not willfully evade the service prescribed in this Rule.

Authority G.S. 113-168.1; 113-171; S.L. 2010-145

15A NCAC 03O .0201 STANDARDS AND REQUIREMENTS FOR SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES

(a) All areas of the public ~~bottoms~~ bottom underlying ~~coastal fishing waters~~ Coastal Fishing Waters shall meet the following ~~standards~~ standards and requirements, in addition to the standards in G.S. 113-202 in order to be deemed suitable for leasing for shellfish cultivation purposes:

(1) ~~The~~ the proposed lease area ~~must~~ shall not contain a ~~natural shellfish bed which is defined as~~ "natural shellfish bed", as defined in G.S. 113-201.1 or have 10 bushels or more of shellfish per ~~acre.~~acre;

(2) ~~The~~ the proposed lease area ~~must~~ shall not be closer than 100 feet to a developed shoreline, except no minimum setback is required when the area to be leased borders the applicant's property or the property of ~~riparian owners~~ "riparian owners", as defined in G.S. 113-201.1 who have consented in a notarized ~~statement. In~~ statement, or is in an area bordered by undeveloped ~~shoreline, no minimum setback is required.~~shoreline; and

(3) ~~The~~ the proposed lease area shall not be less than one-half acre and shall not exceed ~~five~~ 10 acres for all ~~areas except those areas open to the mechanical harvest of oysters where proposed lease area shall not exceed 10 acres.~~areas.

~~This Subparagraph shall not be applied to reduce any holdings as of July 1, 1983.~~

~~(b) Persons holding five or more acres under shellfish lease or franchise shall meet the standards established in Paragraph (c) of this Rule prior to acceptance of applications for additional shellfish lease acreage.~~

(b) To be deemed suitable for leasing for aquaculture purposes, water columns superjacent to leased bottom shall meet the standards in G.S. 113-202.1 and water columns superjacent to franchises recognized pursuant to G.S. 113-206 shall meet the standards in G.S. 113-202.2.

(c) ~~Franchises~~ To avoid termination, franchises recognized pursuant to G.S. 113-206 and shellfish bottom leases shall meet the following ~~standards in addition to the standards in G.S. 113-202. In order to avoid termination, franchises and shellfish bottom leases shall:~~requirements, in addition to the standards in G.S. 113-202:

(1) ~~Produce~~ produce and market 10 bushels of shellfish per acre per year; and

(2) ~~Plant~~ plant 25 bushels of seed shellfish per acre per year or 50 bushels of cultch per acre per year, or a combination of cultch and seed shellfish where the percentage of required cultch planted and the percentage of required seed shellfish planted totals at least 100 percent.

(d) To avoid termination, water column leases shall:

(1) produce and market 40 bushels of shellfish per acre per year; or

(2) plant 100 bushels of cultch or seed shellfish per acre per year.

~~(d)~~(e) The following standards shall be applied to determine compliance with ~~Subparagraphs (1) and (2) of Paragraph (c)~~Paragraphs (c) and (d) of this Rule:

(1) Only shellfish marketed, planted, or produced ~~or marketed according to the definitions~~ as defined in 15A NCAC 03I .0101 as the fishing activities "shellfish marketing from leases and franchises", "shellfish planting effort on leases and franchises", or "shellfish production on leases and franchises" shall be submitted on ~~production/utilization~~ reporting forms as set forth in 15A NCAC 03O .0207 for ~~shellfish~~ leases and franchises.

(2) If more than one ~~shellfish~~ lease or franchise is used in the production of shellfish, one of the leases or franchises used in the production of the shellfish ~~must~~ shall be designated as the producing lease or franchise for those shellfish. Each bushel of shellfish may be produced by only one ~~shellfish~~ lease or franchise. Shellfish transplanted between leases or franchises may be credited as planting effort on only one lease or franchise.

(3) Production and marketing information and planting effort information shall be compiled and averaged separately to assess compliance with the ~~standards.~~requirements. The lease or franchise ~~must~~ shall meet both the production requirement and the planting effort requirement within the dates set forth in G.S. 113-202.1 and 202.2 to be ~~judged~~ deemed in compliance ~~with these standards.~~for shellfish bottom leases. The lease or franchise shall meet either the production requirement or the planting effort requirement within the dates set forth in G.S. 113-202.1 and 202.2 to be deemed in compliance for water column leases.

(4) All bushel measurements shall be in U.S. Standard Bushels.

~~(4)~~(5) In determining production and marketing averages and planting effort averages for information not reported in bushel measurements, the following conversion factors shall be used:

(A) 300 oysters, 400 clams, or 400 scallops equal one bushel; and

(B) 40 pounds of scallop shell, 60 pounds of oyster shell, 75 pounds of clam ~~shell and~~ shell, or 90 pounds of fossil stone equal one bushel.

~~(5) In the event that a portion of an existing lease or franchise is obtained by a new owner, the production history for the portion obtained shall be a percentage of the originating lease or franchise production equal to the percentage of the area of lease or franchise site obtained to the area of the originating lease or franchise.~~

(6) Production and marketing rate averages shall be computed irrespective of transfer of the lease or franchise. The production and marketing rates shall be ~~averaged:~~averaged for the following situations using the time periods described:

(A) for an initial bottom lease or franchise, over the consecutive full calendar years remaining on the bottom lease or franchise contract after December 31 following the second anniversary of the initial bottom ~~leases and franchises.~~lease or franchise;

(B) for a renewal bottom lease or franchise, over the consecutive full calendar years beginning January 1 of the final year of the previous bottom lease or franchise term and ending December 31 of the final year of the current bottom lease ~~contract for renewal leases.~~or franchise contract;

(C) for a water column lease, over the first ~~five year~~ five-year period for an initial water column ~~leases~~ lease and over the most recent ~~five year~~ five-year period thereafter for a renewal water column ~~leases.~~lease; or

(D) for a bottom lease or franchise issued an extension period under 15A NCAC 03O .0208, over the most recent five-year period.

~~Production and marketing rate averages shall be computed irrespective of transfer of the shellfish lease or franchise.~~

~~(7) All bushel measurements shall be in U.S. Standard Bushels.~~

(7) In the event that a portion of an existing lease or franchise is obtained by a new owner, the production history for the portion obtained shall be a percentage of the originating lease or franchise production equal to the percentage of the area of lease or franchise site obtained to the area of the originating lease or franchise.

(f) Persons holding five or more acres under all shellfish bottom leases and franchises combined shall meet the requirements established in Paragraph (c) of this Rule prior to the Division of Marine Fisheries accepting applications for additional shellfish lease acreage.

~~(e) Water columns superjacent to leased bottoms shall meet the standards in G.S. 113-202.1 in order to be deemed suitable for leasing for aquaculture purposes.~~

~~(f) Water columns superjacent to franchises recognized pursuant to G.S. 113-206 shall meet the standards in G.S. 113-202.2 in order to be deemed suitable for leasing for aquaculture purposes.~~

~~(g) Water column leases must produce and market 40 bushels of shellfish per acre per year to meet the minimum commercial production requirement or plant 100 bushels of cultch or seed shellfish per acre per year to meet commercial production by planting effort. The standards for determining production and marketing averages and planting effort averages shall be the same for water column leases as for bottom leases and franchises set forth in~~

~~Paragraph (d) of this Rule except that either the produce and market requirement or the planting requirement must be met.~~

Authority G.S. 113-134; 113-201; 113-202; 113-202.1; 113-202.2; 113-206; 143B-289.52

15A NCAC 03O .0208 ~~CANCELLATION~~TERMINATION OF SHELLFISH BOTTOM LEASES AND FRANCHISES AND WATER COLUMN LEASES

(a) Procedures for termination of shellfish leaseholds are provided in G.S. 113-202. The Secretary's decision to terminate a leasehold may be appealed by initiating a contested case as outlined in G.S. 150B-23.

~~(a)~~(b) ~~In addition to~~ Consistent with the grounds for termination established by G.S. 113-202, ~~the Secretary shall begin action to terminate leases and franchises for failure to produce and market shellfish or for failure to maintain a planting effort of cultch or seed shellfish in accordance with 15A NCAC 03O .0201~~ substantial breach of compliance with the provisions of rules of the Marine Fisheries Commission governing use of the leasehold includes the following, except as provided in Paragraph (c) of this Rule:

(1) failure to meet shellfish production and marketing requirements for bottom leases or franchises in accordance with 15A NCAC 03O .0201;

(2) failure to maintain a planting effort of cultch or seed shellfish for bottom leases or franchises in accordance with 15A NCAC 03O .0201;

(3) failure either to meet shellfish production and marketing requirements or to maintain a planting effort of cultch or seed shellfish for water column leases in accordance with 15A NCAC 03O .0201;

(4) the Fisheries Director has cause to believe the holder of private shellfish bottom or franchise rights has encroached or usurped the legal rights of the public to access public trust resources in navigable waters, in accordance with G.S. 113-205 and 15A NCAC 03O .0204; or

(5) the Attorney General initiates action for the purpose of vacating or annulling letters patent granted by the State, in accordance with G.S. 146-63.

~~(b) Action to terminate a shellfish franchise shall begin when there is reason to believe that the patentee, or those claiming under him, have done or omitted an act in violation of the terms and conditions on which the letters patent were granted, or have by any other means forfeited the interest acquired under the same. The Division shall investigate all such rights issued in perpetuity to determine whether the Secretary should request that the Attorney General initiate an action pursuant to G.S. 146-63 to vacate or annul the letters patent granted by the state.~~

~~(c) Action to terminate a shellfish lease or franchise shall begin when the Fisheries Director has cause to believe the holder of private shellfish rights has encroached or usurped the legal rights of the public to access public trust resources in navigable waters.~~

(c) Consistent with G.S. 113-202(l1) and 113-201(b), a leaseholder that failed to meet requirements in G.S. 113-202, 15A NCAC 03O .0201 or this Rule may be granted a single extension period of no more than two years per contract period upon sufficient showing of hardship by written notice to the Fisheries Director prior to the expiration of the lease term that one of the following occurrences caused or will cause the leaseholder to fail to meet lease requirements:

(1) death, illness, or incapacity of the leaseholder or his "immediate family", as defined in G.S. 113-168 that prevented or will prevent the leaseholder from working the lease;

(2) damage to the lease from hurricanes, tropical storms or other severe weather events recognized by the National Weather Service;

(3) shellfish mortality caused by disease, natural predators, or parasites; or

(4) damage to the lease from a manmade disaster that triggers a state emergency declaration or federal emergency declaration.

(d) In the case of hardship as described in Subparagraph (c)(1), the notice shall state the name of the leaseholder or immediate family member, and either the date of death, or the date and nature of the illness or incapacity. The Fisheries Director may require a doctor's verification of the illness or incapacity. Written notice and any supporting documentation shall be addressed to the Director of the Division of Marine Fisheries, P.O. Box 769, 3441 Arendell St., Morehead City, NC 28557-0769.

(e) Requirements for transfer of beneficial ownership of all or any portion of or interest in a leasehold are provided in G.S. 113-202(k).

~~(d) In the event action to terminate a lease is begun, the owner shall be notified by registered mail and given a period of 30 days in which to correct the situation. Petitions to review the Secretary's decision must be filed with the Office of Administrative Hearings as outlined in 15A NCAC 03P .0102.~~

~~(e) The Secretary's decision to terminate a lease may be appealed by initiating a contested case as outlined in 15A NCAC 03P .0102.~~

Authority G.S. 113-134; 113-201; 113-202; 113-202.1; 113-202.2; 113-205; 143B-289.52

Appendix 2: Referenced Rule Language (for information purposes only)

15A NCAC 03H .0103 PROCLAMATION AUTHORITY OF FISHERIES DIRECTOR

(a) It is unlawful to violate the provisions of any proclamation issued by the authority of Marine Fisheries Commission Rule.

(b) Unless specific variable conditions are set forth in a rule granting proclamation authority to the Fisheries Director, variable conditions triggering the use of the Fisheries Director's proclamation authority may include any of the following:

(1) compliance with changes mandated by the Fisheries Reform Act and its amendments;
(2) biological impacts;
(3) environmental conditions;
(4) compliance with Fishery Management Plans;
(5) user conflicts;
(6) bycatch issues; and
(7) variable spatial distributions.

Authority G.S. 113-134; 113-135; 113-182; 113-221.1; 143B-289.52;

15A NCAC 03I .0102 TEMPORARY SUSPENSION OF RULES

The Fisheries Director is authorized to suspend, in whole or in part, until the next meeting of the Marine Fisheries Commission, or for a lesser period, the operation of any rule of the Marine Fisheries Commission regarding coastal fisheries which may be affected by variable conditions.

Authority G.S. 113-134; 143B-289.52;

Fiscal Note for Proposed Rule Amendments to Create a Permit for Weekend Trawling for Live Shrimp

Rule Amendments: 15A NCAC 03J .0104 TRAWL NETS
15A NCAC 03L .0102 WEEKEND SHRIMPING PROHIBITED
15A NCAC 03O .0501 PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS
15A NCAC 03O .0503 PERMIT CONDITIONS; SPECIFIC

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact:
Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
(252) 808-8014
catherine.blum@ncdenr.gov

Impact Summary: State Government: Minimal
Local Government: No
Private Impact: Yes
Substantial Impact: No

Authority: G.S. 113-134 Rules; 113-169.1 Permits for gear, equipment, and other specialized activities authorized; 113-182 Regulation of fishing and fisheries; 143B-289.52. Marine Fisheries Commission – powers and duties.

Necessity: The proposed rule changes establish a permit to allow weekend trawling for live shrimp as chosen by the N.C. Marine Fisheries Commission (NCMFC) as a preferred management option when amending the N.C. Shrimp Fishery Management Plan. These rule changes are necessary to specify permit conditions as well as allow shrimp to be taken with a trawl from 5 p.m. Friday through 12 p.m. Saturday in Internal Coastal Waters, which are currently closed to shrimp trawling during this time.

I. Summary

In accordance with the N.C. Shrimp Fishery Management Plan Amendment 1, proposed amendments provide an exception for a holder of a Permit for Weekend Trawling for Live Shrimp to use trawl nets in Internal Coastal Waters from 9 p.m. Friday through 12 p.m. Saturday and to take shrimp during this time with trawl nets. Additionally, the rule changes require permit holders to hold a valid Standard or Retired Standard Commercial Fishing License, clarify the responsible party for an assigned license, and establish the Permit for Weekend Trawling for Live Shrimp in rule as well set specific conditions of the permit. The proposed effective date of the rule changes is May 1, 2017.

II. Introduction and Purpose of Rule Change

Live shrimp are popular bait for recreational fishermen targeting spotted sea trout, red drum, and other popular recreational finfish species. Currently, North Carolina does not manage shrimping specifically for bait and fishermen harvesting shrimp as live bait must comply with current regulations that are in place for shrimp harvested for human consumption, including a weekly closure for shrimp trawling in Internal Coastal Waters from 9 p.m. Friday through 5 p.m. Sunday. This weekend closure began as essentially a Sunday closure (sunset Saturday to sunset Sunday) due to religious reasons and was changed to begin Fridays at sunset to also provide a time period for the bottom to "rest", allowing the shrimp to school back together for ease of capture when shrimping reopened. The sunset timeframes were changed to 9 p.m. and 5 p.m. in 2006 to use a time certain instead of the constantly changing time of sunset, for ease of enforcement. The number of pounds of live bait shrimp landed each year is relatively low compared to overall shrimp landings, ranging from 129 pounds in 1994 to 2,735 pounds in 2013. However, the pounds of live bait shrimp have generally increased over time along with the number of trips taken. The ex-vessel price for this fishery is high compared to food shrimp and the ex-vessel value has trended upwards in recent years. On average, the price per pound has been approximately $16 with some years seeing as much as $28 per pound (Table 1). While low, there has been a relatively steady number of fishermen and dealers participating in the fishery since the mid-1990s. Over half the landings typically come from otter trawls (65%) followed by cast nets (12%), skimmer trawls (10%), channel nets (5%), and other gears (8%). Seventy-two percent of the live bait shrimp landings originate from the Cape Fear River, the Intracoastal Waterway, Stump Sound, and Topsail Sound in the southern region of coastal North Carolina.

Table 1. Number of pounds of live bait shrimp, dealers, trips, and participants, 1994-2014.

Year	Pounds	Dealers	Trips	Participants	Ex-Vessel Value	Average Price Per Pound
1994	129	5	69	4	$1,163	$9.02
1995	204	11	85	8	$1,834	$8.99
1996	242	10	118	12	$3,657	$15.11
1997	249	8	130	10	$2,627	$10.55
1998	175	14	126	16	$1,908	$10.90
1999	418	11	60	10	$1,252	$3.00
2000	469	12	88	10	$6,684	$14.25
2001	266	8	150	11	$4,338	$16.31
2002	805	11	222	16	$12,976	$16.12
2003	1,027	12	201	17	$25,758	$25.08
2004	1,154	10	218	14	$19,210	$16.65
2005	921	14	178	15	$7,843	$8.52
2006	1,349	13	142	14	$30,132	$22.34
2007	909	14	134	14	$14,009	$15.41
2008	2,074	11	133	10	$34,572	$16.67
2009	1,652	15	249	14	$22,942	$13.89
2010	1,710	16	250	14	$30,994	$18.13
2011	1,923	17	279	10	$52,673	$27.39
2012	2,586	18	335	13	$52,892	$20.45
2013	2,735	18	358	13	$77,601	$28.37
2014	1,649	14	221	11	$41,252	$25.02

During the approval of the 2015 Shrimp FMP Amendment 1, the NCMFC voted to establish a permitted live bait shrimp fishery and for the North Carolina Division of Marine Fisheries (NCDMF) to craft the guidelines after reviewing permitted operations in other states to encourage the live bait shrimp fishery in North Carolina. The NCMFC also directed the NCDMF to allow live bait shrimp fishermen with a permit to fish until 12 p.m. (noon) on Saturday in Internal Coastal Waters otherwise opened by proclamation to the harvest of shrimp with trawls. Closing at noon on Saturday still takes into account the need for the bottom to "rest". Based on information gathered from other states and from live bait shrimp fishermen in North Carolina, the NCDMF created an issuable permit called the "Permit for Weekend Trawling for Live Shrimp" (WTLS) with the following specific permit conditions that would conform to current industry standards:

- A WTLS is required for holders of a Standard Commercial Fishing License (SCFL) or Retired Standard Commercial Fishing License (RSCFL) who harvest live shrimp as bait with a shrimp trawl from Friday at 9 p.m. until Saturday at 12 p.m. in Internal Coastal Waters.
- A WTLS-holder will be allowed to live bait shrimp with trawls from Friday at 9 p.m. until Saturday at 12 p.m. only in waters that are opened by proclamation to commercial shrimp fishing.
- A WTLS-holder must notify the NCDMF prior to each weekend use of the permit regarding anticipated fishing activity and location.
- Permits are non-transferable. An individual who is assigned a SCFL or RSCFL shall hold a WTLS in his or her own name. The Master designated on a single vessel corporation SCFL is the individual eligible to receive the WTLS.
- It is unlawful for a WTLS-holder to use a shrimp trawl with a headrope length greater than 40 feet.
- It is unlawful for a WTLS-holder to possess more than one gallon of dead shrimp (heads on) per trip.
- It is unlawful for a WTLS-holder to not have a functioning live bait tank or a combination of multiple functioning live bait tanks with aerator(s) and/or circulating water. Tank(s) must total a minimum of 50 gallons.

The WTLS permit will only be necessary for commercial fishermen wishing to trawl in Internal Coastal Waters for shrimp to be used as live bait from Friday at 9 p.m. through 12 p.m. on Saturday. The permit will not be needed for those using other gears to catch shrimp such as channel nets or cast nets, nor will it be needed for those not wishing to fish with a trawl in Internal Coastal Waters outside of the Friday 9 p.m. to Sunday 5 p.m. timeframe. Fishermen can currently use trawls to catch shrimp in open Internal Coastal Waters from 5 p.m. on Sunday to 9 p.m. on Friday and seven days a week in the Atlantic Ocean. The purpose of the permit is to allow interested commercial fishermen to harvest shrimp with trawls to supply bait and tackle shops through the weekend, a time when live bait demand can peak and supplies may run low due to the current weekly closure. The gear limitations and mandatory equipment, which are an industry standard, are specified to ensure that the fishing activities are to capture shrimp to be used as live bait and that the WTLS permit is not used for unintended purposes that may conflict with the overall commercial shrimp fishery.

III. Costs

Costs associated with the WTLS permit are expected to be minimal. No additional NCDMF staff will need to be hired, nor is the permit expected to measurably impose opportunity costs by noticeably taking up additional staff time, as it is anticipated that there will be few participants obtaining the permit initially. Currently, there are 11 participants in the live bait shrimp fishery. There will be no additional need of enforcement staff nor any additional enforcement time required since areas are already patrolled during the weekend. There should be minimal environmental impacts (bycatch and other) because of the nature of the fishery. Tow times are low in order to keep shrimp alive and should translate to less mortality of other species as well. There should be no other additional impacts due to the fact that bait shrimp fishing will occur in the same area that regular shrimp fishing occurs. Furthermore, this permit provides additional opportunities to trawl during currently closed times in Internal Coastal Waters, meaning that participants can maintain their current activities without the WTLS permit. WTLS permit holders will need to notify NCDMF of weekend live bait shrimp trawling activities, however this will be limited to the time of year that the fishery occurs (typically summer and fall) and can be handled via a phone call lasting less than five minutes. Overall, it is anticipated that this free permit will take no more than eight extra hours of NCDMF staff time and no more than five extra hours of permit holders' time annually to implement and adhere to the permit reporting requirements.

IV. Benefits

The proposed rule changes are intended to provide additional fishing opportunities to commercial live bait shrimp fishermen who use trawls in Internal Coastal Waters. Overall, these fishermen will be allowed an extra 15 hours to fish per week in addition to the current 124 hours of fishing time allowed weekly. This is a 12% increase in allowed fishing time per week. On average, trawls (otter and skimmer) account for approximately 75% of the live bait shrimp landings each year. Using this figure of 75%, the ex-vessel value of live bait shrimp landings from 2013 and 2014 as a baseline, and assuming that a 12% increase in fishing time will lead to a 12% increase in the ex-vessel value of landings, the estimated benefits of the proposed rule changes are approximately $3,700 to $7,000 in increased live bait shrimp landings per year.

Appendix: Proposed Amendments

15A NCAC 03J .0104 TRAWL NETS

(a) It is unlawful to possess aboard a vessel while using a trawl in ~~internal waters~~ Internal Coastal Waters more than 500 pounds of finfish from December 1 through ~~February 28,~~ March 1, and 1,000 pounds of finfish from March ~~1~~ 2 through November 30.

