FISHERY MANAGEMENT PLAN UPDATE
WAHOO
AUGUST 2023

STATUS OF THE FISHERY MANAGEMENT PLAN

Fishery Management Plan History

FMP Documentation:	June 2004	
	Amendment 1	July 2010
	Amendment 2	April 2012
	Amendment 3	August 2014
	Amendment 5	July 2014
	Amendment 6	January 2014
	Amendment 7	January 2016
	Amendment 12	June 2021
	Amendment 10	May 2022
Comprehensive Review:	None	

The South Atlantic Fishery 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. The Council adopted a precautionary and risk-averse approach to management for the wahoo fishery to maintain the status quo. The original FMP established no minimum size limit for wahoo in the Atlantic EEZ; established a commercial trip limit of 500 pounds; identified allowable gears in the fishery; and prohibited the use of longline gear to harvest wahoo in areas closed to use of such gear for highly migratory species. Amendment 1 (2010) provided spatial information of Council-designated Essential Fish Habitat and Habitat Areas of Particular Concern relative to the dolphin wahoo fishery. Amendment 2 (SAFMC 2011) established Allowable Biological Catch (ABC), Annual Catch Limits (ACL), Accountability Measures (AM), modified the allocations for both commercial and recreational sectors, and established Annual Catch Targets (ACT) for the recreational sector. Amendment 3 (SAFMC 2014, 79 F.R. 19490) required federal dealer permits and changed the method and frequency of reporting harvest. Amendment 4 (in progress) would change the method of reporting commercial harvest of wahoo through the existing logbook program and is included under the Joint Generic Commercial Logbook Reporting Amendment. In 2013, Amendment 5 (SAFMC 2013) was approved and adopted by the SAFMC and was the most comprehensive amendment to the Dolphin/Wahoo FMP, in terms of process updates. Amendment 5 updated the ACLs and AM for both sectors, as well as the ABC values and ACT for the recreational fishery as a result of improvements to the recreational catch estimation methods used by the Marine Recreational Information Program (MRIP). This amendment also set up an abbreviated framework procedure whereby modifications to the ACLs, ACTs, and AMs can be implemented by the National Oceanic and Atmospheric Administration (NOAA) Fisheries without a full FMP amendment. Amendment 7 (SAFMC 2015a) allowed for dolphin and wahoo fillets to enter the U.S. EEZ after lawful harvest in the Bahamas.

Amendment 12 was approved by the Council at its September 2020 meeting and became effective June 6, 2021 (SAFMC 2020). Amendment 12 adds bullet mackerel and frigate mackerel to the Dolphin/Wahoo Fishery Management Plan and designates them as ecosystem component species. Amendment 10 was approved by the Council at its September 2021 meeting and became effective May 2, 2022 (SAFMC 2020). Amendment 10 includes actions that accommodate updated recreational data from the MRIP by revising the annual catch limits and sector allocations for dolphin and wahoo. The amendment also contains actions that implement other management changes in the fishery including revising accountability measures, accommodating possession of dolphin and wahoo on vessels with certain unauthorized gears onboard, removing the operator card requirement, and reducing the bag limit/recreational vessel limit for dolphin.

To ensure compliance with interstate requirements, North Carolina also manages this species under the North Carolina Fishery Management Plan for Interjurisdictional Fisheries (IJ FMP). The goal of the IJ FMP is to adopt fishery management plans, consistent with N.C. law, approved by the Mid-Atlantic Fishery Management Council, SAFMC, or the Atlantic States Marine Fisheries Commission by reference and implement corresponding fishery regulations in North Carolina to provide compliance or compatibility with approved fishery management plans and amendments, now and in the future. The goal of these plans, established under the Magnuson-Stevens Fishery Conservation and Management Act (federal council plans) and the Atlantic Coastal Fisheries Cooperative Management Act (Atlantic States Marine Fisheries Commission plans), are, like the goals of the Fisheries Reform Act of 1997, to "ensure long-term viability" of these fisheries (NCDMF 2015).

Management Unit

The management unit is the population of wahoo (*Acanthocybium solandri*) from the U.S. South Atlantic, the Mid-Atlantic, and the New England coasts in the 3 to 200-mile Exclusive Economic Zone (EEZ).

Goal and Objectives

The goal of the plan is to maintain the current harvest levels of wahoo and ensure that no new fisheries develop (SAFMC 2003 (a)). To achieve these goals, the following management objectives were identified:

- 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.
- 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.
- 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.

- 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.
- 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.
- Direct research to evaluate the role of dolphin and wahoo as predator and prey in the pelagic ecosystem.
- Direct research to enhance collection of biological, habitat, social, and economic data on dolphin and wahoo stocks and fisheries.