(b) It is unlawful to use trawl nets:

(1) ~~In internal coastal waters,~~ in Internal Coastal Waters, from 9:00 p.m. on Friday through 5:00 p.m. on Sunday, ~~except that in the areas listed in Subparagraph (b)(5) of this Rule, trawling is prohibited from December 1 through February 28 from one hour after sunset on Friday to one hour before sunrise on Monday;~~except:

(A) from December 1 through March 1 from one hour after sunset on Friday to one hour before sunrise on Monday in the areas listed in Subparagraph (b)(5) of this Rule; and

(B) for a holder of a Permit for Weekend Trawling for Live Shrimp in accordance with 15A NCAC 03O .0503;

(2) ~~For~~ for the taking of oysters;

(3) ~~In~~ in Albemarle Sound, Currituck Sound, and their tributaries, west of a line beginning on the south shore of Long Point at a point 36° 02.4910' N - 75° 44.2140' W; running southerly to the north shore on Roanoke Island to a point 35° 56.3302' N - 75° 43.1409' W; running northwesterly to Caroon Point to a point 35° 57.2255' N - 75° 48.3324' W;

(4) ~~In~~ in the areas described in 15A NCAC 03R .0106, except that the Fisheries Director may, by proclamation, open the area designated in Item (1) of 15A NCAC 03R .0106 to peeler crab trawling;

(5) ~~From~~ from December 1 through ~~February 28~~ March 1 from one hour after sunset to one hour before sunrise in the following areas:

(A) In Pungo River, north of a line beginning on Currituck Point at a point 35° 24.5833' N-76° 32.3166' W; running southwesterly to Wades Point to a point 35° 23.3062' N-76° 34.5135' W;

(B) In Pamlico River, west of a line beginning on Wades Point at a point 35° 23.3062' N – 76° 34.5135' W; running southwesterly to Fulford Point to a point 35° 19.8667' N – 76° 35.9333' W;

(C) In Bay River, west of a line beginning on Bay Point at a point 35° 11.0858' N – 76° 31.6155' W; running southerly to Maw Point to a point 35° 09.0214' N – 76° 32.2593' W;

(D) In Neuse River, west of a line beginning on the Minnesott side of the Neuse River Ferry at a point 34° 57.9116' N – 76° 48.2240' W; running southerly to the Cherry Branch side of the Neuse River Ferry to a point 34° 56.3658' N – 76° 48.7110' W; and

(E) In New River, all waters upstream of the N.C. Highway 172 Bridge when opened by proclamation; and

(6) ~~In~~ in designated pot areas opened to the use of pots by 15A NCAC 03J .0301(a)(2) and described in 15A NCAC 03R .0107(a)(5), (a)(6), (a)(7), (a)(8) and (a)(9) within an area bound by the shoreline to the depth of six feet.

(c) Minimum mesh sizes for shrimp and crab trawls are presented in 15A NCAC 03L .0103 and .0202.

(d) The Fisheries Director may, with prior consent of the Marine Fisheries Commission, by proclamation, require bycatch reduction devices or codend modifications in trawl nets to reduce the catch of finfish that do not meet size limits or are unmarketable as individual foodfish by reason of size.

(e) It is unlawful to use shrimp trawls for recreational purposes unless the trawl is marked by attaching to the codend (tailbag), one floating buoy, any shade of hot pink in color, which shall be of solid foam or other solid buoyant material no less than five inches in diameter and no less than five inches in length. The owner shall always be identified on the buoy by using an engraved buoy or by attaching engraved metal or plastic tags to the buoy. Such identification shall include owner's last name and initials and if a vessel is used, one of the following:

(1) gear owner's current motor boat registration number; or

(2) owner's U.S. vessel documentation name.

(f) It is unlawful to use shrimp trawls for the taking of blue crabs in ~~internal waters,~~ Internal Coastal Waters, except that it shall be permissible to take or possess blue crabs incidental to shrimp trawling in accordance with the following limitations:

(1) For individuals using shrimp trawls authorized by a Recreational Commercial Gear License, 50 blue crabs, not to exceed 100 blue crabs if two or more Recreational Commercial Gear License holders are on board.

(2) For commercial operations, crabs may be taken incidental to lawful shrimp trawl operations provided that the weight of the crabs shall not exceed the greater of:

(A) 50 percent of the total weight of the combined crab and shrimp catch; or

(B) 300 pounds.

(g) The Fisheries Director may, by proclamation, close any area to trawling for specific time periods in order to secure compliance with this Rule.

Authority G.S. 113-134; 113-173; 113-182; 113-221.1; 143B-289.52

15A NCAC 03L .0102 WEEKEND SHRIMPING PROHIBITED

It is unlawful to take shrimp by any method from 9:00 ~~P.M.~~ p.m. on Friday through 5:00 ~~P.M.~~ p.m. on Sunday, except:

(1) in the Atlantic Ocean; ~~or~~

(2) with the use of fixed and channel nets, hand seines, shrimp pots and cast ~~nets.~~nets; and

(3) for a holder of a Permit for Weekend Trawling for Live Shrimp in accordance with 15A NCAC 03O .0503.

Authority G.S. 113-134; 113-182; ~~113-221;~~ 143B-289.52

15A NCAC 03O .0501 PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS

(a) To obtain any Marine Fisheries permit, the following information is required for proper application from the applicant, a responsible party, or person holding a power of attorney:

(1) Full name, physical address, mailing address, date of birth, and signature of the applicant on the application. If the applicant is not appearing before a license agent or the designated Division contact, the applicant's signature on the application shall be notarized;

(2) Current picture identification of applicant, responsible party, or person holding a power of attorney. Acceptable forms of picture identification are driver's license, North Carolina Identification card issued by the North Carolina Division of Motor Vehicles, military identification card, resident alien card (green card), or passport; or if applying by mail, a copy thereof;

(3) Full names and dates of birth of designees of the applicant who will be acting under the requested permit where that type permit requires listing of designees;

(4) Certification that the applicant and his designees do not have four or more marine or estuarine resource convictions during the previous three years;

(5) For permit applications from business entities:

(A) Business Name;

(B) Type of Business Entity: Corporation, partnership, or sole proprietorship;

(C) Name, address, and phone number of responsible party and other identifying information required by this Subchapter or rules related to a specific permit;

(D) For a corporation, current articles of incorporation and a current list of corporate officers when applying for a permit in a corporate name;

(E) For a partnership, if the partnership is established by a written partnership agreement, a current copy of such agreement shall be provided when applying for a permit; and

(F) For business entities, other than corporations, copies of current assumed name statements if filed and copies of current business privilege tax certificates, if applicable; and

(6) Additional information as required for specific permits.

(b) A permittee shall hold a valid Standard or Retired Standard Commercial Fishing License in order to hold a:

(1) Pound Net Permit;

(2) Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean; ~~or~~
(3) Atlantic Ocean Striped Bass Commercial Gear ~~Permit.~~Permit; or
(4) Permit for Weekend Trawling for Live Shrimp.
(A) An individual who is assigned a Standard Commercial Fishing License shall hold a Permit for Weekend Trawling for Live Shrimp.
(B) The master designated on the single vessel corporation Standard Commercial Fishing License is the individual required to hold the Permit for Weekend Trawling for Live Shrimp.

(c) A permittee and his designees shall hold a valid Standard or Retired Standard Commercial Fishing License with a Shellfish Endorsement or a Shellfish License in order to hold a:
(1) Permit to Transplant Prohibited (Polluted) Shellfish;
(2) Permit to Transplant Oysters from Seed Oyster Management Areas;
(3) Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises;
(4) Permit to Harvest Rangia Clams from Prohibited (Polluted) Areas; or
(5) Depuration Permit.

(d) A permittee shall hold a valid:
(1) Fish Dealer License in the proper category in order to hold Dealer Permits for Monitoring Fisheries Under a Quota/Allocation for that category; and
(2) Standard Commercial Fishing License with a Shellfish Endorsement, Retired Standard Commercial Fishing License with a Shellfish Endorsement or a Shellfish License in order to harvest clams or oysters for depuration.

(e) Aquaculture Operations/Collection Permits:
(1) A permittee shall hold a valid Aquaculture Operation Permit issued by the Fisheries Director to hold an Aquaculture Collection Permit.
(2) The permittee or designees shall hold appropriate licenses from the Division of Marine Fisheries for the species harvested and the gear used under the Aquaculture Collection Permit.

(f) Atlantic Ocean Striped Bass Commercial Gear Permit:
(1) Upon application for an Atlantic Ocean Striped Bass Commercial Gear Permit, a person shall declare one of the following gears for an initial permit and at intervals of three consecutive license years thereafter:
(A) gill net;
(B) trawl; or
(C) beach seine.
For the purpose of this Rule, a "beach seine" is defined as a swipe net constructed of multi-filament or multi-fiber webbing fished from the ocean beach that is deployed from a vessel launched from the ocean beach where the fishing operation takes place.
Gear declarations shall be binding on the permittee for three consecutive license years without regard to subsequent annual permit issuance.
(2) A person is not eligible for more than one Atlantic Ocean Striped Bass Commercial Gear Permit regardless of the number of Standard Commercial Fishing Licenses, Retired Standard Commercial Fishing Licenses or assignments held by the person.

(g) Applications submitted without complete and required information shall not be processed until all required information has been submitted. Incomplete applications shall be returned to the applicant with deficiency in the application so noted.

(h) A permit shall be issued only after the application has been deemed complete by the Division of Marine Fisheries and the applicant certifies to abide by the permit general and specific conditions established under 15A NCAC 03J .0501, .0505, 03K .0103, .0104, .0107, .0111, .0401, 03O .0502, and .0503 as applicable to the requested permit.

(i) The Fisheries Director, or his agent may evaluate the following in determining whether to issue, modify, or renew a permit:
(1) Potential threats to public health or marine and estuarine resources regulated by the Marine Fisheries Commission;
(2) Applicant's demonstration of a valid justification for the permit and a showing of responsibility as determined by the Fisheries Director; and

(3) Applicant's history of habitual fisheries violations evidenced by eight or more violations in 10 years.

(j) The Division of Marine Fisheries shall notify the applicant in writing of the denial or modification of any permit request and the reasons therefor. The applicant may submit further information, or reasons why the permit should not be denied or modified.

(k) Permits are valid from the date of issuance through the expiration date printed on the permit. Unless otherwise established by rule, the Fisheries Director may establish the issuance timeframe for specific types and categories of permits based on season, calendar year, or other period based upon the nature of the activity permitted, the duration of the activity, compliance with federal or state fishery management plans or implementing rules, conflicts with other fisheries or gear usage, or seasons for the species involved. The expiration date shall be specified on the permit.

(l) For permit renewals, the permittee's signature on the application shall certify all information as true and accurate. Notarization of signature on renewal applications shall not be required.

(m) For initial or renewal permits, processing time for permits may be up to 30 days unless otherwise specified in this Chapter.

(n) It is unlawful for a permit holder to fail to notify the Division of Marine Fisheries within 30 days of a change of name or address, in accordance with G.S. 113-169.2.

(o) It is unlawful for a permit holder to fail to notify the Division of Marine Fisheries of a change of designee prior to use of the permit by that designee.

(p) Permit applications are available at all Division Offices.

Authority G.S. 113-134; 113-169.1; 113-169.3; 113-182; 113-210; 143B-289.52

15A NCAC 03O .0503 PERMIT CONDITIONS; SPECIFIC

(a) Horseshoe Crab Biomedical Use Permit:

(1) It is unlawful to use horseshoe crabs for biomedical purposes without first obtaining a permit.

(2) It is unlawful for persons who have been issued a Horseshoe Crab Biomedical Use Permit to fail to submit a report on the use of horseshoe crabs to the Division of Marine Fisheries due on February 1 of each year. Such reports shall be filed on forms provided by the Division and shall include a monthly account of the number of crabs harvested, statement of percent mortality up to the point of release, and a certification that harvested horseshoe crabs are solely used by the biomedical facility and not for other purposes.

(3) It is unlawful for persons who have been issued a Horseshoe Crab Biomedical Use Permit to fail to comply with the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe Crab. The Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe Crab is incorporated by reference including subsequent amendments and editions. Copies of this plan are available via the Internet from the Atlantic States Marine Fisheries Commission at http://www.asmfc.org/fisheries-management/program-overview and at the Division of Marine Fisheries, P.O. Box 769, 3441 Arendell St., Morehead City, North Carolina 28557 at no cost.

(b) Dealers Permits for Monitoring Fisheries under a Quota/Allocation:

(1) During the commercial season opened by proclamation or rule for the fishery for which a Dealers Permit for Monitoring Fisheries under a Quota/Allocation permit is issued, it is unlawful for the fish dealers issued such permit to fail to:

(A) fax or send via electronic mail by noon daily, on forms provided by the Division, the previous day's landings for the permitted fishery to the dealer contact designated on the permit. Landings for Fridays or Saturdays shall be submitted on the following Monday. If the dealer is unable to fax or electronic mail the required information, the permittee shall call in the previous day's landings to the dealer contact designated on the permit, but shall maintain a log furnished by the Division;

(B) submit the required log to the Division upon request or no later than five days after the close of the season for the fishery permitted;

(C) maintain faxes and other related documentation in accordance with 15A NCAC 03I .0114;

(D) contact the dealer contact designated on the permit daily regardless of whether or not a transaction for the fishery for which a dealer is permitted occurred; and

(E) record the permanent dealer identification number on the bill of lading or receipt for each transaction or shipment from the permitted fishery.

(2) Striped Bass Dealer Permit:

(A) It is unlawful for a fish dealer to possess, buy, sell, or offer for sale striped bass taken from the following areas without first obtaining a Striped Bass Dealer Permit validated for the applicable harvest area:

(i) Atlantic Ocean;

(ii) Albemarle Sound Management Area as designated in 15A NCAC 03R .0201; and

(iii) the Joint and Coastal Fishing Waters of the Central/Southern Management Area as designated in 15A NCAC 03R .0201.

(B) No permittee shall possess, buy, sell, or offer for sale striped bass taken from the harvest areas opened by proclamation without having a North Carolina Division of Marine Fisheries issued valid tag for the applicable area affixed through the mouth and gill cover, or, in the case of striped bass imported from other states, a similar tag that is issued for striped bass in the state of origin. North Carolina Division of Marine Fisheries striped bass tags shall not be bought, sold, offered for sale, or transferred. Tags shall be obtained at the North Carolina Division of Marine Fisheries Offices. The Division of Marine Fisheries shall specify the quantity of tags to be issued based on historical striped bass landings. It is unlawful for the permittee to fail to surrender unused tags to the Division upon request.

(3) Albemarle Sound Management Area for River Herring Dealer Permit: It is unlawful to possess, buy, sell, or offer for sale river herring taken from the following area without first obtaining an Albemarle Sound Management Area for River Herring Dealer Permit: Albemarle Sound Management Area for River Herring as defined in 15A NCAC 03R .0202.

(4) Atlantic Ocean Flounder Dealer Permit:

(A) It is unlawful for a fish dealer to allow vessels holding a valid License to Land Flounder from the Atlantic Ocean to land more than 100 pounds of flounder from a single transaction at their licensed location during the open season without first obtaining an Atlantic Ocean Flounder Dealer Permit. The licensed location shall be specified on the Atlantic Ocean Flounder Dealer Permit and only one location per permit shall be allowed.

(B) It is unlawful for a fish dealer to possess, buy, sell, or offer for sale more than 100 pounds of flounder from a single transaction from the Atlantic Ocean without first obtaining an Atlantic Ocean Flounder Dealer Permit.

(5) Black Sea Bass North of Cape Hatteras Dealer Permit. It is unlawful for a fish dealer to purchase or possess more than 100 pounds of black sea bass taken from the Atlantic Ocean north of Cape Hatteras (35° 15.0321' N) per day per commercial fishing operation during the open season unless the dealer has a Black Sea Bass North of Cape Hatteras Dealer Permit.

(c) Blue Crab Shedding Permit: It is unlawful to possess more than 50 blue crabs in a shedding operation without first obtaining a Blue Crab Shedding Permit from the Division of Marine Fisheries.

(d) Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean:

(1) It is unlawful to trawl for shrimp in the Atlantic Ocean without Turtle Excluder Devices installed in trawls within one nautical mile of the shore from Browns Inlet (34° 35.7000' N latitude) to Rich's Inlet (34° 17.6000' N latitude) without a valid Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean when allowed by proclamation from April 1 through November 30.

(2) It is unlawful to tow for more than 55 minutes from April 1 through October 31 and 75 minutes from November 1 through November 30 in the area described in Subparagraph (d)(1) of this Rule when working under this permit. Tow time begins when the doors enter the water and ends when the doors exit the water.

(3) It is unlawful to fail to empty the contents of each net at the end of each tow.

(4) It is unlawful to refuse to take observers upon request by the Division of Marine Fisheries or the National Marine Fisheries Service.

(5) It is unlawful to fail to report any sea turtle captured. Reports shall be made within 24 hours of the capture to the Marine Patrol Communications Center by phone. All turtles taken incidental to

trawling shall be handled and resuscitated in accordance with requirements specified in 50 ~~CFR~~ Code of Federal Regulations (CFR) 223.206. ~~This federal rule is incorporated by reference including subsequent amendments and editions. Copies of this rule are available via the Code of Federal Regulations posted on the Internet at http://www.gpoaccess.gov/cfr/index.html and at the Division of Marine Fisheries, P.O. Box 769, Morehead City, North Carolina 28557 at no cost.~~ 50 CFR 223.206 (2002) is hereby incorporated by reference. A copy of the reference materials can be found at http://www.ecfr.gov/cgi-bin/text-idx?SID=9088932317c242b91d6a87a47b6bda54&mc=true&tpl=/ecfrbrowse/Title50/50tab_02.tpl , free of charge. A copy of the CFR in effect on the date of this rule can be found at http://portal.ncdenr.org/web/mf/rules-and-regulations, free of charge.

(e) Pound Net Set Permits. Rule 15A NCAC 03J .0505 sets forth the specific conditions for pound net set permits.

(f) Aquaculture Operations/Collection Permits:

(1) It is unlawful to conduct aquaculture operations utilizing marine and estuarine resources without first securing an Aquaculture Operation Permit from the Fisheries Director.

(2) It is unlawful:

(A) to take marine and estuarine resources from Coastal Fishing Waters for aquaculture purposes without first obtaining an Aquaculture Collection Permit from the Fisheries Director.

(B) to sell, or use for any purpose not related to North Carolina aquaculture, marine and estuarine resources taken under an Aquaculture Collection Permit.

(C) to fail to submit to the Fisheries Director an annual report due on December 1 of each year on the form provided by the Division the amount and disposition of marine and estuarine resources collected under authority of this permit.

(3) Lawfully permitted shellfish relaying activities authorized by 15A NCAC 03K .0103 and .0104 are exempt from requirements to have an Aquaculture Operation or Collection Permit issued by the Fisheries Director.

(4) Aquaculture Operations/Collection Permits shall be issued or renewed on a calendar year basis.

(5) It is unlawful to fail to provide the Division of Marine Fisheries with a listing of all designees acting under an Aquaculture Collection Permit at the time of application.

(g) Scientific or Educational Activity Permit:

(1) It is unlawful for institutions or agencies seeking exemptions from license, rule, proclamation, or statutory requirements to collect, hold, culture, or exhibit for scientific or educational purposes any marine or estuarine species without first obtaining a Scientific or Educational Activity Permit.

(2) The Scientific or Educational Activity Permit shall only be issued for scientific or educational purposes and for collection methods and possession allowances approved by the Division of Marine Fisheries.

(3) The Scientific or Educational Activity Permit shall only be issued for approved activities conducted by or under the direction of Scientific or Educational institutions as defined in Rule 15A NCAC 03I .0101.

(4) It is unlawful for the responsible party issued a Scientific or Educational Activity Permit to fail to submit a report on collections and, if authorized, sales to the Division of Marine Fisheries due on December 1 of each year unless otherwise specified on the permit. The reports shall be filed on forms provided by the Division. Scientific or Educational Activity permits shall be issued on a calendar year basis.

(5) It is unlawful to sell marine or estuarine species taken under a Scientific or Educational Activity Permit without:

(A) the required license(s) for such sale;

(B) authorization stated on the permit for such sale; and

(C) providing the information required in Rule 15A NCAC 03I .0114 if the sale is to a licensed fish dealer.

(6) It is unlawful to fail to provide the Division of Marine Fisheries a listing of all designees acting under a Scientific or Educational Activity Permit at the time of application.

(7) The permittee or designees utilizing the permit shall call the Division of Marine Fisheries Communications Center at 800-682-2632 or 252-726-7021 not later than 24 hours prior to use of the permit, specifying activities and location.

(h) Under Dock Oyster Culture Permit:

(1) It is unlawful to cultivate oysters in containers under docks for personal consumption without first obtaining an Under Dock Oyster Culture Permit.

(2) An Under Dock Oyster Culture Permit shall be issued only in accordance with provisions set forth in G.S. 113-210(c).

(3) The applicant shall complete and submit an examination, with a minimum of 70 percent correct answers, based on an educational package provided by the Division of Marine Fisheries pursuant to G.S. 113-210(j). The examination demonstrates the applicant's knowledge of:

(A) the application process;

(B) permit criteria;

(C) basic oyster biology and culture techniques;

(D) shellfish harvest area closures due to pollution;

(E) safe handling practices;

(F) permit conditions; and

(G) permit revocation criteria.

(4) Action by an Under Dock Oyster Culture Permit holder to encroach on or usurp the legal rights of the public to access public trust resources in Coastal Fishing Waters shall result in permit revocation.

(i) Atlantic Ocean Striped Bass Commercial Gear Permit:

(1) It is unlawful to take striped bass from the Atlantic Ocean in a commercial fishing operation without first obtaining an Atlantic Ocean Striped Bass Commercial Gear Permit.

(2) It is unlawful to use a single Standard Commercial Fishing License, including assignments, to obtain more than one Atlantic Ocean Striped Bass Commercial Gear Permit during a license year.

(j) Coastal Recreational Fishing License Exemption Permit:

(1) It is unlawful for the responsible party seeking exemption from recreational fishing license requirements for eligible individuals to conduct an organized fishing event held in Joint or Coastal Fishing Waters without first obtaining a Coastal Recreational Fishing License Exemption Permit.

(2) The Coastal Recreational Fishing License Exemption Permit shall only be issued for recreational fishing activity conducted solely for the participation and benefit of one of the following groups of eligible individuals:

(A) individuals with physical or mental limitations;

(B) members of the United States Armed Forces and their dependents, upon presentation of a valid military identification card, for military appreciation;

(C) individuals receiving instruction on recreational fishing techniques and conservation practices from employees of state or federal marine or estuarine resource management agencies, or instructors affiliated with educational institutions; and

(D) disadvantaged youths.

For purposes of this Paragraph, educational institutions include high schools and other secondary educational institutions.

(3) The Coastal Recreational Fishing License Exemption Permit is valid for the date(s), time, and physical location of the organized fishing event for which the exemption is granted and the time period shall not exceed one year from the date of issuance.

(4) The Coastal Recreational Fishing License Exemption Permit shall only be issued when all of the following, in addition to the information required in 15A NCAC 03O .0501, is submitted to the Fisheries Director in writing a minimum of 30 days prior to the event:

(A) the name, date(s), time, and physical location of the event;

(B) documentation that substantiates local, state, or federal involvement in the organized fishing event, if applicable;

(C) the cost or requirements, if any, for an individual to participate in the event; and

(D) an estimate of the number of participants.

(k) Permit for Weekend Trawling for Live Shrimp:

(1) It is unlawful to take shrimp with trawls from Friday 9:00 p.m. through Saturday 12:00 p.m. (noon) without first obtaining a Permit for Weekend Trawling for Live Shrimp.

(2) It is unlawful for a holder of a Permit for Weekend Trawling for Live Shrimp to use trawls from 12:01 p.m. on Saturday through 5:00 p.m. on Sunday.

(3) It is unlawful for a permit holder during the timeframe specified in subparagraph (k)(1) to:

(A) use trawl nets to take live shrimp except from areas open to the harvest of shrimp with trawls;

(B) take shrimp with trawls that have a combined headrope length of greater than 40 feet in Internal Coastal Waters;

(C) possess more than one gallon of dead shrimp (heads on) per trip;

(D) fail to have a functioning live bait tank or a combination of multiple functioning live bait tanks with aerator(s) and/or circulating water. Tank(s) capacity must total a minimum of 50 gallons; and

(E) fail to call the Division of Marine Fisheries Communications Center at 800-682-2632 or 252-726-7021 prior to each weekend use of the permit, specifying activities and location.

Authority G.S. 113-134; 113-169.1; 113-169.3; 113-182; 113-210; 143B-289.52

FISCAL NOTE FOR PROPOSED AMENDMENTS TO RULE 15A NCAC 03O .0503

SPINY DOGFISH DEALER PERMIT

Rule Amendments: 15A NCAC 03O .0503 PERMIT CONDITIONS; SPECIFIC

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
(252) 808-8014
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Impact Summary: State Government: Yes
Local Government: No
Private Impact: Yes
Substantial Impact: No

Authority: N.C.G.S. 113-169.1 (Permits for gear, equipment, and other specialized activities authorized); 15A NCAC 03O .0503 (Permit Conditions; Specific)

Necessity: The proposed rule changes relocate a 2003 requirement of a permit for dealers transacting in spiny dogfish from proclamation into rule. This rule change is being requested in accordance with the North Carolina Division of Marine Fisheries (NCDMF) policy that recommends moving long-standing proclamations into rule where feasible to aid in the clarity of regulations for the public.

I. Summary

The requirement for licensed seafood dealers participating in the quota-managed spiny dogfish fishery to hold a spiny dogfish dealer permit has been issued by proclamation since its inception in 2003. It is the only dealer permit for quota monitoring purposes that is currently not in rule. Proposed rule changes relocate the requirement of a permit for dealers transacting in spiny dogfish from proclamation into rule. This action is consistent with the NCDMF's policy that recommends moving long-standing proclamations into rule where feasible to aid in the clarity of regulations for the public. The proposed effective date of the rule changes is May 1, 2017.

II. Introduction and Purpose of Rule Change

Several fish species are managed under federal or state commercial quotas that require frequent monitoring in order to limit harvest to amounts dictated in the allocated quota. One basic requirement of any quota monitoring program is to identify the population of those required to report so that reporting compliance can be assessed. For this reason, the division has developed rules for dealer permits for four fish species (summer flounder, black sea bass North of Cape Hatteras, striped bass, and river herring).

It has been standard practice within the division to require dealer permits first by proclamation and later move these requirements into rule once the process stabilizes and is reoccurring without change. If the NCDMF realizes that more frequent monitoring of any of the quota-managed fisheries currently not monitored is required, the division will likely begin by first requiring a dealer quota-monitoring permit by proclamation.

The division has, by proclamation, required a dealer permit and daily reporting of landings for spiny dogfish since November 2003 (Proclamation FF-42-2003.) The division has a policy which recommends moving long-standing proclamations into rule where feasible to aid in the clarity of regulations for the public. The proposed rule changes are consistent with this policy. Proclamations are public notices issued under the authority of rule that provide management flexibility to address variable conditions of certain fisheries. NCDMF now proposes to move the spiny dogfish dealer permit requirement into permanent rule because NCDMF has determined that the need to monitor the species will continue indefinitely. Seasonal openings, as well as trip limits will continue to be implemented via proclamation due to the variable nature of these conditions within the spiny dogfish fishery.

III. Costs

Placing the spiny dogfish dealer permit requirement into rule has no material impact on permit-holders as the permit is free and has been required and enforced via proclamation since 2003. Nevertheless, when moving a requirement from proclamation into rule, a cost analysis must be performed with the baseline being that the permit requirement does not occur until the rule goes into place. As such, both spiny dogfish dealer permit-holders and the NCDMF will incur opportunity costs due to time required to meet the permit's daily reporting requirements (regardless of landings or not) during the open season and monitoring of commercial landings to ensure that the commercial quota allocated to North Carolina is accurately tracked.

Based on NCDMF permit records, there were 33 holders of the commercial spiny dogfish dealer permit in FY 2015. The spiny dogfish season typically lasts approximately six months (26 weeks or 182 days). The permit holders report landings to the NCDMF Marine Biologist I on a daily basis during the open season. Even if the permit holder received no landings on a particular day, they must report zero landings for that day. Based on the expertise of the Marine Biologist I that has been working at the NCDMF with quota management for over 15 years, the NCDMF estimates that each permit-holder spends approximately five to 10 minutes per day satisfying the reporting requirements for this specific permit, depending on the number of vessels landing spiny dogfish at the dealer and the number of pounds landed. This accumulates to 15.2-30.4 hours per permit-holder or 500.5-1,001 hours for all permit-holders over the season. Based on the Bureau of Labor Statistics 2014 mean hourly wage for farming, fishing, and forestry workers of $13.57 per hour[1] and benefits equivalent to approximately 33.6% of total compensation[2], the estimated total opportunity cost stemming from the permit reporting requirements is a range from $9,074-$18,148 each year for all permit-holders. Since most permit-holders are self-employed, this total is a high estimate based on those business owners receiving a lower level of benefits than workers in this industry that are not self-employed. Additionally, based on the expertise of the Marine Biologist

[1] United States Department of Labor Bureau of Labor Statistics. May 2014 State Occupational Employment and Wage Estimates North Carolina. http://www.bls.gov/oes/current/oes_nc.htm#45-0000.
[2] United States Department of Labor Bureau of Labor Statistics. Employer Costs for Employee Compensation- March 2016. http://www.bls.gov/news.release/pdf/ecec.pdf.

I, it is estimated that one NCDMF Marine Biologist I spends approximately 135 hours per season collecting and monitoring spiny dogfish landings from permit-holders. This total is based on one hour per work day (five days per week) for 26 weeks (130 hours), plus five additional hours per year for verification of data with the National Oceanic and Atmospheric Administration Fisheries. Assuming the midpoint wage of a Marine Biologist I with benefits included of $32.69 per hour[3], it is estimated that the opportunity cost of the spiny dogfish dealer permit to NCDMF is approximately $4,413 per year. The total opportunity cost for the spiny dogfish dealer permit requirement for both permit-holders and NCDMF combined is a range from $13,487-$22,561 annually.

The spiny dogfish fishery is a high volume fishery due to the low price per pound fishermen receive (approximately $0.10/pound). Accordingly, reporting requirements apply only to large-volume harvests. There is no incentive for fishermen to harvest spiny dogfish for personal use or in small quantities for sale and the proposed rule change will not affect fishermen's harvesting behavior. Limiting reporting requirements to large-volume harvests is sufficient for the accurate monitoring and management of the species.

IV. Benefits

The rule change aids in the tracking and reporting of commercial landings in the spiny dogfish fishery in North Carolina. This tracking allows managers to monitor compliance with federal spiny dogfish quotas and prevents landing over the quota, which would require reduced landings in future years to offset any overages. Avoiding landing over the quota contributes to a healthy and sustainable spiny dogfish population. Complying with the annual quota set forth by the Atlantic States Marine Fisheries Commission enables North Carolina to participate in the spiny dogfish fishery. The commercial landings value for spiny dogfish was $302,248 in 2013; $566,615 in 2014; and $553,926 in 2015, yielding an average of $474,263 annually.[4] By placing the requirement for dealers to hold and comply with the Spiny Dogfish Dealer Permit, commercial fishermen can land spiny dogfish in North Carolina, creating approximately $500,000 of benefits annually to the state.

Also, approximately four of the 33 dealers who held a permit in 2015 participated in the spiny dogfish research set-aside of up to 500 pounds per day (which still counts toward the quota). The fish can be sold to research companies who in turn sell the specimens to universities for use by students training to become biologists. Spiny dogfish specimens are robust enough to withstand the process of being preserved for this purpose. This adds a qualitative benefit to the rule change by allowing for harvest of spiny dogfish for research purposes; however, since there is no requirement for dealers to report for what amount these fish are sold, no quantitative values are available.

[3] Hourly compensation estimates based on the midpoint of the salary range for the relevant position as published in the *State of North Carolina Salary Plan* effective July 1, 2014 (http://s3.amazonaws.com/oshr.ncgovstaging.fayze2.com/s3fs-public/migrated_files/Guide/CompWebSite/2014%20Salary%20Plan%20Book.pdf) and the Employee Total Compensation Calculator on the website of the North Carolina Office of State Human Resources (https://oshr.nc.gov/state-employee-resources/classification-compensation/total-compensation-calculator). The total-compensation calculations assume five years of service in state government for relevant employees working a 2080-hour work year.

[4] Division of Marine Fisheries data, retrieved from http://portal.ncdenr.org/web/mf/statistics/comstat/dogfishSP

Finally, the rule changes aid in the clarity of fishing regulations to the public by moving a long-standing proclamation into rule.

V. Economic Impact Summary

Proposed rule changes pertaining to spiny dogfish dealer permits are expected to have a combined annual cost and benefit of $518,024. This will not meet the impact threshold of $1 million in aggregate costs and benefits to be considered rule changes with a substantial economic impact. The proposed rule changes will generate net benefits of $418,976 annually.

Table 1: Aggregate and Net Economic Impact Summary

	Annual Impact
Costs	
State Government	$(4,413)
Private Sector	$(13,611); midpoint of range $9,074-$18,148
Benefits	
State Government	$ -
Private Sector	$ 500,000 +R +C*
Aggregate Impact	$ 518,024 +R +C*
Net Impact	$ 481,976 +R +C*

* R and C represent the unquantified benefit of the value of spiny dogfish harvested for research and the unquantified benefit of improving the clarity of regulations for the public.

Appendix: Proposed Amendments

15A NCAC 03O .0503 PERMIT CONDITIONS; SPECIFIC

(a) Horseshoe Crab Biomedical Use Permit:

(1) It is unlawful to use horseshoe crabs for biomedical purposes without first obtaining a permit.

(2) It is unlawful for persons who have been issued a Horseshoe Crab Biomedical Use Permit to fail to submit a report on the use of horseshoe crabs to the Division of Marine Fisheries due on February 1 of each year. Such reports shall be filed on forms provided by the Division and shall include a monthly account of the number of crabs harvested, statement of percent mortality up to the point of release, and a certification that harvested horseshoe crabs are solely used by the biomedical facility and not for other purposes.

(3) It is unlawful for persons who have been issued a Horseshoe Crab Biomedical Use Permit to fail to comply with the Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe Crab. The Atlantic States Marine Fisheries Commission Interstate Fishery Management Plan for Horseshoe Crab is incorporated by reference including subsequent amendments and editions. Copies of this plan are available via the Internet from the Atlantic States Marine Fisheries Commission at http://www.asmfc.org/fisheries-management/program-overview and at the Division of Marine Fisheries, P.O. Box 769, 3441 Arendell St., Morehead City, North Carolina 28557 at no cost.

(b) Dealers Permits for Monitoring Fisheries under a Quota/Allocation:

(1) During the commercial season opened by proclamation or rule for the fishery for which a Dealers Permit for Monitoring Fisheries under a Quota/Allocation permit is issued, it is unlawful for the fish dealers issued such permit to fail to:

(A) fax or send via electronic mail by noon daily, on forms provided by the Division, the previous day's landings for the permitted fishery to the dealer contact designated on the permit. Landings for Fridays or Saturdays shall be submitted on the following Monday. If the dealer is unable to fax or electronic mail the required information, the permittee shall call in the previous day's landings to the dealer contact designated on the permit, but shall maintain a log furnished by the Division;

(B) submit the required log to the Division upon request or no later than five days after the close of the season for the fishery permitted;

(C) maintain faxes and other related documentation in accordance with 15A NCAC 03I .0114;

(D) contact the dealer contact designated on the permit daily regardless of whether or not a transaction for the fishery for which a dealer is permitted occurred; and

(E) record the permanent dealer identification number on the bill of lading or receipt for each transaction or shipment from the permitted fishery.

(2) Striped Bass Dealer Permit:

(A) It is unlawful for a fish dealer to possess, buy, sell, or offer for sale striped bass taken from the following areas without first obtaining a Striped Bass Dealer Permit validated for the applicable harvest area:

(i) Atlantic Ocean;

(ii) Albemarle Sound Management Area as designated in 15A NCAC 03R .0201; and

(iii) the Joint and Coastal Fishing Waters of the Central/Southern Management Area as designated in 15A NCAC 03R .0201.

(B) No permittee shall possess, buy, sell, or offer for sale striped bass taken from the harvest areas opened by proclamation without having a North Carolina Division of Marine Fisheries issued valid tag for the applicable area affixed through the mouth and gill cover, or, in the case of striped bass imported from other states, a similar tag that is issued for striped bass in the state of origin. North Carolina Division of Marine Fisheries striped bass tags shall not be bought, sold, offered for sale, or transferred. Tags shall be obtained at the North Carolina Division of Marine Fisheries Offices. The Division of Marine Fisheries shall specify the quantity of tags to be issued based on historical striped bass landings. It is unlawful for the permittee to fail to surrender unused tags to the Division upon request.

(3) Albemarle Sound Management Area for River Herring Dealer Permit: It is unlawful to possess, buy, sell, or offer for sale river herring taken from the following area without first obtaining an

Albemarle Sound Management Area for River Herring Dealer Permit: Albemarle Sound Management Area for River Herring as defined in 15A NCAC 03R .0202.

(4) Atlantic Ocean Flounder Dealer Permit:

(A) It is unlawful for a fish dealer to allow vessels holding a valid License to Land Flounder from the Atlantic Ocean to land more than 100 pounds of flounder from a single transaction at their licensed location during the open season without first obtaining an Atlantic Ocean Flounder Dealer Permit. The licensed location shall be specified on the Atlantic Ocean Flounder Dealer Permit and only one location per permit shall be allowed.

(B) It is unlawful for a fish dealer to possess, buy, sell, or offer for sale more than 100 pounds of flounder from a single transaction from the Atlantic Ocean without first obtaining an Atlantic Ocean Flounder Dealer Permit.

(5) Black Sea Bass North of Cape Hatteras Dealer Permit. It is unlawful for a fish dealer to purchase or possess more than 100 pounds of black sea bass taken from the Atlantic Ocean north of Cape Hatteras (35° 15.0321' N) per day per commercial fishing operation during the open season unless the dealer has a Black Sea Bass North of Cape Hatteras Dealer Permit.

(6) Spiny Dogfish Dealer Permit. It is unlawful for a fish dealer to purchase or possess more than 100 pounds of spiny dogfish per day per commercial fishing operation unless the dealer has a Spiny Dogfish Dealer Permit.

(c) Blue Crab Shedding Permit: It is unlawful to possess more than 50 blue crabs in a shedding operation without first obtaining a Blue Crab Shedding Permit from the Division of Marine Fisheries.

(d) Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean:

(1) It is unlawful to trawl for shrimp in the Atlantic Ocean without Turtle Excluder Devices installed in trawls within one nautical mile of the shore from Browns Inlet (34° 35.7000' N latitude) to Rich's Inlet (34° 17.6000' N latitude) without a valid Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean when allowed by proclamation from April 1 through November 30.

(2) It is unlawful to tow for more than 55 minutes from April 1 through October 31 and 75 minutes from November 1 through November 30 in the area described in Subparagraph (d)(1) of this Rule when working under this permit. Tow time begins when the doors enter the water and ends when the doors exit the water.

(3) It is unlawful to fail to empty the contents of each net at the end of each tow.

(4) It is unlawful to refuse to take observers upon request by the Division of Marine Fisheries or the National Marine Fisheries Service.

(5) It is unlawful to fail to report any sea turtle captured. Reports shall be made within 24 hours of the capture to the Marine Patrol Communications Center by phone. All turtles taken incidental to trawling shall be handled and resuscitated in accordance with requirements specified in 50 CFR Code of Federal Regulations (CFR) 223.206. ~~This federal rule is incorporated by reference including subsequent amendments and editions. Copies of this rule~~ are available via the ~~Code of Federal Regulations posted on the~~ Internet at ~~http://~~www.~~gpoaccess~~.gov~~/cfr/index.html~~ and at the Division of Marine Fisheries, ~~P.O. Box 769, Morehead City, North Carolina 28557 at no cost.~~ 50 CFR 223.206 (2002) is hereby incorporated by reference. A copy of the reference materials can be found at http://www.ecfr.gov/cgi-bin/text-idx?SID=9088932317c242b91d6a87a47b6bda54&mc=true&tpl=/ecfrbrowse/Title50/50tab_02.tpl , free of charge. A copy of the CFR in effect on the date of this rule can be found at http://portal.ncdenr.org/web/mf/rules-and-regulations, free of charge.

(e) Pound Net Set Permits. Rule 15A NCAC 03J .0505 sets forth the specific conditions for pound net set permits.

(f) Aquaculture Operations/Collection Permits:

(1) It is unlawful to conduct aquaculture operations utilizing marine and estuarine resources without first securing an Aquaculture Operation Permit from the Fisheries Director.

(2) It is unlawful:

(A) to take marine and estuarine resources from Coastal Fishing Waters for aquaculture purposes without first obtaining an Aquaculture Collection Permit from the Fisheries Director.

(B) to sell, or use for any purpose not related to North Carolina aquaculture, marine and estuarine resources taken under an Aquaculture Collection Permit.

(C) to fail to submit to the Fisheries Director an annual report due on December 1 of each year on the form provided by the Division the amount and disposition of marine and estuarine resources collected under authority of this permit.

(3) Lawfully permitted shellfish relaying activities authorized by 15A NCAC 03K .0103 and .0104 are exempt from requirements to have an Aquaculture Operation or Collection Permit issued by the Fisheries Director.

(4) Aquaculture Operations/Collection Permits shall be issued or renewed on a calendar year basis.

(5) It is unlawful to fail to provide the Division of Marine Fisheries with a listing of all designees acting under an Aquaculture Collection Permit at the time of application.

(g) Scientific or Educational Activity Permit:

(1) It is unlawful for institutions or agencies seeking exemptions from license, rule, proclamation, or statutory requirements to collect, hold, culture, or exhibit for scientific or educational purposes any marine or estuarine species without first obtaining a Scientific or Educational Activity Permit.

(2) The Scientific or Educational Activity Permit shall only be issued for scientific or educational purposes and for collection methods and possession allowances approved by the Division of Marine Fisheries.

(3) The Scientific or Educational Activity Permit shall only be issued for approved activities conducted by or under the direction of Scientific or Educational institutions as defined in Rule 15A NCAC 03I .0101.

(4) It is unlawful for the responsible party issued a Scientific or Educational Activity Permit to fail to submit a report on collections and, if authorized, sales to the Division of Marine Fisheries due on December 1 of each year unless otherwise specified on the permit. The reports shall be filed on forms provided by the Division. Scientific or Educational Activity permits shall be issued on a calendar year basis.

(5) It is unlawful to sell marine or estuarine species taken under a Scientific or Educational Activity Permit without:

(A) the required license(s) for such sale;

(B) authorization stated on the permit for such sale; and

(C) providing the information required in Rule 15A NCAC 03I .0114 if the sale is to a licensed fish dealer.

(6) It is unlawful to fail to provide the Division of Marine Fisheries a listing of all designees acting under a Scientific or Educational Activity Permit at the time of application.

(7) The permittee or designees utilizing the permit shall call the Division of Marine Fisheries Communications Center at 800-682-2632 or 252-726-7021 not later than 24 hours prior to use of the permit, specifying activities and location.

(h) Under Dock Oyster Culture Permit:

(1) It is unlawful to cultivate oysters in containers under docks for personal consumption without first obtaining an Under Dock Oyster Culture Permit.

(2) An Under Dock Oyster Culture Permit shall be issued only in accordance with provisions set forth in G.S. 113-210(c).

(3) The applicant shall complete and submit an examination, with a minimum of 70 percent correct answers, based on an educational package provided by the Division of Marine Fisheries pursuant to G.S. 113-210(j). The examination demonstrates the applicant's knowledge of:

(A) the application process;

(B) permit criteria;

(C) basic oyster biology and culture techniques;

(D) shellfish harvest area closures due to pollution;

(E) safe handling practices;

(F) permit conditions; and

(G) permit revocation criteria.

(4) Action by an Under Dock Oyster Culture Permit holder to encroach on or usurp the legal rights of the public to access public trust resources in Coastal Fishing Waters shall result in permit revocation.

(i) Atlantic Ocean Striped Bass Commercial Gear Permit:

(1) It is unlawful to take striped bass from the Atlantic Ocean in a commercial fishing operation without first obtaining an Atlantic Ocean Striped Bass Commercial Gear Permit.

(2) It is unlawful to use a single Standard Commercial Fishing License, including assignments, to obtain more than one Atlantic Ocean Striped Bass Commercial Gear Permit during a license year.

(j) Coastal Recreational Fishing License Exemption Permit:

(1) It is unlawful for the responsible party seeking exemption from recreational fishing license requirements for eligible individuals to conduct an organized fishing event held in Joint or Coastal Fishing Waters without first obtaining a Coastal Recreational Fishing License Exemption Permit.

(2) The Coastal Recreational Fishing License Exemption Permit shall only be issued for recreational fishing activity conducted solely for the participation and benefit of one of the following groups of eligible individuals:

(A) individuals with physical or mental limitations;

(B) members of the United States Armed Forces and their dependents, upon presentation of a valid military identification card, for military appreciation;

(C) individuals receiving instruction on recreational fishing techniques and conservation practices from employees of state or federal marine or estuarine resource management agencies, or instructors affiliated with educational institutions; and

(D) disadvantaged youths.

For purposes of this Paragraph, educational institutions include high schools and other secondary educational institutions.

(3) The Coastal Recreational Fishing License Exemption Permit is valid for the date(s), time, and physical location of the organized fishing event for which the exemption is granted and the time period shall not exceed one year from the date of issuance.

(4) The Coastal Recreational Fishing License Exemption Permit shall only be issued when all of the following, in addition to the information required in 15A NCAC 03O .0501, is submitted to the Fisheries Director in writing a minimum of 30 days prior to the event:

(A) the name, date(s), time, and physical location of the event;

(B) documentation that substantiates local, state, or federal involvement in the organized fishing event, if applicable;

(C) the cost or requirements, if any, for an individual to participate in the event; and

(D) an estimate of the number of participants.