DESCRIPTION OF THE STOCK

Biological Profile

Wahoo are an epipelagic marine species and can be found worldwide in tropical and subtropical waters and extend seasonally into temperate waters. Wahoo are typically solitary but may form small loose aggregations (Collette and Nausen 1983). They gather around floating debris and flotsam, including sargassum, spending most of their time in water less than 200m depth, and prefer water temperatures ranging from 17.5 to 27.5 degrees Celsius (63.5 – 81.5 degrees Fahrenheit; Theisen and Baldwin 2012). The species is presumed to be short lived (with a possible lifespan of up to or more than 5-6 years; Oxenford et al. 2003); there is much uncertainty in aging wahoo, and there has been no successful validation of presumed annuli or daily growth checks in otoliths to date. In addition, wahoo grows rapidly, with fish captured off North Carolina reaching a mean length of 44 inches by approximately age-1 (Hogarth 1976). The state record for wahoo was caught off Ocracoke in 1994 and weighed 150 pounds; however, fish landed in North Carolina weigh on average approximately 27 pounds. Wahoo become sexually mature during their first year, at around 34 inches for males and 40 inches for females (Hogarth 1976). They are considered batch spawners, meaning they will spawn many times throughout the spawning season, maximizing the survival of larval fish. Spawning occurs offshore of North Carolina around open-ocean currents from June to August, with a peak in June and July (Hogarth 1976).

Stock Status

The stock status of wahoo in the western Atlantic is unknown.

Stock Assessment

A stock assessment is not available for this species.

DESCRIPTION OF THE FISHERY

Current Regulations

The North Carolina Division of Marine Fisheries (NCDMF) currently complements the management measures of the Dolphin/Wahoo FMP through rule (15A NCAC 03M .0517). It is unlawful to possess for recreational purposes more than two wahoo per person per day taken by hook and line. For commercial fishing, there is a 500-pound trip limit (landed head and tail intact). It is unlawful for a commercial fishing operation to take or possess or sell a commercial trip limit of wahoo without a Federal Commercial Dolphin/Wahoo Vessel Permit. Commercial vessels federally permitted in another fishery are allowed to land up to 200 pounds of dolphin and wahoo combined.

Commercial Fishery

Commercial landings of wahoo are reported through the mandatory DMF Trip Ticket program. Landings since 1986 have fluctuated with a low of 6,014 pounds in 1986 and a high of 40,731 pounds in 1995 (Table 1; Figure 1). In the past 10 years, landings have averaged approximately 20,036 pounds; commercial landings in 2022 (7,924 pounds) were much lower than the average.

Recreational Fishery

Recreational landings of wahoo are estimated from the MRIP. Recreational estimates across all years have been updated and are now based on the MRIP new Fishing Effort Survey-based calibrated estimates. For more information on MRIP see https://www.fisheries.noaa.gov/topic/recreational-fishing-data.

Landings of wahoo, on average, have decreased in the last 10 years (2013-2022 average of 568,163 pounds compared to the 2002-2011 average of 1,058,188 pounds). After peaking in 2004 (2,220,765 pounds), wahoo landings have fluctuated, declining to low of 232,436 pounds in 2022 (Table 1; Figure 2). Landings remained similar to 2021 (244,078 pounds) in 2022 at 232,436.

The DMF offers award citations for recreational fishermen who land wahoo greater than 40 pounds. After a period of high, stable number of citations from 2012-2019 (750 citations per year average), the total number of citations awarded through the North Carolina Saltwater Fishing Tournament decreased in 2020 (527 citations), and 2021 (310 citations) before increasing in 2022 (462 citations; Table 2; Figure 2).

MONITORING PROGRAM DATA

Fishery-Dependent Monitoring

Fishery dependent length-frequency information for the commercial wahoo fishery in North Carolina is collected by fish house samplers, specifically through DMF programs 438 (Offshore Live Bottom Fishery) and 439 (Coastal Pelagic). The number of wahoo samples obtained by fish house samplers is generally low, ranging from 1 to 101 samples each year from 1986 to 2021; this is due to it being an incidental catch in other fisheries. In 2022, five wahoo lengths were obtained,

an increase from the previous year (4 samples in 2021) and below the average number of samples (11 samples; Table 3; Figure 3). The average size of wahoo sampled from the commercial fishery decreased in 2022 (46.3 inches fork length) from the previous year (48.3 inches fork length) and was below the time series average (49.3 inches fork length; Table 3; Figure 4). The maximum size of wahoo sampled from the commercial fishery increased in 2022 (53.4inches fork length) from the previous year (52.6 inches fork length) and was below the time series average (59.7 inches fork length; Table 3; Figure 4).

Length and weight information for the recreational fishery are collected through the MRIP dockside sampling. The average size of wahoo sampled from the recreational fishery was slightly larger in 2022 (47.4 inches fork length) compared to the previous year (46.0 inches fork length), and overall has remained relatively constant throughout the time series (Table 3; Figure 5). The minimum size of wahoo sampled from the recreational fishery was much smaller in 2022 (5.6 inches fork length) from the previous year (26.0 inches fork length). The maximum size of wahoo sampled from the recreational fishery decreased in 2022 (68.0 inches fork length) from the previous year (71.9 inches fork length in 2021).