Authority G.S. 113-134; 113-169.1; 113-169.3; 113-182; 113-210; 143B-289.52

FISCAL NOTE FOR INCREASING PENALTIES FOR CONVICTIONS OF LARCENY OR DAMAGE OF FISHING GEAR

Rule Amendments: 15A NCAC 03O .0114 SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact:
Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
3441 Arendell Street
Morehead City, NC 28557
(252) 808-8014
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Impact Summary:

State government:	Yes
Local government:	No
Private impact:	Yes
Substantial impact:	No

Authority: G.S. 14-72. Larceny of property; receiving stolen goods or possessing stolen goods; 113-168.1. General provisions governing licenses and endorsements; 113-171. Suspension, revocation, and reissuance of licenses; 113-268. Injuring, destroying, stealing, or stealing from nets, seines, buoys, pots, etc.; 15A NCAC 03O .0114. Suspension, revocation and reissuance of licenses.

Necessity: Proposed rule amendments to 15A NCAC 03O .0114 provide an appropriate penalty against a licensee for convictions of G.S. 14-72 (Larceny of property; receiving stolen goods or possessing stolen goods when related to fishing gear) or G.S. 113-268 (Injuring, destroying, stealing or stealing from nets, seines, buoys, pots, etc.) to serve as a deterrent to theft of fishing gear, vandalism to fishing gear, and theft of fish from fishing gear. These rule changes are consistent with penalties granted under other similar marine fisheries laws and are intended to reduce theft of gear or fish and intentional damage to gear which has become an increasing problem.

I. Summary

There has been an increase in the theft or larceny of commercial fishing gear, especially in the northeastern region of the state. Current Marine Fisheries Commission rules do not authorize suspensions or revocations of licenses under rule 15A NCAC 03O .0114 (SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES) for convictions of property crimes under G.S. 14-72 (Larceny of property; receiving stolen goods or possessing stolen goods) when related to fishing gear. Violations that fall under G.S. 113-268 (Injuring, destroying, stealing, or stealing from nets, seines, buoys, pots, etc.) will only lead to a suspension or revocation if the defendant has certain prior Marine Fisheries convictions on his/her record. Amendments to 15A NCAC 03O .0114 are being proposed to add convictions of these statutes to the list of convictions that fall under this rule to allow license suspension or revocation in a timely manner as a more effective deterrent to individuals stealing or intentionally destroying fishing gear and/or stealing a fisherman's catch. The anticipated effective date of the proposed rule changes is May 1, 2017.

II. Introduction and Purpose of Rule Changes

For the past several years, the N.C. Marine Patrol has investigated an increasing number of crimes related to the larceny of commercial gear. Most of these crimes pertain to the larceny of crab pots, but in some cases, larcenies of gill nets, hoop nets, and fish pots have occurred and been investigated as well. In addition, crimes have been investigated for the stealing of fish from pots, gill nets, pound nets, and other gear. The investigations of these crimes often involve significant time and resources, including execution of search warrants, transport and storage of evidence, arrests, and multiple court appearances for the officers. These investigations pull Marine Patrol officers away from their core mission of protecting marine resources, to a sub-mission of protecting personal property.

While investigating these crimes, officers often receive complaints from victims and other fishermen that if a person is convicted of stealing, the Division of Marine Fisheries (division) will not suspend or revoke the defendant's license that was issued by the division. These individuals often want to see a license revocation occur for these convictions so that the violators are immediately unauthorized to participate in fishing activities and others may be disincentivized from committing a similar crime again. The division cannot suspend or revoke a fisherman's license when the fisherman is only accused of a crime (not convicted) and even for certain convictions, such as for general property crimes (e.g., stealing a bicycle or a lawn mower), the division does not have the authority to suspend a fishing-related license.

The ability to suspend or revoke a license is an important tool to discourage potential violators from stealing or intentionally damaging fishing gear and/or stealing catch. Current Marine Fisheries Commission rules do not authorize suspensions or revocations of licenses under rule 15A NCAC 03O .0114 (SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES) for convictions of property crimes under G.S. 14-72 (Larceny of property; receiving stolen goods or possessing stolen goods) when related to fishing gear. Convictions under G.S. 113-268 (Injuring, destroying, stealing, or stealing from nets, seines, buoys, pots, etc.) will only lead to a suspension or revocation if the defendant has multiple prior Marine Fisheries convictions on his/her record within a three-year timeframe. Amendments to 15A NCAC 03O .0114 are being proposed to add convictions of these statutes to the list of convictions that fall under this rule to allow license suspension or revocation in a timelier manner to serve as a more effective deterrent to individuals stealing or intentionally destroying fishing gear and/or stealing catch. Under this rule change, a violator shall have their fishing license revoked for a period no less than one year upon a single conviction of G.S. 14-72 or 113-268. In simple terms, a suspension is when a license is taken away from a license holder for a certain amount of time. At the end of the timeframe, the license is returned to the license holder and he/she can continue to use the license. A revocation is when a license is taken away from the license holder forever; however, the former license holder may, after a specified time (usually one year), petition the director of the division to reinstate the license. There is no guarantee the license will be reinstated; it is solely in the director's discretion.

From 2013 through 2015, the division only revoked an average of five fishing licenses per year. Because of the lack of authority, none of these revocations were for convictions of G.S. 14-72; none were for convictions of G.S. 113-268 due to the lack of multiple convictions within a three-year period. The theft of gear or fish or intentional damage to gear often goes undetected and unreported to law enforcement. One reason for this is that fishing gear is often left unattended in the isolated and remote waters of the state where it is vulnerable to theft. In these areas, there is no one around to see the offense being committed; thefts often occur at night. Another reason is that theft in small amounts may not alarm a fisherman. Factors such as winds, tides,

and currents, or damage from passing boats, limbs/logs, and other debris can cause small losses of gear or fish that fishermen expect in normal operations. So, if someone is stealing small amounts of gear or fish, it would not necessarily "set off an alarm" with a fisherman. This practice of stealing a little here or there from a fisherman has been referred to as "plucking" by the fishing community. "Plucking" is hard to catch and goes unreported in most cases. Despite the overall small number of license revocations, the legitimate potential consequence of license revocation for someone considering committing the crime of stealing gear or fish or intentional damage to gear (after the rule change) will serve as a deterrent to committing the crime, a change legitimate fishermen support. Even when multiple offenses of laws are combined into a plea agreement, which minimizes the consequences intended to serve as a deterrent, convictions of the above-referenced statutes would still result in license revocation. This would ensure a meaningful conviction, potentially reducing the number of crimes of theft of gear or fish or intentional damage to gear.

III. Costs

Costs to Convicted Violators

Under the proposed rule changes, violators who are convicted under G.S. 14-72 or 113-268 will have their fishing licenses revoked. In doing so, commercial fishing license holders or for-hire captains will lose their ability to make income from fishing activities. Recreational fishing license holders will lose their ability to legally catch and harvest marine and estuarine finfish. The extent to which this cost will be realized will be highly variable among individuals.

The number of revocations that will be issued for these crimes is unknown. An average of five licenses are currently revoked each year, but the number of revocations that will occur as a result of this rule change is uncertain because current revocations are for crimes other than the theft of gear or fish or intentional damage to gear. Therefore, the number of fishermen who may have their licenses revoked cannot be quantified due to uncertainty.

Costs to Deterred Violators

Given that offenders have standing in society and any impact on this population is included in the calculation of overall social welfare, individuals who are deterred from stealing gear or fish or intentionally damaging gear due to the rule change will incur the cost associated with foregoing the crime. The crime is a transfer from owners to offenders. The cost of deterred crime to would-be violators is calculated as the sum of the value of the goods that would have been stolen less any reduction in the value of those goods (sales value may be less for stolen goods). This impact cannot be quantified because the behavioral response to the new penalties and thus the number of thefts or incidences of damaged gear that will be deterred by the rule change is uncertain.

Costs to the State

Assuming the same number of license revocations as the recent annual average of five were to result from convictions of theft of gear or fish or intentional damage to gear under the rule change, and assuming all five licenses were the state license with the highest cost, the Standard Commercial Fishing License at $400/year, the state impact would be $2,000 in the initial year from loss of license renewal fees. This estimate is highly uncertain.

Enforcement processes will not change and the number of revocations are assumed to be low. Therefore, the rule change will not create any new administrative costs to the state. The impact could be variable in following years depending on if a former license holder petitioned for a license

to be reinstated, the outcome of the petition, or in the absence of a petition, other factors that may have caused the fisherman to not renew the license for various other reasons.

IV. Benefits

The proposed rule changes are expected to enhance the property rights of fishermen by providing a better deterrent to stealing or intentionally destroying their fishing gear and/or stealing their catch. Fishermen can have tens of thousands of dollars in catch and gear left in water that could potentially be stolen or damaged, so any reduction in stolen or damaged gear or catch would be highly beneficial to the lawful owners. The potential revocation of licenses for those convicted of stealing gear or fish or intentional damage to gear is anticipated to decrease the occurrences of theft and damaged gear. The change in the number of thefts and the value of the deterred thefts cannot be quantified due to uncertainty about the behavioral response to the new penalties. Additionally, should the proposed rule changes effectively reduce incidences of stolen or damaged gear or catch, the N.C. Marine Patrol would be able to better fulfill its core mission of protecting marine resources and enforcing marine fisheries laws.

V. Comprehensive Statement of Costs and Benefits

Amendments to 15A NCAC 03O .0114 would add convictions for theft of gear or fish and intentional damage to gear under G.S. 14-72 and 113-268 that may result in revocation of fishing licenses to implement stronger deterrents to committing these crimes. The proposed rule changes will benefit fishermen by discouraging theft of their gear and fish and damage to their gear. There would be an estimated cost to the state of $2,000 in the initial year for foregone license renewal fees. These costs and benefits will not meet the threshold of $1 million in aggregate costs and benefits to be considered rule changes with a substantial economic impact.

Appendix 1: Proposed Rule Changes

15A NCAC 03O .0114 SUSPENSION, REVOCATION AND REISSUANCE OF LICENSES

(a) All commercial and recreational licenses issued under Article 14A, Article 14B, and Article 25A of Chapter 113 are subject to suspension and revocation.

(b) A conviction resulting from being charged by an inspector under G.S. 14-32, ~~14-33 or~~ 14-33, 14-72 or 14-399 shall be deemed a conviction for license suspension or revocation purposes.

(c) Upon receipt of notice of a licensee's conviction as specified in G.S. 113-171 or a conviction as specified in Paragraph (b) of this Rule, the Fisheries Director shall determine whether it is a first, a second, a third or a fourth or subsequent conviction. Where several convictions result from a single transaction or occurrence, the convictions shall be treated as a single conviction so far as suspension or revocation of the licenses of a licensee is concerned. For a second conviction, the Fisheries Director shall suspend all licenses issued to the licensee for a period of 30 days; for a third conviction, the Fisheries Director shall suspend all licenses issued to the licensee for a period of 90 days; for a fourth or subsequent conviction, the Fisheries Director shall revoke all licenses issued to the licensee, except:

(1) For a felony conviction under G.S. 14-399, the Fisheries Director shall suspend all licenses issued to the licensee for a period of one year;

(2) For a first conviction under G.S. 113-187(d)(1), the Fisheries Director shall suspend all licenses issued to the licensee for a period of one year; for a second or subsequent conviction under G.S. 113-187(d)(1), the Fisheries Director shall revoke all licenses issued to the licensee;

(3) For a conviction under G.S. ~~113-209,~~ 14-72, 113-209 or 113-268 the Fisheries Director shall revoke all licenses issued to the licensee; and

(4) For a conviction under G.S. 14-32 or 14-33, when the offense was committed against a marine fisheries inspector the Fisheries Director shall revoke all licenses issued to the licensee; the former licensee shall not be eligible to apply for reinstatement of a revoked license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 for a period of two years.

(d) After the Fisheries Director determines a conviction requires a suspension or revocation of the licenses of a licensee, the Fisheries Director shall cause the licensee to be served with written notice of suspension or revocation. The written notice may be served upon any responsible individual affiliated with the corporation, partnership, or association where the licensee is not an individual. The notice of suspension or revocation shall be served by an inspector or other agent of the Department or by certified mail, must state the ground upon which it is based, and takes effect immediately upon service. The agent of the Fisheries Director making service shall then or subsequently, as may be feasible under the circumstances, collect all license certificates and plates and other forms or records relating to the license as directed by the Fisheries Director.

(e) Where a license has been suspended, the former licensee shall not be eligible to apply for reissuance of license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 during the suspension period. Licenses shall be returned to the licensee by the Fisheries Director or the Director's agents at the end of a period of suspension.

(f) Where a license has been revoked, the former licensee shall not be eligible to apply for reinstatement of a revoked license or for any additional license authorized in Article 14A, Article 14B and Article 25A of Chapter 113 for a period of one year, except as provided in Paragraph (c)(4) of this Rule. For a request for reinstatement following revocation, the eligible former licensee shall satisfy the Fisheries Director that the licensee will strive in the future to conduct the operations for which the license is sought in accord with all applicable laws and rules by sending a request for reinstatement in writing to the Fisheries Director, Division of Marine Fisheries, P.O. Box 769, Morehead City, North Carolina 28557. Upon the application of an eligible former licensee after revocation, the Fisheries Director may issue one license sought but not another, as deemed necessary to prevent the hazard of recurring violations of the law.

(g) A licensee shall not willfully evade the service prescribed in this Rule.

Authority G.S. 113-168.1; 113-171; S.L. 2010-145

Appendix 2: Referenced Statues

G.S. 14-72. Larceny of property; receiving stolen goods or possessing stolen goods.

(a) Larceny of goods of the value of more than one thousand dollars ($1,000) is a Class H felony. The receiving or possessing of stolen goods of the value of more than one thousand dollars ($1,000) while knowing or having reasonable grounds to believe that the goods are stolen is a Class H felony. Larceny as provided in subsection (b) of this section is a Class H felony. Receiving or possession of stolen goods as provided in subsection (c) of this section is a Class H felony. Except as provided in subsections (b) and (c) of this section, larceny of property, or the receiving or possession of stolen goods knowing or having reasonable grounds to believe them to be stolen, where the value of the property or goods is not more than one thousand dollars ($1,000), is a Class 1 misdemeanor. In all cases of doubt, the jury shall, in the verdict, fix the value of the property stolen.

(b) The crime of larceny is a felony, without regard to the value of the property in question, if the larceny is any of the following:

(1) From the person.

(2) Committed pursuant to a violation of G.S. 14-51, 14-53, 14-54, 14-54.1, or 14-57.

(3) Of any explosive or incendiary device or substance. As used in this section, the phrase "explosive or incendiary device or substance" shall include any explosive or incendiary grenade or bomb; any dynamite, blasting powder, nitroglycerin, TNT, or other high explosive; or any device, ingredient for such device, or type or quantity of substance primarily useful for large-scale destruction of property by explosive or incendiary action or lethal injury to persons by explosive or incendiary action. This definition shall not include fireworks; or any form, type, or quantity of gasoline, butane gas, natural gas, or any other substance having explosive or incendiary properties but serving a legitimate nondestructive or nonlethal use in the form, type, or quantity stolen.

(4) Of any firearm. As used in this section, the term "firearm" shall include any instrument used in the propulsion of a shot, shell or bullet by the action of gunpowder or any other explosive substance within it. A "firearm," which at the time of theft is not capable of being fired, shall be included within this definition if it can be made to work. This definition shall not include air rifles or air pistols.

(5) Of any record or paper in the custody of the North Carolina State Archives as defined by G.S. 121-2(7) and G.S. 121-2(8).

(6) Committed after the defendant has been convicted in this State or in another jurisdiction for any offense of larceny under this section, or any offense deemed or punishable as larceny under this section, or of any substantially similar offense in any other jurisdiction, regardless of whether the prior convictions were misdemeanors, felonies, or a combination thereof, at least four times. A conviction shall not be included in the four prior convictions required under this subdivision unless the defendant was represented by counsel or waived counsel at first appearance or otherwise prior to trial or plea. If a person is convicted of more than one offense of misdemeanor larceny in a single session of district court, or in a single week of superior court or of a court in another jurisdiction, only one of the convictions may be used as a prior conviction under this subdivision; except that convictions based upon offenses which occurred in separate counties shall each count as a separate prior conviction under this subdivision.

(c) The crime of possessing stolen goods knowing or having reasonable grounds to believe them to be stolen in the circumstances described in subsection (b) is a felony or the crime of receiving stolen goods knowing or having reasonable grounds to believe them to be stolen in the circumstances described in subsection (b) is a felony, without regard to the value of the property in question.

(d) Where the larceny or receiving or possession of stolen goods as described in subsection (a) of this section involves the merchandise of any store, a merchant, a merchant's agent, a merchant's employee, or a peace officer who detains or causes the arrest of any person shall not be held civilly liable for detention, malicious prosecution, false imprisonment, or false arrest of the person detained or arrested, when such detention is upon the premises of the store or in a reasonable proximity thereto, is in a reasonable manner for a reasonable length of time, and, if in detaining or in causing the arrest of such person, the merchant, the merchant's agent, the merchant's employee, or the peace officer had, at the time of the detention or arrest, probable cause to believe that the person committed an offense under subsection (a) of this section. If the person being detained by the merchant, the merchant's agent, or the merchant's employee, is a minor under the age of 18 years, the merchant, the merchant's agent, or the merchant's employee, shall call or notify, or make a reasonable effort to call or notify the parent or guardian of the minor, during the period of

detention. A merchant, a merchant's agent, or a merchant's employee, who makes a reasonable effort to call or notify the parent or guardian of the minor shall not be held civilly liable for failing to notify the parent or guardian of the minor. (1895, c. 285; Rev., s. 3506; 1913, c. 118, s. 1; C.S., s. 4251; 1941, c. 178, s. 1; 1949, c. 145, s. 2; 1959, c. 1285; 1961, c. 39, s. 1; 1965, c. 621, s. 5; 1969, c. 522, s. 2; 1973, c. 238, ss. 1, 2; 1975, c. 163, s. 2; c. 696, s. 4; 1977, c. 978, ss. 2, 3; 1979, c. 408, s. 1; c. 760, s. 5; 1979, 2nd Sess., c. 1316, ss. 11, 47; 1981, c. 63, s. 1; c. 179, s. 14; 1991, c. 523, s. 2; 1993, c. 539, s. 34; 1994, Ex. Sess., c. 24, s. 14(c); 1995, c. 185, s. 2; 2006-259, s. 4(a); 2012-154, s. 1.)

G.S. 113-268. Injuring, destroying, stealing, or stealing from nets, seines, buoys, pots, etc.

(a) It is unlawful for any person without the authority of the owner of the equipment to take fish from nets, traps, pots, and other devices to catch fish which have been lawfully placed in the open waters of the State.

(b) It is unlawful for any master or other person having the management or control of a vessel in the navigable waters of the State to willfully, wantonly, and unnecessarily do injury to any seine, net or pot which may lawfully be hauled, set, or fixed in such waters for the purpose of taking fish except that a net set across a channel may be temporarily moved to accommodate persons engaged in drift netting, provided that no fish are removed and no damage is done to the net moved.

(c) It is unlawful for any person to willfully steal, destroy, or injure any buoys, markers, stakes, nets, pots, or other devices on property lawfully set out in the open waters of the State in connection with any fishing or fishery.

(d) Violation of subsections (a), (b), or (c) is a Class A1 misdemeanor.

(e) The Department may, either before or after the institution of any other action or proceeding authorized by this section, institute a civil action for injunctive relief to restrain a violation or threatened violation of subsections (a), (b), or (c) of this section pursuant to G.S. 113-131. The action shall be brought in the superior court of the county in which the violation or threatened violation is occurring or about to occur and shall be in the name of the State upon the relation of the Secretary. The court, in issuing any final order in any action brought pursuant to this subsection may, in its discretion, award costs of litigation including reasonable attorney and expert-witness fees to any party. (1987, c. 636, s. 1; 1989, c. 727, s. 112; 1993, c. 539, s. 849; 1994, Ex. Sess., c. 24, s. 14(c); 1998-225, s. 3.9.)

REGULATORY IMPACT ANALYSIS OF PROPOSED AMENDMENTS TO RULE 15A NCAC 03R .0103

CORRECTION OF WADE CREEK PRIMARY NURSERY AREA BOUNDARY LINE

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
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Impact Summary: *De minimis* rule change
State Government: No
Local Government: No
Private Impact: No
Substantial Impact: No

Authority: G.S. 113-134 (Rules); G.S. 113-182 (Regulation of Fishing and Fisheries); G.S. 113-187 (Penalties for Violations of Subchapter and Rules) G.S. 143B-289.52 (Marine Fisheries Commission-Powers and Duties); 15 NCAC 03R .0103 (Primary Nursery Areas)

Necessity: The proposed rule changes seek to correct a set of coordinates delineating the primary nursery area boundary in Wade Creek, which is a tributary of Jarrett Bay in Carteret County, North Carolina. An error occurred in 2004 when the format of the coordinates was converted, setting the boundary line for the primary nursery area further inland than the original delineation. It is in the best interest of both the general public and law enforcement agencies that the N.C. Administrative Code contains correct coordinate references that reflect actual Division of Marine Fisheries (DMF) operations. Additionally, this correction satisfies statutory requirements for rulemaking principles as set forth in G.S. 150B-19.1, which is part of the Administrative Procedure Act.

I. Summary

The primary purpose of the rule changes is to correct a set of coordinates delineating the primary nursery area boundary in Wade Creek. The current coordinates do not accurately represent the intended and enforced boundary for the primary nursery area within the creek. Thus, the proposed rule changes seek to correct the coordinates to accurately reflect the intended location. The proposed effective date of these rule changes is May 1, 2017.

II. Introduction and Purpose of Rule Change

Nursery areas are an important component of the DMF mission to “ensure sustainable marine and estuarine fisheries and habitats for the benefit and health of the people of North Carolina” (cite home page of DMF site in footnote). Nursery areas are equally important in enabling the Marine Fisheries Commission’s (MFC) to manage, protect, preserve, and enhance the marine

and estuarine resources within its jurisdiction (G.S. 143B-289.52.) Per MFC rule 15A NCAC 03I .0101(4)(f), primary nursery areas are "those areas in the estuarine system where initial post-larval development takes place. These are areas where populations are uniformly early juveniles." Several MFC rules designate these areas and protect these areas by restricting certain fishing gears and fishing activities. In addition, G.S. 113-187 outlines the penalty for not abiding by these restrictions in primary nursery areas. These regulations contribute to the overall health of North Carolina fisheries. Several MFC rules designate and protect these important areas, to include restricting the use of certain fishing gears and activities. In addition, G.S. 113-187 provides the penalty for not abiding by these restrictions in primary nursery areas. These regulations contribute to the overall health of the state's fisheries.

All primary nursery area boundaries, including Wade Creek, can be found in 15A NCAC 03R .0103. Wade Creek is a tributary of Jarrett Bay, in Carteret County, North Carolina. Wade Creek was designated as a primary nursery area by rule in 1977 as part of the original primary nursery rule designations. Primary nursery areas, in accordance with other supporting rules, means that it is unlawful to use trawl nets, long haul seines, swipe nets, dredges, or mechanical methods for clamming or oystering in Wade Creek. In general, these restrictions help to protect juvenile fish to allow them to mature, migrate, and eventually spawn and contribute to achieving healthy fisheries. Also, nursery areas may be recognized by the Environmental Management Commission for enhanced water quality standards, or by the Coastal Resources Commission for more protective coastal development standards. Primary nursery areas, in particular are considered High Quality Waters for the purpose of water quality standards, and have dredging restrictions by both commissions.

Recently, a marine patrol officer noted a discrepancy in the boundaries of the Wade Creek primary nursery area. The coordinates in rule do not align with the placement of the primary nursery area signs or the primary nursery area map provided by the Geographic Information System (GIS) department of the N.C. Department of Environmental Quality. Research into this issue revealed that the error most likely occurred during coordinate conversions codified in the 2004 rule amendment. All coordinates were originally in degrees/minutes/seconds format and converted to decimal degrees with four decimal places. The conversions were part of a project to update boundary lines and physically check boundary lines to ensure accuracy. The resulting conversions were codified in 2004 and the Wade Creek primary nursery area coordinate error went unnoticed since then.

No documentation can be found indicating that the coordinates were meant to be substantively changed through the rulemaking process. Available historical DMF nursery area maps as well as proclamation maps delineating areas closed to shrimping before and after 2004 demarcate the Wade Creek primary nursery area with the same original boundaries and reveal no changes despite the unintended coordinates included as part of the rule change in 2004. Therefore, for practical purposes, the line has always been at the mouth of Wade Creek and correcting the coordinates will constitute no change in the intention of the rule or current enforcement practices.

The proposed rule change is being put forward to correct the rule to align the coordinates for the Wade Creek primary nursery area to their historical placement, only adjusting for improved GIS accuracy (see Appendix 2). This will cover approximately 20 acres of the creek, ensuring that the primary nursery area is properly protected in the rule and the coordinates accurately reflect management of the area. Additionally, G.S. 150B-19.1, part of the Administrative Procedure Act, sets forth the principles of rulemaking. These principles state that rules shall be written in a clear and unambiguous manner and that rules shall be based on sound, reasonably available scientific,

technical, and other relevant information. Correcting the error in rule will comply with these statutory requirements for rulemaking.

III. Costs

There are minor costs associated with the proposed rule changes, as the changes reflect current management practices. There have been no know fishing activities or proposed alternations in the area of focus that would change the activity currently occurring should the primary nursery area boundary be corrected. There may be some loss of future benefits if fishing or other activities in this area were to take place that are prohibited in primary nursery areas, but these losses are expected to be minimal given the relatively small area and no know current interest in such activities.

IV. Benefits

While there are no quantifiable economic benefits to the proposed rule change, both the general public and law enforcement agencies will benefit from the coordinates listed in rule representing the intended boundary of the primary nursery area in Wade Creek.

Appendix 1: Proposed Rule Changes

15A NCAC 03R .0103 PRIMARY NURSERY AREAS

The primary nursery areas referenced in 15A NCAC 03N .0104 are delineated in the following coastal water areas:

(1) In the Roanoke Sound Area:

(a) Shallowbag Bay:

. . .

(10) Core Sound Area:

(a) Cedar Island Bay - northwest of a line beginning on the northeast shore at a point 34° 59.7770' N - 76° 17.3837' W; running southwesterly to the southwest shore to a point 34° 59.0100' N - 76° 17.9339' W;

(b) Lewis Creek - north of a line beginning on the west shore at a point 34° 56.8736' N - 76° 16.8740' W; running easterly to the east shore to a point 34° 56.9455' N - 76° 16.8234' W;

(c) Thorofare Bay:

(i) Merkle Hammock Creek - southwest of a line beginning on the northwest shore at a point 34° 55.4796' N - 76° 21.4463' W; running southeasterly to the southeast shore to a point 34° 55.3915' N - 76° 21.1682' W; and

(ii) Barry Bay - west of a line beginning on the north shore at a point 34° 54.6450' N - 76° 20.6127' W; running southerly to the south shore to a point 34° 54.4386' N - 76° 20.4912' W;

(d) Nelson Bay:

(i) Willis Creek and Fulchers Creek - west of a line beginning on the north shore of Willis Creek at a point 34° 51.1006' N - 76° 24.5996' W; running southerly to the south shore of Fulchers Creek to a point 34° 50.2861' N - 76° 24.8708' W; and

(ii) Lewis Creek - west of a line beginning on the north shore at a point 34° 51.9362' N - 76° 24.6322' W; running southerly to the south shore to a point 34° 51.7323' N - 76° 24.6487' W;

(e) Cedar Creek between Sea Level and Atlantic - west of a line beginning on the north shore at a point 34° 52.0126' N - 76° 22.7046' W; running southerly to the south shore to a point 34° 51.9902' N - 76° 22.7190' W;

(f) Oyster Creek, northwest of the Highway 70 Bridge; and

(g) Jarrett Bay Area:

(i) Smyrna Creek - northwest of the Highway 70 Bridge;

(ii) Ditch Cove and adjacent tributary - east of a line beginning on the north shore at a point 34° 48.0167' N - 76° 28.4674' W; running southerly to the south shore to a point 34° 47.6143' N - 76° 28.6473' W;

(iii) Broad Creek - northwest of a line beginning on the west shore at a point 34° 47.7820' N - 76° 29.2724' W; running northeasterly to the east shore to a point 34° 47.9766' N - 76° 28.9729' W;

(iv) Howland Creek - northwest of a line beginning on the northeast shore at a point 34° 47.5129' N - 76° 29.6217' W; running southwesterly to the southwest shore to a point 34° 47.3372' N - 76° 29.8607' W;

(v) Great Creek - southeast of a line beginning on the northeast shore at a point 34° 47.4279' N - 76° 28.9565' W; running southwesterly to the southwest shore to a point 34° 47.1515' N - 76° 29.2077' W;

(vi) Williston Creek - northwest of the Highway 70 Bridge;

(vii) Wade Creek - west of a line beginning on the north shore at a point ~~34° 46.3022' N - 76° 30.5443' W;~~ 34° 46.3125' N - 76° 30.2676' W; running southerly to the south shore to a point ~~34° 46.2250' N - 76° 30.3864' W;~~ 34° 46.1915' N - 76° 30.3593' W;

(viii) Jump Run - north of a line beginning on the west shore at a point 34° 45.5385' N - 76° 30.3974' W; running easterly to the east shore to a point 34° 45.5468' N - 76° 30.3485' W;

(ix) Middens Creek - west of a line beginning on the north shore at a point 34° 45.5046' N - 76° 30.9710' W; running southerly to the south shore to a point 34° 45.4093' N - 76° 30.9584' W;

(x) Tusk Creek - northwest of a line beginning on the northwest shore at a point 34° 44.8049' N - 76° 30.6248' W; running southerly to the south shore to a point 34° 44.6074' N - 76° 30.7553' W; and

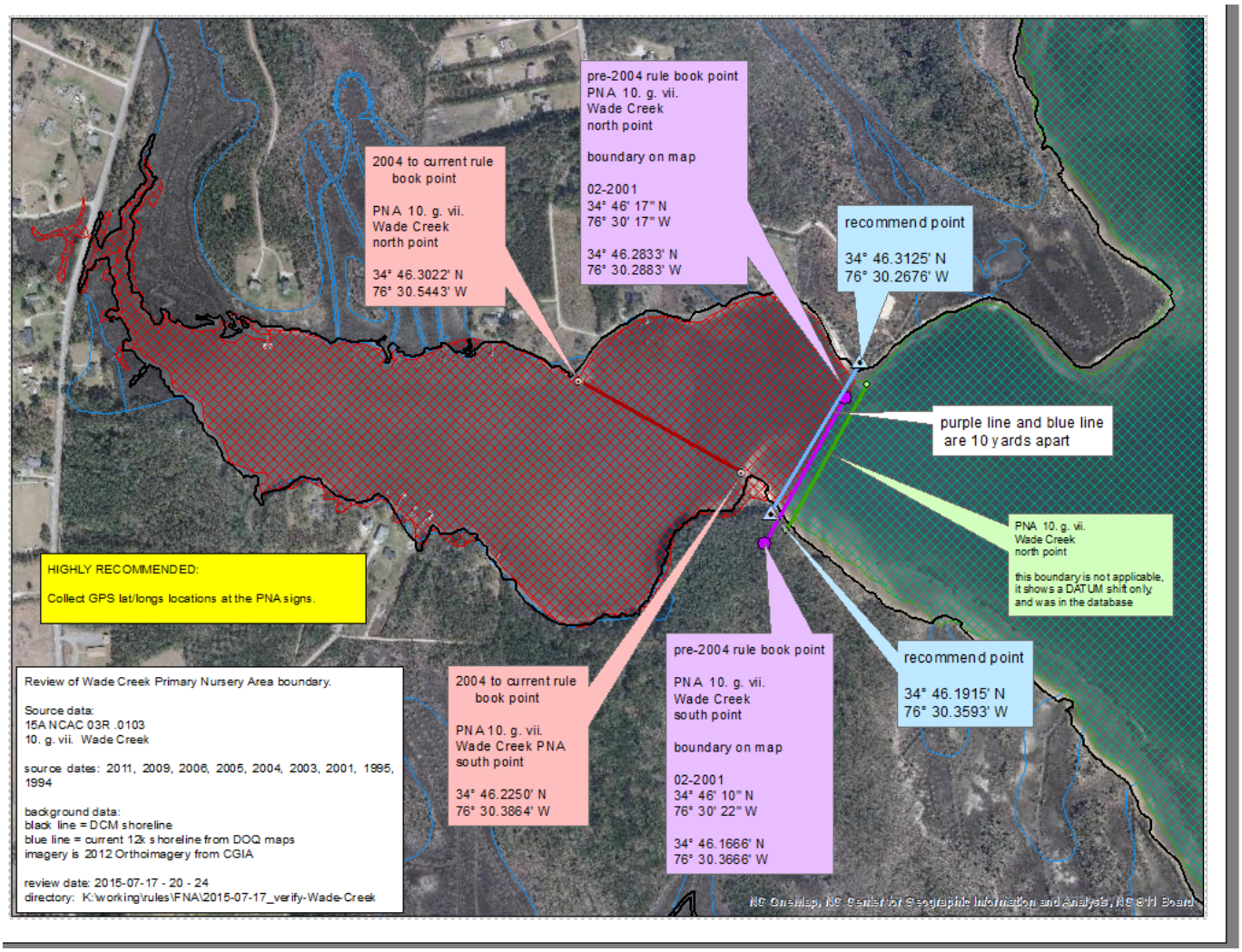
(xi) Creek west of Bells Island - west of a line beginning on the north shore at a point 34° 43.9531' N - 76° 30.4144' W; running southerly to the south shore to a point 34° 43.7825' N - 76° 30.3543' W;

(11) Straits, North River, Newport River Area:

. . .

Authority G.S. 113-134; 113-182; 143B-289.52;

Appendix 2: Map of Wade Creek Boundary



FISCAL NOTE OF PROPOSED RULE AMENDMENTS TO 15A NCAC 03O .0501

LICENSE REQUIREMENTS FOR LEASEHOLDER DESIGNEES

Name of Commission: N.C. Marine Fisheries Commission

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Impact Summary: State Government: Yes
Local Government: No
Private Impact: Yes
Substantial Impact: No

Authority: North Carolina Session Laws 2013-360, Section 14.8 (g); 2015-241, Section 14.10B. G.S. 113-134 (Rules); 113-169.1. (Permits for gear, equipment, and other specialized activities authorized); 113-169.2. (Shellfish license for North Carolina residents without a SCFL); 113-182 (Regulation of Fishing and Fisheries); 113-201 (Legislative findings and declaration of policy; authority of Marine Fisheries Commission); 113-201.1 (Definitions); 143B-289.52 (Marine Fisheries Commission – powers and duties); 15A NCAC 03K .0111 Permits to use mechanical methods for shellfish on shellfish leases or franchises; 03O .0501 Procedures and requirements to obtain permits

Necessity: Proposed rule amendments clarify the requirement to hold a Standard or Retired Standard Commercial Fishing License with a shellfish endorsement to obtain a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises in accordance with Session Laws 2013-360 and 2015-241. Additional proposed amendments provide an exemption from license requirements for certain designees of the holder of a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises in accordance with G.S. 113-169.2.

I. Summary

The proposed rule amendments seek to align rule with the requirements of Session Law 2015-241 that included a provision for employees of a leaseholder with a Standard Commercial Fishing License (SCFL) to harvest shellfish from a lease by mechanical means without a license. This legislation created a discrepancy between G.S. 113-169.2 and Marine Fisheries Commission (NCMFC) Rule 15A NCAC 03O .0501 (c)(3). Upon review of this issue, staff only now discovered an earlier discrepancy had resulted when Session Law 2013-360 made a SCFL a requirement to harvest shellfish by mechanical means. Thus, a discrepancy has existed between G.S. 113-169.2 and NCMFC Rule 15A NCAC 03O .0501 (c)(3) since 2013. Both of these issues are addressed in the proposed amendments. The proposed effective date of this rule is May 1, 2017.

II. Introduction and Purpose of Rule Change

According to G.S. 113-201, the General Assembly finds that shellfish cultivation provides increased seafood production, economic and employment opportunities, and increased ecological benefits to the estuarine environment by promoting natural water filtration and increased fishery habitats. Shellfish are defined in G.S. 113-201.1 as oysters, clams, scallops, mussels or any other species of mollusks that the NCMFC determines suitable for cultivation, harvesting, and marketing from public grounds or private beds. The Division of Marine Fisheries (NCDMF) administers the Shellfish Lease and Franchise program to provide for private use of public trust waters for the commercial production of shellfish. Staff works with potential leaseholders and franchise holders to ensure leaseholders and franchise holders and other individuals working on those private shellfish beds are properly licensed and/or permitted to take shellfish.

Shellfish can be harvested from a lease or franchise by either hand methods or mechanical methods. Hand methods include harvesting by hand, hand rake, or hand tongs. Mechanical methods for clamming defined in 15A NCAC 03I .0101(3)(l) include dredges, hydraulic clam dredges, stick rakes, and other rakes when towed by engine power, patent tongs, kicking with propeller or deflector plates with or without trawls and any other method that utilizes mechanical means to harvest clams. Mechanical methods for oystering defined in 15A NCAC 03I .0101(3)(m) include dredges, patent tongs, stick rakes, and other rakes when towed by engine power, and any other method that utilizes mechanical means to harvest oysters.

G.S. 113-169.2 provides the license requirements for harvesting shellfish from public and private grounds. Section 14.8.(g) of Session Law 2013-360 amended this statute and specified different license requirements for hand and mechanical harvest. Prior to this, the license requirements were the same for either method. Individuals taking shellfish from leases or franchises (private grounds) by hand methods were required to hold a Shellfish License or a SCFL with a shellfish endorsement. In between Session Law 2013-360 and Session Law 2015-241, any individual taking shellfish from leases or franchises by mechanical methods was required to obtain a SCFL. Section 14.10B of Session Law 2015-241 further amended G.S. 113-169.2 and provides that the employees of a leaseholder holding a valid SCFL are exempt from mechanical methods licensing requirements (see Appendix 2).

One additional requirement for the mechanical harvest of shellfish from private grounds is contained in NCMFC Rule 15A NCAC 03K .0111. This rule states that it is unlawful to harvest shellfish by the use of mechanical methods from shellfish leases or franchises without first obtaining a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases and Franchises. As provided in 15A NCAC 03O .0501 (c)(3), a requirement to hold this permit is that the permittee and his designees shall hold a valid SCFL or Retired SCFL with a shellfish endorsement or a Shellfish License. When Session Law 2013-360 was passed it created a discrepancy with this rule since an individual who takes shellfish by mechanical means must obtain a SCFL, thus making a Shellfish License insufficient to obtain a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases and Franchises. Also, as written in 15A NCAC 03O .0501 (c)(3), the permittee and his designees shall hold a valid SCFL or Retired SCFL with a shellfish endorsement or a Shellfish License. The term “designee” is defined in 15A NCAC 03I .0101 (5)(b) as any person who is under the direct control of the permittee or who is employed by or under direct contract to the permittee for the purposes authorized by the permit. When Session Law 2015-241 was passed, Section 14.10B created a discrepancy between G.S. 113-169.2 and 15A NCAC 03O

.0501 (c)(3) because employees of leaseholders with a SCFL are now exempt from holding a license by statute, yet the license requirement remains in rule.

As mentioned, NCMFC Rule 15A NCAC 03O .0501 contains procedures and requirements to obtain permits. Paragraph (c)(3) of this Rule requires the holder of a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises and his designees to hold a valid SCFL or Retired SCFL with a shellfish endorsement or a Shellfish License. However, since 2013, G.S. 113-169.2 (a1) required any individual who takes shellfish by mechanical means to obtain a SCFL. G.S. 113-169.2 (i) now provides an exemption from license requirements for the employees of leaseholders holding a valid SCFL. These contradictions could create confusion for the regulated public in trying to determine what, if any, license they are required to hold to harvest shellfish from a lease. These issues also create confusion for Shellfish Lease and Franchise Program staff for how to advise leaseholders as to license requirements. Issuing a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises to an individual with a Shellfish License as allowed under NCMFC rule would contradict statutory requirements. Adhering to NCMFC rule requirements for designees of permittees would result in a more burdensome interpretation of who is required to be issued a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises to mechanically harvest shellfish from leases or franchises. Since license requirements are unclear as currently written, it could create problems for Marine Patrol officers from an enforcement standpoint as well.

The proposed rule amendments (see Appendix 1) align with state statute as modified by Session Law 2013-360 and Session Law 2015-241. Specifically, these amendments align 15A NCAC 03O .0501 with changes to G.S. 113-169.2 (a1) from Session Law 2013-360, by removing rule language granting the ability of Shellfish License holders to obtain a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises since a SCFL or Retired SCFL is required in order to obtain this permit. In order to address the changes to G.S. 113-169.2 (i) from Session Law 2015-241, rule amendments provide that a license exemption only applies as specified in statute; G.S. 113-169.2 provides the exemption to employees using mechanical methods to harvest shellfish for a leaseholder with a SCFL.

III. Costs

Costs to the Private Sector

In the private sector, Shellfish License holders who wish to harvest by mechanical means and not merely work as a designee of someone else's lease will incur the cost of obtaining a SCFL with a shellfish endorsement in order to be eligible to obtain a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises. From 2007-2012 (prior to the 2013 statute change), there was an average of six individuals that held only a Shellfish License (not a SCFL with a shellfish endorsement) with the Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises (free). Any individual that purchased a SCFL ($400/year) with shellfish endorsement (free) instead of the Shellfish License ($50/year), would pay a difference of $350 each year ($400 – $50). The cost for all six individuals would collectively be $2,100. This is a high estimate, because the example assumes the individual would meet the requirements to obtain a SCFL and be interested in paying the higher fee. It also assumes the individual did not benefit from the designee exemption established in 2015 providing the opportunity for them to work a lease holder's lease without holding any fishing license or permit.

Costs to the State

Theoretically, there could be loss of revenue to the state from foregone sales of SCFLs with a shellfish endorsement due to the designee exemption (2015 statute change). In reality, someone who holds a SCFL who is working a lease holder's lease initially obtained the SCFL for other purposes that will likely continue. Working a lease holder's lease is simply a way to earn additional income to offset the seasonal nature of various fisheries in which a SCFL holder otherwise participates. Additionally, there is no way to verify if a former SCFL holder chose to not renew their license due to the designee exemption or any number of other reasons. In the case of a Shellfish License, the designee exemption allows leaseholders to hire staff to work their lease without those employees having to hold a SCFL with a shellfish endorsement, Shellfish License, Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises, or any other kind of fishing license or permit. From 2007-2012 (prior to the 2013 statute change), there was an average of six individuals that held only a Shellfish License (not a SCFL with a shellfish endorsement) with the Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises. Even if all six individuals opted to forego their Shellfish License and worked as a lease designee without any type of license, the cost to the state in foregone license fees would only be $300 per year (6 x $50).

A complicating factor regarding participation in various fisheries and corresponding license sales are increases in license fees that the General Assembly incrementally implemented in fiscal years 2014-2015 and 2015-2016 (Table 1). [Note that shellfish leases operate on a calendar year statutorily. Also, the Retired Standard Commercial Fishing License (RSCFL) is half the cost of the SCFL; however, the number of RSCFL participants in the lease program are minimal, so for this analysis the higher figures are used as if all applicable participants held a SCFL, not an RSCFL.] These increased fees likely contributed to overall attrition in commercial fisheries. Sales for fiscal year 2013-2014 resulted in 6,685 commercial fishing licenses; for fiscal year 2014-2015 there were 6,635 commercial fishing licenses sold and for fiscal year 2015-2016 there were 6,465 commercial fishing license sold. Records do not track if a participant opted to not renew their license due to increased fees, changing statutory requirements, or personal or other reasons.

Table 1. Annual Standard Commercial Fishing License and Shellfish License fees, 2014-2017.

License Type	2013-2014 Fee	2014-2015 Fee	2015-2016 Fee	2016-2017 Fee
Standard Commercial Fishing	$200	$250	$400	$400
Shellfish	$25	$31.25	$50	$50

Finally, because the designee change was not made in statute until September 2015 and by that time in the calendar year, lease renewals and corresponding issuance of licenses and permits had already occurred for the 2015 lease (calendar) year, there has not yet been a full lease year to determine the number of participants who changed their level of or mechanism to participate in lease activities since the 2015 statute change. Since 2007, the highest number of SCFLs that also had a Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises was 33 (2012). Even if every SCFL was not renewed, with the current license costs this would be an unrealistically high estimate of $13,200 (33 x $400) in foregone license fees for the state. It is not practical to assume that every SCFL would not be renewed so that the SCFL holder could merely work someone else's lease under the lease designee exemption; this estimate is provided only to show this does not approach the substantial economic impact threshold.

IV. Benefits

It is in the interest and benefit of the regulated public and state government that rules properly align with state statutes for regulatory certainty and consistent enforcement. The proposed rule changes accomplish this by bringing the rule in line with current state statutes.

Benefits to the Private Sector

Proposed rule amendments referring to the license exemption for designees provided in G.S. 113-169.2 allows leaseholders to hire staff to work their lease without those employees having to hold a SCFL with a shellfish endorsement, Shellfish License, Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises, or any other kind of fishing license or permit. This provides flexibility to the leaseholder to hire the help they need to meet planting and production requirements for the lease. This also provides employment opportunities to the potential employees. The benefit of this cannot be quantified due to multiple variable factors such as number of employees hired, number of hours that employees worked, and amount employees were paid, all of which are determined at the discretion of the leaseholder. The leaseholder is only obligated to inform the NCDMF of who the designees (employees) are that are working the lease.

Benefits to the State

There are indirect benefits to the state from the flexibility provided to leaseholders via the license exemption in G.S. 113-169.2 to hire employees to work their lease. Without the constraints of licensure, lease holders have the ability to hire the staff they need to meet planting and production requirements for the lease. Meeting these requirements contributes to the broad benefits of shellfish cultivation from increased seafood production, economic and employment opportunities, and increased ecological benefits to the estuarine environment by promoting natural water filtration and increased fishery habitats. The extent to which this indirect benefit will be realized is highly variable; however, it should be acknowledged.

There could be a minor benefit to the state from increased sales of SCFLs with a shellfish endorsement for those who wish to continue using mechanical means to harvest shellfish from a lease or franchise. This is because Shellfish License holders are no longer eligible to use those gears; a SCFL with a shellfish endorsement is required. But, from 2007-2012 (prior to the 2013 statute change), there was an average of six individuals that held only a Shellfish License (not a SCFL with a shellfish endorsement) with the Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or Franchises (free). Even if all six individuals purchased a SCFL ($400/year) with a shellfish endorsement (free) instead of the Shellfish License ($50/year), the state would only gain $2,100 per year ([6 x $400] – [6 x $50]). This is a high estimate, because the example assumes all six individuals would meet the requirements to obtain a SCFL and be interested in paying the higher fee. It also assumes none of the six individuals benefitted from the designee exemption established in 2015 providing the opportunity for them to work a lease holder's lease without holding any fishing license or permit.

V. Comprehensive Statement of Costs and Benefits

The costs and benefits to the proposed rule changes will have an aggregate impact of $4,500 per year and a net impact of $300 per year plus unquantified costs and benefits (see Table 2). These costs and benefits will not meet the threshold of $1 million in aggregate costs and benefits to be considered rule changes with a substantial economic impact.

Table 2. Summary of Estimated Economic Impact.

	FY2017	FY2018
Costs		
Private	(2,100)	(2,100)
State	(300) -C	(300) -C
Benefits		
Private	+B	+B
State	(2,100) +B	(2,100) +B
Net Impact	(300) -C +B	(300) -C +B

"C" and "B" represent unquantified costs or benefits. Please refer to the discussion of the relevant rule change for more details. Neither the unquantified costs nor the unquantified benefits are expected to be substantial (>$1M), either individually or in total.

Appendix 1: Proposed Rule Changes

15A NCAC 03O .0501 PROCEDURES AND REQUIREMENTS TO OBTAIN PERMITS

(a) To obtain any Marine Fisheries permit, the following information is required for proper application from the applicant, a responsible party, or person holding a power of attorney:

(1) Full name, physical address, mailing address, date of birth, and signature of the applicant on the application. If the applicant is not appearing before a license agent or the designated Division contact, the applicant's signature on the application shall be notarized;

(2) Current picture identification of applicant, responsible party, or person holding a power of attorney. Acceptable forms of picture identification are driver's license, North Carolina Identification card issued by the North Carolina Division of Motor Vehicles, military identification card, resident alien card (green card), or passport; or if applying by mail, a copy thereof;

(3) Full names and dates of birth of designees of the applicant who will be acting under the requested permit where that type permit requires listing of designees;

(4) Certification that the applicant and his designees do not have four or more marine or estuarine resource convictions during the previous three years;

(5) For permit applications from business entities:

(A) Business Name;

(B) Type of Business Entity: Corporation, partnership, or sole proprietorship;

(C) Name, address, and phone number of responsible party and other identifying information required by this Subchapter or rules related to a specific permit;

(D) For a corporation, current articles of incorporation and a current list of corporate officers when applying for a permit in a corporate name;

(E) For a partnership, if the partnership is established by a written partnership agreement, a current copy of such agreement shall be provided when applying for a permit; and

(F) For business entities, other than corporations, copies of current assumed name statements if filed and copies of current business privilege tax certificates, if applicable; and

(6) Additional information as required for specific permits.

(b) A permittee shall hold a valid Standard or Retired Standard Commercial Fishing License in order to hold a:

(1) Pound Net Permit;

(2) Permit to Waive the Requirement to Use Turtle Excluder Devices in the Atlantic Ocean; or

(3) Atlantic Ocean Striped Bass Commercial Gear Permit.

(c) ~~A~~ When mechanical methods to take shellfish are used, a permittee and his designees shall hold a valid Standard or Retired Standard Commercial Fishing License with a Shellfish Endorsement ~~or a Shellfish License~~ in order for a permittee to hold a:

(1) Permit to Transplant Prohibited (Polluted) Shellfish;

(2) Permit to Transplant Oysters from Seed Oyster Management Areas;

(3) Permit to Use Mechanical Methods for Shellfish on Shellfish Leases or ~~Franchises;~~ Franchises, except as provided in G.S. 113-169.2;

(4) Permit to Harvest Rangia Clams from Prohibited (Polluted) Areas; or

(5) Depuration Permit.

(d) When mechanical methods to take shellfish are not used, a permittee and his designees shall hold a valid Standard or Retired Standard Commercial Fishing License with a Shellfish Endorsement or a Shellfish License in order for a permittee to hold a:

(1) Permit to Transplant Prohibited (Polluted) Shellfish;

(2) Permit to Transplant Oysters from Seed Oyster Management Areas;

(3) Permit to Harvest Rangia Clams from Prohibited (Polluted) Areas; or

(4) Depuration Permit.

~~(d)~~(e) A permittee shall hold a valid:

(1) Fish Dealer License in the proper category in order to hold Dealer Permits for Monitoring Fisheries Under a Quota/Allocation for that category; and

(2) Standard Commercial Fishing License with a Shellfish Endorsement, Retired Standard Commercial Fishing License with a Shellfish Endorsement or a Shellfish License in order to harvest clams or oysters for depuration.

~~(e)~~(f) Aquaculture Operations/Collection Permits:

(1) A permittee shall hold a valid Aquaculture Operation Permit issued by the Fisheries Director to hold an Aquaculture Collection Permit.

(2) The permittee or designees shall hold appropriate licenses from the Division of Marine Fisheries for the species harvested and the gear used under the Aquaculture Collection Permit.

~~(f)~~(g) Atlantic Ocean Striped Bass Commercial Gear Permit:

(1) Upon application for an Atlantic Ocean Striped Bass Commercial Gear Permit, a person shall declare one of the following gears for an initial permit and at intervals of three consecutive license years thereafter:

(A) gill net;

(B) trawl; or

(C) beach seine.

For the purpose of this Rule, a "beach seine" is defined as a swipe net constructed of multi-filament or multi-fiber webbing fished from the ocean beach that is deployed from a vessel launched from the ocean beach where the fishing operation takes place.

Gear declarations shall be binding on the permittee for three consecutive license years without regard to subsequent annual permit issuance.

(2) A person is not eligible for more than one Atlantic Ocean Striped Bass Commercial Gear Permit regardless of the number of Standard Commercial Fishing Licenses, Retired Standard Commercial Fishing Licenses or assignments held by the person.

~~(g)~~(h) Applications submitted without complete and required information shall not be processed until all required information has been submitted. Incomplete applications shall be returned to the applicant with deficiency in the application so noted.

~~(h)~~(i) A permit shall be issued only after the application has been deemed complete by the Division of Marine Fisheries and the applicant certifies to abide by the permit general and specific conditions established under 15A NCAC 03J .0501, .0505, 03K .0103, .0104, .0107, .0111, .0401, 03O .0502, and .0503 as applicable to the requested permit.

~~(i)~~(j) The Fisheries Director, or his agent may evaluate the following in determining whether to issue, modify, or renew a permit:

(1) Potential threats to public health or marine and estuarine resources regulated by the Marine Fisheries Commission;

(2) Applicant's demonstration of a valid justification for the permit and a showing of responsibility as determined by the Fisheries Director; and

(3) Applicant's history of habitual fisheries violations evidenced by eight or more violations in 10 years.

~~(j)~~(k) The Division of Marine Fisheries shall notify the applicant in writing of the denial or modification of any permit request and the reasons therefor. The applicant may submit further information, or reasons why the permit should not be denied or modified.

~~(k)~~(l) Permits are valid from the date of issuance through the expiration date printed on the permit. Unless otherwise established by rule, the Fisheries Director may establish the issuance timeframe for specific types and categories of permits based on season, calendar year, or other period based upon the nature of the activity permitted, the duration of the activity, compliance with federal or state fishery management plans or implementing rules, conflicts with other fisheries or gear usage, or seasons for the species involved. The expiration date shall be specified on the permit.

~~(l)~~(m) For permit renewals, the permittee's signature on the application shall certify all information as true and accurate. Notarization of signature on renewal applications shall not be required.

~~(m)~~(n) For initial or renewal permits, processing time for permits may be up to 30 days unless otherwise specified in this Chapter.

~~(n)~~(o) It is unlawful for a permit holder to fail to notify the Division of Marine Fisheries within 30 days of a change of name or address, in accordance with G.S. 113-169.2.

~~(o)~~(p) It is unlawful for a permit holder to fail to notify the Division of Marine Fisheries of a change of designee prior to use of the permit by that designee.

~~(p)~~(q) Permit applications are available at all Division Offices.

Authority G.S. 113-134; 113-169.1; 113-169.2; 113-169.3; 113-182; 113-210; 143B-289.52;

Appendix 2: Referenced Session Laws

[NOTE: The following excerpt of Session Law 2013-360 is provided for informational purposes only.]

"**§ 113-169.2. Shellfish license for North Carolina residents without a SCFL.**
(a) License or Endorsement Necessary to Take or Sell ~~Shellfish.~~Shellfish Taken by Hand Methods. – It is unlawful for an individual to take shellfish from the public or private grounds of the State ~~by mechanical means or~~ as part of a commercial fishing operation by ~~any means~~hand methods without holding either a shellfish license or a shellfish endorsement of a SCFL. A North Carolina resident who seeks only to take shellfish by hand methods and sell such shellfish shall be eligible to obtain a shellfish license without holding a SCFL. The shellfish license authorizes the licensee to sell shellfish.
(a1) License Necessary to Take or Sell Shellfish Taken by Mechanical Means. – Subject to subsection (i) of this section, an individual who takes shellfish from the public or private grounds of the State by mechanical means must obtain an SCFL under the provisions of G.S. 113-168.2.
(b) Repealed by Session Laws 1998-225, s. 4.17, effective July 1, 1999.
(c) Fees. – Shellfish licenses issued under this section shall be issued annually upon payment of a fee of ~~twenty-five dollars ($25.00)~~thirty-one dollars and twenty-five cents ($31.25) upon proof that the license applicant is a North Carolina resident.
(d) License Available for Inspection. – It is unlawful for any individual to take shellfish as part of a commercial fishing operation from the public or private grounds of the State without having ready at hand for inspection a current and valid shellfish license issued to the licensee personally and bearing the licensee's correct name and address. It is unlawful for any individual taking or possessing freshly taken shellfish to refuse to exhibit the individual's license upon the request of an officer authorized to enforce the fishing laws.
(e) Repealed by Session Laws 1998-225, s. 4.17, effective July 1, 1999.
(f) Name or Address Change. – In the event of a change in name or address or upon receipt of an erroneous shellfish license, the licensee shall, within 30 days, apply for a replacement shellfish license bearing the correct name and address. Upon a showing by the individual that the name or address change occurred within the past 30 days, the trial court or prosecutor shall dismiss any charges brought pursuant to this subsection.
(g) Transfer Prohibited. – It is unlawful for an individual issued a shellfish license to transfer or offer to transfer the license, either temporarily or permanently, to another. It is unlawful for an individual to secure or attempt to secure a shellfish license from a source not authorized by the Commission.
(h) Exemption. – Persons under 16 years of age are exempt from the license requirements of this section if accompanied by a parent, grandparent, or guardian who is in compliance with the requirements of this section or if in possession of a parent's, grandparent's or guardian's shellfish license.
(i) Taking Shellfish Without a License for Personal Use. – Shellfish may be taken without a license for personal use in quantities established by rules of the Marine Fisheries Commission."

[NOTE: The following excerpt of Session Law 2015-241 is provided for informational purposes only.]

"**§ 113-169.2. Shellfish license for North Carolina residents without a SCFL.**
(a) License or Endorsement Necessary to Take or Sell Shellfish Taken by Hand Methods. – It is unlawful for an individual to take shellfish from the public or private grounds of the State as part of a commercial fishing operation by hand methods without holding either a shellfish license or a shellfish endorsement of a SCFL. A North Carolina resident who seeks only to take shellfish by hand methods and sell such shellfish shall be eligible to obtain a shellfish license without holding a SCFL. The shellfish license authorizes the licensee to sell shellfish.

(a1) License Necessary to Take or Sell Shellfish Taken by Mechanical Means. – ~~Subject to~~ Except as provided in subsection (i) of this section, an individual who takes shellfish from the public or private grounds of the State by mechanical means must obtain an SCFL under the provisions of G.S. 113-168.2.

…

(i) Taking Shellfish Without a License for Personal ~~Use.~~Use or as Employee of Certain License Holders. – Shellfish may be taken without a license ~~for~~ under the following circumstances:

(1) For personal use in quantities established by rules of the Marine Fisheries Commission.

(2) When the taking is from an area leased for the cultivation of shellfish under Article 16 of this Chapter by a person who is an employee of a leaseholder holding a valid SCFL issued under the provisions of G.S. 113-168.2, and the person provides an authorization letter with the leaseholder's SCFL number and signature."

FISCAL NOTE FOR PROPOSED RULE AMENDMENTS TO 15A NCAC 03H .0103 AND 03K .0110

MODIFY PROCLAMATION AUTHORITY FOR PROTECTION OF PUBLIC HEALTH

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
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Impact Summary: State Government: No
Local Government: No
Private Impact: Yes
Substantial Impact: No

Authority: G.S. 113-221.1. (Proclamations; emergency review); 113-221.2 (Additional rules to establish sanitation requirement for scallops, shellfish, and crustacea; permits and permit fees authorized)

Necessity: The proposed rule amendments are being requested to more fully address the additional duties and responsibilities of the North Carolina Division of Marine Fisheries (NCDMF) and the North Carolina Marine Fisheries Commission (NCMFC) following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality section of the Division of Environmental Health to NCDMF. Proposed changes also further establish authority for the Fisheries Director to implement requirements of the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish, Section II: Model Ordinance (Model Ordinance) via proclamation. The Model Ordinance establishes minimum requirements that states must meet for the sanitary control of molluscan shellfish.

I. Summary

Proposed amendments add a variable condition for the protection of public health to the list of variable conditions for the use of the Fisheries Director's proclamation authority that is set forth in other rules of the NCFMC; the variable condition is constrained to the public health programs that fall under the authority of the NCMFC. This more comprehensively addresses the authority of the NCMFC following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality section of the Division of Environmental Health to the Division of Marine Fisheries. Additionally, in accordance with the Model Ordinance and to protect public health, proposed amendments provide the authority for the Fisheries Director to set sanitary harvest and handling practices for harvesters and enforce issues relating to the potential contamination of shellfish (oysters, clams, scallops, and mussels) during harvest. The proposed effective date of this rule is May 1, 2017.

II. Introduction and Purpose of Rule Change

The National Shellfish Sanitation Program (NSSP) is a federal/state cooperative program recognized by the U.S. Food and Drug Administration (FDA) and the Interstate Shellfish Sanitation Conference (ISSC) for the sanitary control of shellfish sold and produced for human consumption. In 1984, the FDA entered into a Memorandum of Understanding (MOU) with the ISSC which allows the ISSC to provide a formal structure for state regulatory authorities to participate in establishing continuing updated regulatory guidelines and procedures. The purpose of the NSSP is to promote and improve the sanitation of shellfish moving in interstate commerce through federal/state cooperation and uniformity of state shellfish programs. Participants in the NSSP include agencies from shellfish-producing and non-producing states, the FDA, the U.S. Environmental Protection Agency, the National Oceanic and Atmospheric Administration, MOU countries such as New Zealand, Canada, Mexico and Korea, and the shellfish industry. Through the NSSP and membership in the ISSC, states and MOU countries agree to enforce the NSSP Guide for the Control of Molluscan Shellfish, Section II: Model Ordinance (commonly referred to as the Model Ordinance) as the requirements which are minimally necessary for the sanitary control of molluscan shellfish. This includes all species of raw or frozen oysters, clams, mussels, and scallops, except when the final product form is the adductor muscle only.

Historically, the Shellfish Sanitation Section, working under the Division of Environmental Health, implemented NSSP requirements for classifying growing areas as well as permitting and inspecting certified shellfish dealers. The NCDMF had responsibility for enforcing the harvest of shellfish and opening and closing shellfish waters by proclamation, under authority of the State Health Director and recommendation of the Shellfish Sanitation Section. In July 2011, the Division of Environmental Health was eliminated and the Shellfish Sanitation Section was merged with the NCDMF via Session Law 2011-145.

NCDMF staff, including the Shellfish Sanitation Section, believes this merger strengthens both groups and the close coordination provides a greater level of protection to shellfish consumers. However, during early attempts to begin integrating Commission for Public Health shellfish sanitation rules into NCMFC rules, several common areas have been discovered where existing rules of the two agencies differ enough to create obstacles in effective implementation and enforcement of the more recent NSSP requirements. This primarily stems from the differences between public health-related rules and resource management-related rules. Attempts to combine or re-write rule areas that deal with harvester and dealer requirements have revealed more changes that are needed in other supporting rules. As a result, the full integration of these rules has taken several years to accomplish and is ongoing. During this time, North Carolina risks being in non-compliance with the NSSP's Model Ordinance if recent requirements adopted by the ISSC are not implemented. The FDA annually evaluates compliance with the Model Ordinance standards. Continued non-compliance with the Model Ordinance may result in disciplinary action and possible removal from the FDA's list of Interstate Certified Shellfish Shippers, thereby jeopardizing interstate shipment of all North Carolina shellfish products. This would be highly detrimental to the state's shellfish growers, harvesters, and dealers.

Due to the time required for the permanent rule making process and relatively short implementation deadlines commonly required by the NSSP (often 6 months or less), the most efficient way to address existing and future changes to the Model Ordinance is the use of

proclamation authority by the Fisheries Director. This authority is solely used to implement the minimum requirements adopted by the NSSP for public health protection and is not used for addressing resource or management issues. If specific NSSP requirements are changed, the ability of the Fisheries Director to use this proclamation authority greatly enhances the ability of the state to remain in compliance with the national program. Accommodating needed flexibility is provided for in G.S. 113-221.1(b) which provides the "Marine Fisheries Commission may delegate to the Fisheries Director the authority to issue proclamations suspending or implementing, in whole or in part, particular rules of the Commission that may be affected by *variable* conditions." The flexibility this authority provides is important for many fishery management issues and for this issue in particular because changes occur that are outside the direct control of North Carolina. The NSSP usually allows a period of time for states to come into compliance with new requirements, but for some recent changes this has been as little as six months. Falling into non-compliance forces the state to operate under a corrective plan, monitored by the FDA, and may jeopardize the interstate sale of North Carolina shellfish products.

Chapter VIII of the NSSP Model Ordinance lists the shellfish harvesting requirements for harvesters and the state authority. Specifically, Chapter VIII .02 C (1) requires that "The operator shall assure that all vessels used to harvest and transport shellstock are properly constructed, operated, and maintained to prevent contamination, deterioration, and decomposition of the shellstock." Additional language further details that "Decks and storage bins shall be constructed and located to prevent bilge water or polluted overboard water from coming into contact with the shellstock."

According to the 2015 FDA Program Element Evaluation Report for the Shellfish Control of Harvest, field observations revealed several harvest vessels as being improperly constructed. These vessels lacked false bottoms and/or lacked areas where shellfish could be safely stowed away to prevent contamination from bilge water, gas, and motor oil. The FDA report also noted that a small harvest "vessel had a pet dog on board during harvest activities." Chapter VIII .02 C (2) of the Model Ordinance requires that "Cats, dogs, and other animals shall not be allowed on vessels." This requirement is for the protection of shellstock from pet waste contamination.

According to the FDA report, previous evaluations also expressed concerns over vessel construction and the protection of shellstock from contamination by bilge water, oil, or gas. The FDA recommends that N.C. Marine Patrol have the authority to enforce potential contamination issues related to vessel construction and pets on harvest vessels. N.C. Marine Patrol currently lacks the legal authority to enforce contamination issues related to the harvest of shellfish.

NCMFC Rule 15A NCAC 03K .0110 became effective April 1, 2014. This rule was adopted in order to give the Fisheries Director proclamation authority to implement the minimum state requirements of the NSSP. It was determined that proclamation authority was the most efficient way to address existing and future changes to the Model Ordinance in order to remain in compliance with the national program. This rule only gives the authority to implement the minimum state requirements adopted by the NSSP for public health protection and cannot be used for addressing resource or management issues.

This rule specifies seven components of the shellfish program where restrictions can be imposed in order to protect public health. These include shellfish harvest time and temperature controls, tagging and labeling requirements, and training requirements for shellfish harvesters and dealers, among others. Although Rule 15A NCAC 03K .0110 was adopted to protect public health by

ensuring that shellfish have not been adulterated during harvest (in addition to other areas such as processing, storage and transport), none of the seven components of the rule cover restrictions on harvest practices that may contaminate shellfish as described above. The recommended action to resolve this likely oversight is to amend Rule 15A NCAC 03K .0110 to provide the Fisheries Director the authority to set sanitary harvest and handling practices, as well as enforce issues relating to the contamination of shellfish during harvest. This would allow NCDMF to come back into compliance with the Model Ordinance.

Related to this issue, proposed amendments to Rule 15A NCAC 03H .0103 add the variable condition of "protection of public health related to the public health programs that fall under the authority of the Marine Fisheries Commission" to the list of possible variable conditions required to be in place for the use of the Fisheries Director's proclamation authority that is set forth in other particular rules of the Marine Fisheries Commission. This more comprehensively addresses the authority of the Marine Fisheries Commission following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health to the Division of Marine Fisheries. Additional proposed amendments clarify that the mere presence of a variable condition is not sufficient to "trigger" the use of the Fisheries Director's proclamation authority. The Marine Fisheries Commission must delegate in a particular rule the authority for the Fisheries Director to issue a proclamation. The word "trigger" is proposed to be deleted, placing more emphasis on the existing text that provides the list of possible variable conditions that may be considered *if a variable condition is not otherwise set forth* in a rule of the commission granting proclamation authority to the Fisheries Director [emphasis added].

III. Costs

There were 1,004 North Carolina commercial fishermen that used a vessel to land shellfish in 2015. These individuals are the potential population that may be directly impacted by the amendments to 15A NCAC 03K .0110. While many of the fishery participants have existing devices to prevent bilge contamination, some will need to modify their vessel to adhere to the Model Ordinance protocol. This requirement can be met by creating a "false bottom" using material such as a shipping pallet, which can be acquired at no or very low cost. A piece of plywood with sections of two-inch by four-inch pieces of lumber could be used as well. Materials for the latter option would cost approximately $25. As an upper estimate of material costs to all potentially impacted fishermen, assuming each fisherman would incur $25 in material costs, the total estimated cost of addressing the requirement to prevent bilge contamination is approximately $25,100. N.C. Marine Patrol currently lacks the legal authority to enforce contamination issues related to the harvest of shellfish; however, should authority be obtained by adoption of the rule changes, inspections for contamination issues would occur simultaneously with inspections for other potential violations that currently occur as part of N.C. Marine Patrol officers' routine duties. As a result, no opportunity cost is expected to be realized.

Although measures stemming from the proposed rule will codify proper shellfish handling practices as defined by the NSSP, the extent that these practices will impose costs or go above and beyond common practice is difficult to distinguish. While there have been documented cases of violations of the Model Ordinance in regards to potential contamination of shellfish by bilge water or pet waste, there have been no documented shellfish related food-borne illnesses originating from North Carolina shellfish products according to records of the NCDMF. This suggests general practices among most shellfish harvesters and dealers within the state are likely

rigorous, with a focus on a quality product that is safe for human consumption. Many harvesters are already likely following the protocols to prevent bilge material from coming in contact with harvested shellfish and most likely do not have a pet onboard when fishing, and therefore will not realize any costs from the proposed rule changes and actions mandated by the Model Ordinance.

Costs stemming from the proposed amendments to Rule 15A NCAC 03H .0103 are difficult to quantify. There is potential to incur costs to both the state and private industry, but immediate measures that differ from current management are unlikely to occur. As such, the marginal and total cost of this specific rule change is expected to be minimal.

IV. Benefits

The proposed amendments to NCAC 03K .0110 will allow state harvesters to maintain compliance with federal protocols in shellfish handling and shipment. This will prevent disciplinary measures from being levied for non-compliance of such protocols, thereby not jeopardizing the interstate shipment of North Carolina shellfish products. The rule changes will allow continued access to out of state markets which are vital to the economic viability of the commercial shellfish industry in the state. The rule changes will also yield benefits to public health by continuing to ensure that shellfish are properly handled. Finally, the proposed rule changes will help encourage a higher quality product that may be more marketable and face less chance of discard due to potential contamination.

Proposed amendments to 15A NCAC 03H .0103 will clarify the Fisheries Director's proclamation authority. This more comprehensively specifies the authority of the Marine Fisheries Commission following the adoption of Session Law 2011-145 that transferred the Shellfish Sanitation and Recreational Water Quality Section of the Division of Environmental Health to the Division of Marine Fisheries. Additionally, it allows flexibility in timely implementation of actions to preserve and protect public health.

Appendix 1: Proposed Rule Changes

15A NCAC 03H .0103 ~~PROCLAMATION AUTHORITY OF FISHERIES DIRECTOR~~PROCLAMATIONS, GENERAL

(a) It is unlawful to violate the provisions of any proclamation issued by the authority of Marine Fisheries Commission ~~Rule.~~rule.

(b) ~~Unless~~ If specific variable conditions are not set forth in a rule ~~granting~~ of the Marine Fisheries Commission that grants proclamation authority to the Fisheries Director, possible variable conditions ~~triggering the use of the Fisheries Director's proclamation authority~~ may include any of the following:

(1) compliance with changes mandated by the Fisheries Reform Act and its amendments;
(2) biological impacts;
(3) environmental conditions;
(4) compliance with Fishery Management Plans;
(5) user conflicts;
(6) bycatch issues; ~~and~~
(7) variable spatial ~~distributions.~~distributions; and
(8) protection of public health related to the public health programs that fall under the authority of the Marine Fisheries Commission.

Authority G.S. 113-134; 113-135; 113-182; 113-221.1; 113-221.2; 113-221.3; 143B-289.52;

15A NCAC 03K .0110 PUBLIC HEALTH AND CONTROL OF OYSTERS, CLAMS, ~~SCALLOPS~~ SCALLOPS, AND MUSSELS

~~(a) To protect public health, the Fisheries Director may, by proclamation, impose any or all of the following restrictions on oysters, clams, scallops, and mussels to ensure the sale or distribution of shellfish from approved areas or shellstock dealers as defined in Rule 15A NCAC 18A .0301 and to ensure that shellfish have not been adulterated or mislabeled during cultivation, harvesting, processing, storage and transport, in compliance with the National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance:~~

(a) The National Shellfish Sanitation Program Guide for Control of Molluscan Shellfish, Section II: Model Ordinance (Model Ordinance) includes minimum requirements for the sale or distribution of shellfish from approved areas or shellstock dealers, as defined in 15A NCAC 18A .0301, and to ensure that shellfish have not been adulterated or mislabeled during:

(1) cultivation;
(2) harvesting;
(3) processing;
(4) storage; and
(5) transport.

(b) To protect public health and to address variable conditions of the Model Ordinance, the Fisheries Director may, by proclamation, impose requirements as set forth in Paragraph (c) of this Rule on any of the following:

(1) oysters;
(2) clams;
(3) scallops;
(4) mussels;
(5) areas used to store shellfish;
(6) means and methods to take shellfish;
(7) vessels used to take shellfish; and
(8) shellstock conveyances as defined in 15A NCAC 18A .0301.

(c) Proclamations issued under this Rule may impose any of the following requirements:

(1) specify time and temperature controls;
(2) specify sanitation requirements to prevent a food safety hazard, as defined in 15A NCAC 18A .0301, or cross-contamination or adulteration of shellfish;
~~(2)~~(3) specify sanitation control procedures as specified in 21 Code of Federal Regulations (CFR) Part 123.11;
~~(3)~~(4) specify Hazard Analysis Critical Control Point (HACCP) requirements as specified in 21 CFR Part:
(A) 123.3 Definitions;

(B) 123.6 HACCP Plan;
(C) 123.7 Corrective Actions;
(D) 123.8 Verification;
(E) 123.9 Records; and
(F) 123.28 Source Controls;

~~(4)~~(5) specify tagging and labeling requirements;

~~(5)~~(6) implement the National Shellfish Sanitation Program's training requirements for shellfish harvesters and certified shellfish dealers;

~~(6)~~(7) require sales records and collection and submission of information to provide a mechanism for shellfish product to be traced back to the water body of origin; and

~~(7)~~(8) require implicated product recall and specify recall procedures.

21 CFR 123.3 (2015), 123.6-9 (1997), 123.11 (2015), and 123.28 (1997) are hereby incorporated by reference. A copy of the reference materials can be found at http://www.ecfr.gov/cgi-bin/text-idx?SID=f4cdd666e75f54ccda1d9938f4edd9ab&mc=true&tpl=/ecfrbrowse/Title21/21tab_02.tpl, free of charge. A copy of the CFR in effect on the date of this rule can be found at http://portal.ncdenr.org/web/mf/rules-and-regulations, free of charge.

~~(b)~~(d) Proclamations issued under this Rule shall suspend appropriate rules or portions of rules under the authority of the Marine Fisheries Commission as specified in the proclamation. The provisions of 15A NCAC 03I .0102 terminating suspension of a rule pending the next Marine Fisheries Commission meeting and requiring review by the Marine Fisheries Commission at the next meeting shall not apply to proclamations issued under this Rule.

Authority G.S. 113-134; 113-182; 113-201; 113-221.1; 113-221.2; 143B-289.52

REGULATORY IMPACT ANALYSIS OF PROPOSED RULE 15A NCAC 03M .0522

ESTABLISH RULE FOR SPOTTED SEATROUT

Name of Commission: N.C. Marine Fisheries Commission

Agency Contact: Catherine Blum, Rule Making Coordinator
N.C. Division of Marine Fisheries
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Impact Summary: *De minimis* rule change
State Government: No
Local Government: No
Private Impact: No
Substantial Impact: No

Authority: G.S. 113-134 (Rules); 113-182 (Regulation of Fishing and Fisheries); 113-182.1 (Fishery Management Plans); 113-221.1. Proclamations; emergency review; 143B-289.52 (Marine Fisheries Commission-Powers and Duties); 15A NCAC 03M .0512 Compliance with Fishery Management Plans

Necessity: This rule is proposed for adoption to provide a mechanism for the Fisheries Director to manage spotted seatrout in the event that current authority under rule 15A NCAC 03M .0512 is lost due to the removal of spotted seatrout as a managed species from the Atlantic States Marine Fisheries Commission.

I. Summary

This rule is proposed for adoption to establish a rule of the North Carolina Marine Fisheries Commission (NCMFC) for the management of spotted seatrout, independent of the current authority for interjurisdictional management under the Atlantic States Marine Fisheries Commission (ASMFC) and rule 15A NCAC 03M .0512. The proposed rule would delegate proclamation authority to the Fisheries Director to specify time, area, means and methods, season, size, and quantity of spotted seatrout harvested in North Carolina. Current management measures would remain in place in accordance with the North Carolina Spotted Seatrout Fishery Management Plan (FMP). The proposed rule adoption would only change the mechanism by which those same measures are implemented. The proposed effective date of this rule is May 1, 2017.

II. Introduction and Purpose of Rule Change

At its Nov. 5, 2015 meeting, the ASMFC's South Atlantic State/Federal Fisheries Management Board (Management Board) agreed with a state proposal that given spotted seatrout's limited migratory range, species management would be best left to the individual states rather than being managed through an interstate FMP. Therefore, the Management Board recommended to the ASMFC Interstate Fisheries Management Program Policy Board (Policy Board) that spotted seatrout be removed from ASMFC management authority. At its Feb. 3, 2016 meeting, the

Management Board revisited its November motion given that some states' regulations for spotted seatrout are tied to the ASMFC FMP; North Carolina is one of those states. Even with this concern, the Management Board reiterated the appropriateness of state management given the largely non-migratory nature of the species. As a result, the Management Board decided to indefinitely postpone the recommendation to the Policy Board until states have the authority to implement regulations independent of the ASMFC plan.

In North Carolina, spotted seatrout are currently managed under the authority of three FMPs: the ASMFC Omnibus Amendment to the Interstate Fishery Management Plans for Spanish Mackerel, Spot, and Spotted Seatrout; North Carolina Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP); and North Carolina Spotted Seatrout Fishery Management Plan. Management measures are implemented via Rule 15A NCAC 03M .0512 (See Appendix 2), which provides that the North Carolina Division of Marine Fisheries (NCDMF) director may take actions to specify size, season, area, quantity, and means and methods for species listed in the IJ FMP. The goal of the IJ FMP is to "adopt FMPs, consistent with N.C. law, approved by the [Federal] Councils or ASMFC by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved FMPs and amendments, now and in the future" (NCDMF 2015). As long as spotted seatrout is managed by the ASMFC, implementation of regulations of the species falls under the umbrella of authority granted by rule 15A NCAC 03M .0512 for interjurisdictional species. Should the ASMFC remove spotted seatrout from its purview, this would remove the species from the IJ FMP and thus also eliminate the NCDMF director's proclamation authority for management of the species through rule 15A NCAC 03M .0512. Since there is no other rule specific to spotted seatrout in the N.C. Administrative Code, there would be no legal mechanism in place by which to implement the management measures for spotted seatrout in North Carolina as authorized by the N.C. Spotted Seatrout FMP.

This proposed rule (see Appendix 1) would establish management authority for spotted seatrout, independent of the authority granted by interjurisdictional management under the ASMFC, the IJ FMP, and rule 15A NCAC 03M .0512. The proposed rule would delegate proclamation authority to the Fisheries Director to specify time, area, means and methods, season, size, and quantity of spotted seatrout harvested in North Carolina. Current management measures would remain in place in accordance with the North Carolina Spotted Seatrout FMP. The proposed rule adoption would only change the mechanism by which those same measures are implemented.

III. Costs

There are no costs associated with the proposed rule, as the rule reflects current management practices.

IV. Benefits

The proposed rule change would allow the NCMFC and NCDMF to continue to maintain proclamation authority to manage spotted seatrout in the event that the ASMFC decides to remove spotted seatrout as a managed species. The proposed rule would continue to provide the authority to manage spotted seatrout for a robust and viable recreational and commercial fishery under the authority of the FMP. The goal of the FMP and the current management measures is to ensure long-term sustainability for the spotted seatrout stock in North Carolina (NCDMF 2012).

LITERATURE CITED

NCDMF. 2012. North Carolina Spotted Seatrout Fishery Management Plan. North Carolina Department of Environment and Natural Resources. North Carolina Division of Marine Fisheries. 344 pp.

NCDMF. 2015. North Carolina Fishery Management Plan Interjurisdictional Fisheries Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. 127 pp.

Appendix 1: Proposed Rule Changes

15A NCAC 03M .0522 SPOTTED SEATROUT

The Fisheries Director may, by proclamation, impose any of the following requirements on the taking of spotted seatrout:

(1) Specify time;
(2) Specify area;
(3) Specify means and methods;
(4) Specify season;
(5) Specify size; and
(6) Specify quantity.

Authority G.S. 113-134; 113-182; 113-221.1; 143B-289.52;

Appendix 2: Referenced Rule (No Proposed Changes)

15A NCAC 03M .0512 COMPLIANCE WITH FISHERY MANAGEMENT PLANS

(a) In order to comply with management requirements incorporated in Federal Fishery Management Council Management Plans or Atlantic States Marine Fisheries Commission Management Plans or to implement state management measures, the Fisheries Director may, by proclamation, take any or all of the following actions for species listed in the Interjurisdictional Fisheries Management Plan:

(1) Specify size;
(2) Specify seasons;
(3) Specify areas:
(4) Specify quantity;
(5) Specify means and methods; and
(6) Require submission of statistical and biological data.

(b) Proclamations issued under this Rule shall be subject to approval, cancellation, or modification by the Marine Fisheries Commission at its next regularly scheduled meeting or an emergency meeting held pursuant to G.S. 113-221.1.

Authority G.S. 113-134; 113-182; 113-221; 113-221.1; 143B-289.52;

REGULATORY IMPACT ANALYSIS OF PROPOSED RULE 15A NCAC 03P .0101

ALIGN METHOD FOR COMMENCEMENT OF LICENSE, PERMIT, AND CERTIFICATE SUSPENSION/REVOCATION PROCESS

Name of Commission: N.C. Marine Fisheries Commission

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Impact Summary: *De minimis* rule change
State Government: No
Local Government: No
Private Impact: No
Substantial Impact: No

Authority: G.S. 113-134 (Rules); 113-171 (Suspension, revocation, and reissuance of licenses); 113-221.2 (Additional rules to establish sanitation requirements for scallops, shellfish, and crustacea; permits and permit fees authorized); 150B-3 (Special provisions on licensing); 150B-23 (Commencement; assignment of administrative law judge; hearing required; notice; intervention); 15A NCAC 03O .0114 (Suspension, Revocation, and Reissuance of Licenses); 03O .0504 (Suspension/Revocation of Permits); 03P .0101 (License, Permit, or Certificate Denial: Request for Review)

Necessity: This rule is proposed for amendment to align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the Division of Marine Fisheries and Marine Fisheries Commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division staff.

I. Summary

The method for commencement of proceedings to suspend or revoke a fishing license, permit, or certificate currently includes an opportunity for an informal meeting with division staff. This is inconsistent with the method required for other similar administrative proceedings by the Division of Marine Fisheries to submit information in writing. This rule is proposed for amendment to align the method of commencement of proceedings to suspend or revoke a fishing license, permit, or certificate with other similar administrative proceedings by the Division of Marine Fisheries and Marine Fisheries Commission. This would require affected stakeholders to submit information in writing to the division instead of having an informal meeting with division staff. The proposed effective date of this rule is May 1, 2017.

II. Introduction and Purpose of Rule Change

Chapter 150B of the North Carolina General Statutes is the Administrative Procedure Act. G.S. 150B-1(a) states the purpose of the chapter is to establish "a uniform system of administrative rule making and adjudicatory procedures for agencies. The procedures ensure that the functions of rule making, investigation, advocacy, and adjudication are not all performed by the same person in the administrative process." Several rules of the Marine Fisheries Commission set requirements for fishermen to hold certain licenses, permits, and certificates to participate in various fishing activities. The requirements are set under the authority of the Marine Fisheries Commission and administered and enforced by the Division of Marine Fisheries. When those requirements are not met, the Administrative Procedure Act governs the proceedings to suspend or revoke the license, permit, or certificate that originally extended the privilege to a fisherman to engage in a particular activity. It is important to note that while commission rules distinguish between licenses, permits, and certificates, G.S. 150B-2(3) defines a "license" as "any *certificate, permit* or other evidence, by whatever name called, of a right or privilege to engage in any activity, except licenses issued under Chapter 20 and Subchapter I of Chapter 105 of the General Statutes and occupational licenses [emphasis added]." So, for the administrative proceedings governed by the Administrative Procedure Act, licenses, permits, and certificates are synonymous. For simplicity, general references to "license" in this analysis include permits, certifications, and certificates of compliance.

G.S. 150B-3 provides special provisions on licensing. Subsection (b) requires that before "the commencement of proceedings for the suspension, revocation, annulment, withdrawal, recall, cancellation, or amendment of any license other than an occupational license . . . the licensee shall be given an opportunity to show compliance with all lawful requirements for retention of the license . . . " Currently, Marine Fisheries Commission Rule 15A NCAC 03P .0101, License/Permit Denial: Informal Hearing Procedures, provides this opportunity to a license holder via an informal meeting with division staff.

There are several other processes involving administrative proceedings of the Division of Marine Fisheries and Marine Fisheries Commission that require information in writing in order to begin. Some of these include:

- Requests for license reinstatement following revocation (15A NCAC 03O .0114(f));
- Requests for a declaratory ruling (15A NCAC 03P .0202(a));
- Requests for a petition for rulemaking (15A NCAC 03P .0301(a));
- Requests for hardship relative to failing to fish commercial crab pots within at least five days (15A NCAC 03I .0105(b)(2)); and
- Requests for user conflict resolution (15A NCAC 03I .0122(b)).

The process of commencement of proceedings to suspend or revoke a license currently begins with providing the license holder an opportunity to show compliance with all lawful requirements of the license in an informal meeting with division staff. For consistency with other parallel proceedings and for improved documentation of proceedings, a change to the process could be made to align it with other similar administrative processes that begin with submitting information in writing to the division.

In order to comply with the requirements of G.S. 150B-3, the Division of Marine Fisheries and Marine Fisheries Commission must provide a license holder an opportunity to show compliance

with all lawful requirements for retention of a license. Except in cases where G.S. 113-171 is applicable or in cases of summary suspension, the division and commission must extend this opportunity to a license holder prior to commencement of proceedings to suspend or revoke a license. G.S. 113-171 applies when there is a conviction of a criminal offense pertaining to a license to take resources under the jurisdiction of the Marine Fisheries Commission. Per G.S. 150B-3, summary (or immediate) suspension of a license may occur when the public health, safety, or welfare requires emergency action. The terms of suspension, revocation, and reissuance of licenses and permits are set forth in G.S. 113-171 and Marine Fisheries Commission rules 15A NCAC 03O .0114 and .0504.

Since at least Jan. 1, 1991, when 15A NCAC 03P .0101 was adopted, this opportunity to show compliance prior to commencement of proceedings has been extended to a license holder via a request by the license holder for an informal meeting with division staff responsible for the initiation of the action to suspend or revoke the license. Since by its very nature there are no records of an informal meeting, it is unknown how many times a license holder has made such a request, but anecdotal information from division staff shows the requests are rarely made.

The very fact that there is no documentation for an informal meeting is cause for reconsideration of these proceedings since they potentially impact the continued privilege for a fisherman to engage in a particular activity. Since other similar administrative proceedings are undertaken by requiring information from affected stakeholders to be submitted in writing, those proceedings demonstrate an alternate way to still comply with the statutory requirements while yielding a better record of events. Additionally, amending the rule to change the process from requesting an informal meeting to submitting information in writing to division staff could increase fairness to all involved stakeholders and improve understanding of required division and commission processes. The license holder's written statement to show compliance with all lawful requirements for retention of the license could include material changes made enabling the license holder to conduct the operations for which the license is held in accord with all applicable laws and rules. The request could also include noting a processing error made by the division.

There are several additional items contained in 15A NCAC 03P .0101 that also need to be corrected. Existing paragraph (a) of the rule simply restates requirements already set out in statute, so it is proposed to be deleted since it is redundant. Proposed new paragraph (a) clarifies the rule applies to licenses, permits, and certifications or certificates of compliance and that for simplicity, references to "license" throughout the rule are inclusive of all of the named types of documents. Currently, paragraph (c) of the rule directs a license holder to make a request for an administrative hearing to division staff. The correct recipient for these requests is the Office of Administrative Hearings, per G.S. 150B-23. Also, paragraph (e) is proposed to be deleted, since the very nature of the need to summarily suspend a license does not allow sufficient time to consider a request from a license holder to show compliance prior to license suspension. The proposed rule reflects the aforementioned changes, an updated title, as well as minor changes to grammar and punctuation. Additional text also provides the current mailing address of the Division of Marine Fisheries and lists subparagraphs in a sequence that matches the sequence of corresponding subsections in statute.

III. Costs

There are no costs associated with the proposed rule changes. From an opportunity cost perspective, the process of holding an informal meeting with division staff responsible for the

initiation of the action to revoke a license is substantially the same as the license holder submitting a request in writing to division staff. For an informal meeting, the license holder would contact the division, schedule a meeting, a meeting would be held between both parties, division staff would later consider the information exchanged, make a determination about commencing with the license suspension, and notify the license holder accordingly. For a written request, the license holder would draft an email or letter, send or mail it, division staff would review the information contained in the request, make a determination about commencing with the license suspension, and notify the license holder accordingly.

IV. Benefits

The very fact that there is no documentation for an informal meeting is cause for reconsideration of these proceedings since they potentially impact the continued privilege for a fisherman to engage in a particular activity. Since other similar administrative proceedings are undertaken by requiring information from affected stakeholders to be submitted in writing, those proceedings demonstrate an alternate way to still comply with the statutory requirements while yielding a better record of events. Additionally, the proposed rule changes increase fairness to all involved stakeholders and potentially improve understanding of required division and commission processes. Corrections and clarifications to the rule also increase understanding of the required steps in the process.

V. Comprehensive Statement of Costs and Benefits

There are no costs and no quantifiable benefits to the proposed rule changes. These costs and benefits will not meet the threshold of $1 million in aggregate costs and benefits to be considered rule changes with a substantial economic impact.

Appendix 1: Proposed Rule Changes

15A NCAC 03P .0101 ~~LICENSE/PERMIT~~ LICENSE, PERMIT, OR CERTIFICATE DENIAL: ~~INFORMAL HEARING PROCEDURES~~ REQUEST FOR REVIEW

~~(a) If the Division decides to deny or limit a renewal of a license or permit for an activity of a continuing nature, the license sought to be renewed shall continue in effect as provided in G.S. 150B-3.~~

(a) For the purpose of this rule and in accordance with G.S. 150B-2, "license" includes "permit" as well as "certification" and "certificate of compliance".

(b) Except in cases where G.S. 113-171 is applicable, before the Division may commence proceedings for suspension, revocation, annulment, withdrawal, recall, cancellation, or amendment of a ~~license or permit,~~ license, notice shall be given to the license ~~or permit~~ holder ~~notifying him~~ that:

(1) the license holder has a right through filing a request for a contested case hearing in the Office of Administrative Hearings to a hearing before an administrative law judge and a final agency decision by the Marine Fisheries Commission; and

~~(1)~~(2) ~~He~~ the license holder may request an opportunity to show compliance with all lawful requirements for retention of the license ~~in an informal meeting with Division personnel responsible for the initiation of the action to revoke the license; and~~by submitting a statement in writing to the personnel designated in the notice for the initiation of the action.

~~(2) He has a right through filing a request for a contested case hearing in the Office of Administrative Hearings to a hearing before an administrative law judge and a final agency decision by the Marine Fisheries Commission.~~

(c) Any ~~requests~~ statements submitted by the license holder ~~for an informal meeting or administrative hearings shall be made to the person designated in the notice.~~to show compliance with all lawful requirements for retention of the license shall be postmarked within 15 days of receipt of the notice for the initiation of the action. Statements and any supporting documentation shall be addressed to the personnel designated in the notice and mailed to the Division of Marine Fisheries, 3441 Arendell Street, P.O. Box 769, Morehead City, NC 28557.

(d) Upon receipt of a statement and any supporting documentation from the license holder, the Division shall review the statement and within 15 days, notify the license holder in writing with the Division's determination of whether the license holder demonstrated compliance with all lawful requirements for retention of the license. In making this determination, the Division may consider criteria including, but not limited to material changes made enabling the license holder to conduct the operations for which the license is held in accord with all applicable laws and rules, and processing errors made by the Division.

~~(d)~~(e) The Division may order summary suspension of a license ~~or permit~~ if it finds that the public health, safety, or welfare requires emergency action. Upon such ~~determination~~ determination, the Fisheries Director shall issue an order giving the reasons for the emergency action. The effective date of the order shall be the date specified on the order or the date of service of a certified copy of the order at the last known address of the license ~~or permit holder~~ holder, whichever is later.

~~(e) When a license is summarily suspended and a request is made for an informal meeting or a hearing, the proceeding shall be promptly commenced and determined.~~

Authority G.S. 113-134; 113-171; 113-221.2; 150B-3; 150B-23;

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor
DONALD R. VAN DER VAART
Secretary
BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **Rule Suspend 8-16**

TO: Marine Fisheries Commission

FROM: Kathy Rawls, Fisheries Management Section Chief

SUBJECT: Rule Suspensions

Attached is the temporary rule suspension information for the August 2016 meeting. In accordance with the Division of Marine Fisheries Resource Management Policy Number 2014-2, the Marine Fisheries Commission will vote on any new rule suspensions that have occurred since the May 2016 meeting. Those suspensions are for cobia, blue crab and Spanish mackerel and are listed as follows:

- Approve continued suspension of N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0516 Cobia in its entirety for an indefinite period of time. Suspension of this rule allows the division to increase the recreational size limit and decrease the recreational creel limit for cobia in response to management actions taken by the commission at its May 2016 meeting. This suspension is effective in Proclamation FF-28-2016.

- Approve continued suspension of portions of N.C. Marine Fisheries Commission Rule 15A NCAC 03L .0201 Crab Harvest Restrictions and portions of 03L .203 Crab Dredging for an indefinite period of time. This continued suspension allows the division to implement the blue crab harvest restrictions adopted by the commission in the May 2016 Revision to Amendment 2 of the N.C Blue Crab Fishery Management Plan. These suspensions were implemented in Proclamation M-11-2016.

- Approve continued suspension of N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0301 Spanish Mackerel to a date certain, through Sept. 30, 2016. This suspension allows the division to decrease the minimum size limit for Spanish mackerel in the commercial pound net fishery to reduce seasonal dead discards. This suspension was implemented in Proclamation FF-31-2016.

The temporary rules suspension information also includes suspensions previously approved by the commission that are still in effect. Those suspensions included portions of N.C. Marine Fisheries Commission Rules 15A NCAC 03J .0501, 03M .0519, 03Q .0107 and 03M .0503.

N.C. Marine Fisheries Commission Rule Suspension Update- As of July 29, 2016
(In accordance with Division of Marine Fisheries Resource Management Policy 2014-2: Temporary Rule Suspensions)

New Suspension-Action Required
The following new suspensions occurred since the commission's May 2016 meeting. These suspensions are an action item on the August 2016 agenda and are subject to approval:

- **N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0516 COBIA is suspended:**
  (a) It is unlawful to possess cobia less than 33 inches fork length
  (b) It is unlawful to possess more than two cobia per person per day.

Suspension of this rule allows the division to increase the recreational size limit and decrease the recreational harvest of cobia to one (1) fish per person per day. These changes are effective in Proclamation FF-28-2016. This is a continuing suspension.

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03L .0201 CRAB HARVEST RESTRICTIONS is suspended:**
  Sections (a) and (b), which read:
  (a) It is unlawful to possess more than 10 percent by number in any container, male and immature female hard blue crabs less than five inches from tip of spike to tip of spike and to fail to return hard blue crabs not meeting this restriction to the waters from which taken, except the Fisheries Director may, by proclamation authority established in Paragraph (f) of this Rule, further restrict the harvest of blue crabs. All blue crabs not sorted into containers as specified in Paragraph (b) of this Rule shall be deemed hard blue crabs for the purpose of establishing the 10 percent culling tolerance.
  (b) It is unlawful to possess blue crabs less than five inches from tip of spike to tip of spike unless individual crabs are sorted to and placed in separate containers for each of the following categories:
    (1) soft crabs;
    (2) pink and red-line peeler crabs;
    (3) white-line peeler crabs; and
    (4) from March 1 through October 31, male crabs to be used as peeler crab bait.

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03L .0203 CRAB DREDGING is suspended:**
  Section (a), which reads:
  (a) It is unlawful to take crabs with dredges except:
    (1) from January 1 through March 1 in the area of Pamlico Sound described in 15A NCAC 03R .0109; and
    (2) incidental to lawful oyster dredging operations in areas not subject to the exception in Subparagraph (a)(1) of this Rule provided the weight of the crabs shall not exceed:
      (A) 50 percent of the total weight of the combined oyster and crab catch; or
      (B) 500 pounds, whichever is less.

Suspension of the above rules relative to crab harvest and dredging allows the division to implement the blue crab harvest restrictions adopted by the Marine Fisheries Commission in the May 2016 Revision to Amendment 2 of the N.C. Blue Crab Fishery Management Plan. These

restrictions were implemented in proclamation M-11-2016, effective June 6, 2016. These are continuing suspensions.

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0301 SPANISH MACKEREL is suspended:**
  Section (a) (1), which reads:
  (a) Spanish Mackerel:
  (1) It is unlawful to possess Spanish mackerel less than 12 inches fork length.

Suspension of portion of this rule allows the division to change the minimum size limit for Spanish mackerel in the commercial pound net fishery to reduce seasonal dead discards in this fishery. These restrictions were implemented in FF-31-2016, effective July 4 until midnight September 30, 2016. This is a suspension to a date certain.

Continuing Suspensions- No Action Required

The following rule suspensions have been approved on a continuing basis by the commission and no further action is required:

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03J .0501 DEFINITIONS AND STANDARDS FOR POUND NETS AND POUND NET SETS is suspended:**
  Section (e)(2), which reads:
  (e) Escape Panels:
  (2) It is unlawful to use flounder pound net sets without four unobstructed escape panels in each pound. The escape panels shall be fastened to the bottom and corner ropes on each wall on the side and back of the pound opposite the heart. The escape panels shall be a minimum mesh size of five and one-half inches, hung on the diamond, and shall be at least six meshes high and eight meshes long.

Suspension of portions of this rule allows the division to increase the minimum mesh size of escape panels for flounder pound nets in accordance with Supplement A to Amendment 1 of the North Carolina Southern Flounder Fishery Management Plan.

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0519 SHAD is suspended:**
  Paragraphs (a) and (b) which read:
  (a) It is unlawful to take American shad and hickory shad by any method except hook-and-line from April 15 through December 31.
  (b) It is unlawful to possess more than 10 American shad or hickory shad, in the aggregate, per person per day taken by hook-and-line or for recreational purposes.

- **The following portion of N.C. Marine Fisheries Commission Rule 15A NCAC 03Q .0107 SPECIAL REGULATIONS: JOINT WATERS is suspended:**
  Paragraph (4) which reads**:**
  (4) Shad: It is unlawful to possess more than 10 American shad or hickory shad, in the aggregate per person per day taken by hook-and-line.

Suspension of portions of these rules allows the division to change the season and creel limit of American shad under the management framework of the North Carolina American Shad Sustainable Fishery Plan.

- **The following <u>portion</u> of N.C. Marine Fisheries Commission Rule 15A NCAC 03M .0503 FLOUNDER is suspended:**
  Section (i) (1), which reads:
  (1) The North Carolina season for landing ocean-caught flounder shall open January 1 each year. If 80 percent of the quota allocated to North Carolina in accordance with the joint Mid-Atlantic Fishery Management Council/Atlantic States Marine Fisheries Commission Fishery Management Plan for Summer Flounder is projected to be taken, the Fisheries Director shall, by proclamation, close North Carolina ports to landing of flounder taken from the ocean.

Suspension of portions of this rule allows the division to extend the Atlantic Ocean summer flounder season. This suspension was implemented in FF-23-2016, effective May 1, 2016.

Marine Fisheries
ENVIRONMENTAL QUALITY

PAT McCRORY
Governor

DONALD R. VAN DER VAART
Secretary

BRAXTON C. DAVIS
Director

August 3, 2016

MEMORANDUM **CHPP 8-16**

TO: Marine Fisheries Commission

FROM: Jimmy Johnson

SUBJECT: North Carolina Coastal Habitat Protection Plan Annual Report

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The Fisheries Reform Act of 1997 requires an annual report be submitted to the Environmental Review Commission and the Joint Legislative Commission on Governmental Operations from the Department of Environmental Quality regarding activities directly related to North Carolina's Coastal Habitat Protection Plan. The report is due on Sept. 1 of each year. The Coastal Habitat Protection Plan Steering Committee, a committee with a membership of two commissioners from the Environmental Management Commission, Coastal Resources Commission, and the Marine Fisheries Commission has approved this Coastal Habitat Protection Plan Annual Report for FY 2015-2016. Each of the respective commissions is now being asked to approve the report before it is sent to the General Assembly. The Coastal Resources Commission and the Environmental Management Commission have been presented the Annual Report. The Coastal Resources Commission received it as an information item while the Water Quality Committee of the Environmental Management Commission approved the annual report, which is included with the commission's briefing materials.

The report focuses on the process of the 2016 Coastal Habitat Protection Plan revision and focuses on the four priority concerns contained within the document. Also noted in the report were mapping efforts of shell bottom and the additional funding provided by the General Assembly for the oyster restoration efforts led by the Division of Marine Fisheries.

Staff requests the Marine Fisheries Commission approve the 2015-2016 Coastal Habitat Protection Plan Annual Report.

State of North Carolina | Environmental Quality | Marine Fisheries
PO Box 769 | 3441 Arendell Street | Morehead City, NC 28557
252 726 7021 T

NORTH CAROLINA'S COASTAL HABITAT PROTECTION PLAN

2015 - 2016

ANNUAL REPORT

TO THE

ENVIRONMENTAL REVIEW COMMISSION

AND THE

JOINT LEGISLATIVE COMMISSION ON GOVERNMENTAL OPERATIONS

OF THE

NORTH CAROLINA GENERAL ASSEMBLY

FROM THE

MARINE FISHERIES COMMISSION,

COASTAL RESOURCES COMMISSION,

ENVIRONMENTAL MANAGEMENT COMMISSION,

AND THE

DEPARTMENT OF ENVIRONMENTAL QUALITY

September 2016

2015-2016 Annual Report

Background

North Carolina's Coastal Habitat Protection Plan (CHPP), mandated by the 1997 Fisheries Reform Act and drafted by then Department of Environment and Natural Resources (DENR) staff, now the Department of Environmental Quality (DEQ), was adopted in 2004 by the N.C. Environmental Management Commission (EMC), Coastal Resources Commission (CRC), and Marine Fisheries Commission (MFC). Following adoption, the department's staff developed two-year implementation plans in 2005, 2007, 2009, and 2011. These plans detailed specific steps each participating agency agreed to focus on during those timeframes. The CHPP Steering Committee, a subset of commissioners from the CRC, EMC, and MFC, leads in setting implementation priorities. Implementation progress and accomplishments have been reported annually since 2006 through the CHPP Annual Report. While the latest 5-year revision of the CHPP is finalized, the department will continue to use the 2011 Implementation Plan.

Implementation Progress

The 2015-2016 reporting term was spent revising and rewriting the CHPP document. Several new commissioners were appointed to the Steering Committee, and with each new commissioner came a new set of eyes and ideas. At the August 2015 Steering Committee meeting, the commissioners asked that the CHPP document be drastically altered to include a much shorter plan intended for a broader audience and a source document which contained the great majority of the science. The two documents would go hand in hand, but the new, shorter CHPP would have broader appeal to the general public. With that in mind, the department requested an extension into the first quarter of 2016 to get the documents before the three commissions, and the N.C. General Assembly granted the request. The plan was approved by each of the three commissions in the first half of 2016. The final CHPP documents are currently being prepared by DEQ for submission to the N.C. General Assembly. As noted above, the department's staff opted to continue working on actions from the 2011-2013 Implementation Plan, rather than attempt to develop a 2013-2015 plan during the ongoing transitions.

This past year, DEQ staff were actively engaged in the latest revision and then making the necessary changes that were requested by the CHPP Steering Committee at the August 2015 meeting. Over 25 staff members from DEQ have been involved in the current revision process and they have been recognized in the document itself for their contributions. The document, besides being written for a wider audience and drastically shortened, also includes new graphics, which should add to its appeal. New information on the economic value of coastal fish habitats, due to enhanced fish production and ecosystem services, was highlighted throughout both documents. The source document was restructured and the habitat chapters were shortened. This effort reduced many of the redundancies seen in the previous two documents.

The CHPP Steering Committee, along with DEQ staff, has met on at least a quarterly basis since January 2015, reviewing the draft plan and making suggestions for revisions and updates. The current draft plan has also identified four priority habitat issues to focus on over the next five years: oyster restoration, living shorelines, sedimentation, and developing metrics.

Some work related to the priority issues has already begun. The Division of Marine Fisheries has been working on oyster restoration for many years through the building of oyster sanctuaries and the creation and enhancement of harvestable oyster reefs (planting of cultch material). The CHPP identifies oyster reefs as being "*critical economically for the seafood industry, and ecologically for improving water quality and*

providing fish habitat." The General Assembly, in its most recent budget, included additional funding for the expansion of the oyster restoration efforts currently underway.

Living shorelines are critical to protecting eroding shorelines as well as restoring fish habitat and ecosystem services. The CHPP states that, *"Research in North Carolina has shown that living shorelines support a higher diversity and abundance of fish and shellfish than bulkhead-stabilized shorelines, effectively deter erosion, and survive storm events well."* The Division of Coastal Management (DCM) has an internal working group that meets quarterly to follow up on actions and research issues identified in their living shorelines strategy, which is available on DCM's website. Currently, discussions are underway regarding the U.S. Army Corps of Engineers Nationwide Permit as it pertains to living shorelines, with the hope that the discussions will lead to a streamlined permitting process, which in combination with the other benefits of living shorelines would be an incentive for property owners to choose a living shoreline method over a vertical stabilization method.

Addressing sedimentation is a priority primarily because there are a number of potential negative impacts from sedimentation on coastal habitats and water quality. While a moderate amount of sedimentation is needed to support soft bottom habitat and wetlands, excessive amounts *"can silt over existing oyster beds and submerged aquatic vegetation, smother invertebrates, clog fish gills, reduce survival of fish eggs and larvae, reduce recruitment of new oysters onto shell, and lower overall diversity and abundance of marine life."* Pollutants also bind to the sediment particles and are transported into the estuarine system. More work is needed on the sources and rates of sedimentation in coastal waters and the effects on fish habitats.

Developing metrics to assess habitat trends and management effectiveness is the cornerstone of habitat protection and restoration. Without them, if and to what extent habitat conservation measures are needed is unknown. The development of metrics requires mapping efforts to identify trends in habitat distribution, developing indicators to assess habitat condition, the monitoring of fish habitat use in priority areas, and developing performance criteria to determine the success of management initiatives.

Work is already underway with regard to the identified priority issues. Mapping and restoration of oyster reefs and shell bottom continues to be carried out by DMF. The Albemarle-Pamlico National Estuary Partnership (APNEP) continues to take the lead on mapping of the presence and extent of submerged aquatic vegetation. Partners such as university and National Oceanic and Atmospheric Administration scientists continue to study sedimentation and accretion in coastal wetlands to assess change and study the quality of the sediment inputs. APNEP continues to work on identifying indicators and DWR is currently leading a multiagency effort to set nutrient criteria for the waters of the state.

Staff from DEQ continues to meet with federal partners and other state agencies on a quarterly basis to review current permit requests and to strengthen the lines of communication between the commenting agencies. DCM has taken the lead in this effort.

Progress on CHPP Review and Revision

The 5-year review and revision of the CHPP as required under the 1997 Fisheries Reform Act is in the final stages of the process. In an effort to streamline the document, it has been reorganized to reduce redundancy, and the CHPP writing team has focused on priority issues, as directed by DEQ and the CHPP Steering Committee. Those priority issues, as mentioned above, include:

- Increasing oyster habitat restoration and enhancement activities
- Increasing the use of living shorelines for erosion control
- Addressing sedimentation and its effects on estuarine creek habitat
- Generating metrics on management success and habitat trends

While DMF staff led in working on the revised plan, agency staff from throughout the department, as well as staff from the N.C. Forest Service, the Division of Soil and Water within the N.C. Department of Agriculture and Consumer Services, and the U.S. Army Corps of Engineers have also actively participated in the CHPP revision.

Important to Remember

In 2014, the department requested the CHPP process and direction be re-evaluated and modified so that the CHPP remains vital and relevant in sustaining our state's natural resources, and that it supports the Department's priorities and mission statement. Those suggested changes are attached to this annual report again this year for the purpose of reminding readers of the changes that have been made to the process and to report on the accomplishments the department has made over the now 11-year history of this document.

Current CHPP Steering Committee Members

Mr. David Anderson - Environmental Management Commission
Mr. Larry Baldwin - Coastal Resources Commission
Mr. Chuck Laughridge – Marine Fisheries Commission
Dr. Robert Rubin – Environmental Management Commission
Mr. John Snipes – Coastal Resources Commission
Ms. Alison Willis – Marine Fisheries Commission

North Carolina Coastal Habitat Protection Plan
Purpose, Process, and Direction (2014)

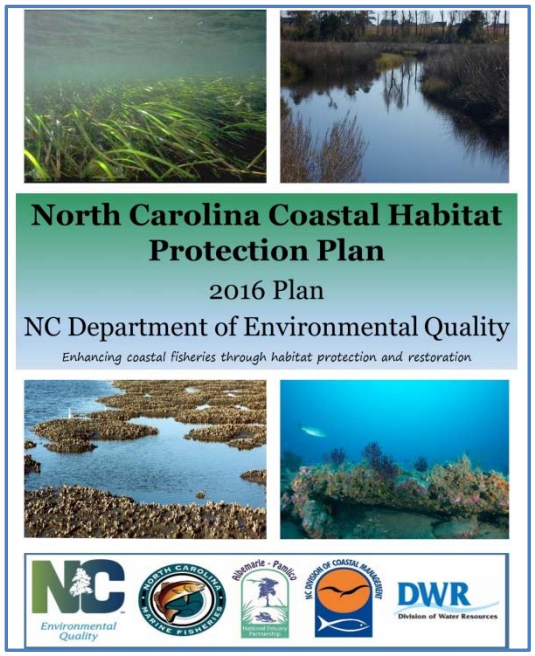
Purpose of the Plan

The 1997 Fisheries Reform Act (SL 1997-400) mandated that a N.C. Coastal Habitat Protection Plan (CHPP) be developed by the N.C. Department of Environment and Natural Resources (DENR), now the Department of Environmental Quality (DEQ), for the purpose of long term enhancement of coastal fisheries through the protection and restoration of coastal fish habitat. This legislation was initiated because of widespread water quality issues such as increasing algal blooms, fish kills, oyster disease, and shellfish harvest closures.

CHPP Accomplishments

Through an inter-commission approach, the CHPP has been successful in implementing a number of recommendations, with the majority of the plan actions being non-regulatory in nature. Accomplishments include:

- Increased outreach and education
- Improved communication between agencies
- New mapping and research
- Oyster and fish passage restoration
- Compliance with existing regulations



Positions and funding to undertake CHPP recommendations have been obtained through past appropriations and grants. The most notable accomplishment of the CHPP process has been the improved interagency and inter-commission communication and coordination, which improves effectiveness and efficiency of processes within DEQ.

CHPP Process

The law specifies that the CHPP include a description of North Carolina's coastal fish habitats, their ecological functions, value, status, and threats, as well as recommended actions to protect, enhance, and restore fish habitat. The focus of initial efforts involved developing a process and gathering the necessary data by which the Marine Fisheries, Coastal Resources, and Environmental Management Commissions could make informed recommendations. The result was a lengthy document that compiled the results of a large amount of relevant research on coastal habitats. Biennial implementation plans were then developed based on recommendations of the Steering Committee. The initial plan was completed and approved in 2005 and updated in 2010. As the next five-year update is scheduled for completion in 2015, there is an opportunity to re-evaluate the current process and plan structure in an effort to streamline and enhance the program.

Changes Proposed for Continued Success

After 10 years of implementation, DEQ staff evaluated the CHPP processes and suggested several changes to allow continued implementation of the program while achieving improved efficiencies. The proposed changes would not require a legislative action. We propose to realign the CHPP updates to be similar to the existing DMF Fishery Management Plan (FMP) amendment process. Both the Fishery Management and CHPP plans are required to be reviewed and revised at least every five years. In an FMP amendment (or update), staff focus on the development of individual "information papers" that assess specific relevant

issues, with only necessary updates to the background text. The issues are identified by staff on the Plan Development Team or an Advisory Committee.

1) **Focus on the Science.** The CHPP Team, consisting of staff from the Divisions of Marine Fisheries, Coastal Management and Water Resources, will identify current relevant habitat issues. Involvement from the Division of Energy, Mineral, and Land Resources will be considered since that division now oversees stormwater management. With input from the CHPP Steering Committee, which is comprised of two commissioners from each commission, staff will develop background information on primary habitat and water quality matters for inclusion in the threats section of the updated plan. Updates to the background text will be limited to those necessary to adequately support development of recommendations. Priority will be given to action recommendations with an emphasis on increasing knowledge and understanding of cause and effect through study, monitoring and research and gap analysis.
2) **Streamline.** The plan's background text will be streamlined to make the document more reader friendly. Once completed, the bulk of the information now in the CHPP will serve as the foundation and require limited modification to background information in subsequent plan updates. Each updated plan is a stand-alone document.
3) **Fewer meetings.** Commission involvement (CHPP Steering Committee) will be reduced to annual meetings instead of the quarterly or semi-annual meetings. The CHPP Steering Committee may meet more regularly during plan updates. Status reports on implementation will be provided to the CHPP Steering Committee at their annual meeting. Reports on implementation progress may optionally be presented to the full commissions to further engage and educate commissioners on environmental issues.
4) **Fewer reports.** CHPP Implementation Plans will be restricted to issues addressed in CHPP amendments and will be updated on five-year cycles to coincide with the plan update. Like Fishery Management Plans, an update can be initiated sooner than five years if it is determined that a habitat issue needs to be addressed before the five-year update.

The vision for the Coastal Habitat Protection Program is to continue to use the plan and process as a tool to enhance communication across the DEQ divisions and commissions and to improve effectiveness in sustaining our state's natural resources.