Due to so few commercial samples, there was no modal length for the commercial fishery in 2021; however, in 2019, the commercial modal length was 44 inches fork length. The modal length for the wahoo recreational fishery in 2022 was 50 inches fork length (Figure 5). On average, the recreational fishery harvests larger maximum sizes of wahoo than the commercial fishery (Table 3; Figure 5); the average maximum length of wahoo sampled from the recreational fishery is 67.3, compared to an average of 59.7 inches fork length by the commercial fishery. However, on average, the commercial fishery harvests similar size fish (49.3 inches fork length) to the recreational fishery (47.9 inches fork length; Table 3; Figure 5).

Fishery-Independent Monitoring

Currently, DMF does not have any fishery-independent sampling programs that target or catch wahoo in great numbers.

RESEARCH NEEDS

The following are research and management needs as determined by the council and outlined in the FMPs for pelagic Sargassum habitat and the dolphin/wahoo fishery (SAFMC 2002; SAFMC 2003 (b)).

Essential Fish Habitat research needs for wahoo in order of priority from highest to lowest:

- What is the areal and seasonal abundance of pelagic Sargassum off the southeast U.S.?
- Develop methodologies to remotely assess Sargassum using aerial or satellite technologies (e.g., Synthetic Aperture Radar)
- What is the relative importance of pelagic Sargassum weedlines and oceanic fronts for early life stages of wahoo?
- Are there differences in wahoo abundance, growth rate, and mortality?

- 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?
- Is pelagic Sargassum mariculture feasible?
- Determine the species composition and age structure of species associated with pelagic Sargassum when it occurs deeper in the water column.
- Additional research on the dependencies of pelagic Sargassum productivity on the marine species using it as habitat.
- Quantify the contribution of nutrients to deepwater benthic habitat by pelagic Sargassum.
- 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.
- 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.
- Develop cooperative research partnerships between the Council, NOAA Fisheries 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.
- Direct specific research to further address the association between pelagic Sargassum habitat and post-hatchling sea turtles

Biological research reeds for wahoo in order of priority from highest to lowest:

- Additional data are needed to develop and/or improve estimates of growth, fecundity, etc.
- 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.
- Trophic data should be considered in support of an ecosystem management approach.
- Essential fish habitats for dolphin and wahoo need to be identified.
- An overall design should be developed for future tagging work. In addition, existing tagging databases should be examined.
- Establish a list serve for dolphin and wahoo which would facilitate research and the exchange of information.

MANAGEMENT STRATEGY

In North Carolina, wahoo is included in the North Carolina Fishery Management Plan for Interjurisdictional Fisheries, which defers to management under the South Atlantic Fishery Management Council Fishery Management Plan requirements. The South Atlantic Fishery Management Council approved a Fishery Management Plan for wahoo in 2004 and it is currently

managed under Amendment 5 (SAFMC 2013), Amendment 7 (SAFMC 2015a), Amendment 12 (SAFMC 2020), Amendment 10 (SAFMC 2021).

LITERATURE CITED

Collette, B.B., and C.E. Nauen. 1983. FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos, and related species known to date. FAO Fisheries Synopsis, 125(2): 137 p.

Federal Register 19490 (April 9, 2014) (codified at 50 C.F.R. 622) (Available online at: https://www.federalregister.gov/documents/2014/04/09/2014-07983/fisheries-of-the-caribbean-gulf-of-mexico-and-south-atlantic-revisions-to-dealer-permitting-and.)

Hogarth, W.T. 1976. Life history aspects of the wahoo Acanthocybium solandri (Cuvier and Valenciennes) from the coast of North Carolina. Ph.D. Thesis, North Carolina State University, NC, USA, 119 p.

NCDMF (North Carolina Division of Marine Fisheries). 2015. Fishery Management Plan for Interjurisdictional Fisheries: Information Update. North Carolina Department of Environmental Quality. North Carolina Division of Marine Fisheries. Morehead City, North Carolina. 85 pp.

Oxenford, H.A., P.A. Murray, and B.E. Luckhurst. 2003. The Biology of Wahoo (Acanthocybium solandri) in the Western Central Atlantic. Gulf and Caribbean Research 15 (1): 33-49.

SAFMC (South Atlantic Fishery Management Council). 2002. Fishery Management Plan for Pelagic Sargassum Habitat of the South Atlantic Region. South Atlantic Fishery Management Council. Charleston, South Carolina. 228 pp.

SAFMC. 2003 (a). 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.

SAFMC. 2003 (b). Fishery management plan for the dolphin and wahoo fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 308 pp.

SAFMC. 2010. Comprehensive Ecosystem Based Amendment 1 for the South Atlantic Region (Amendment 1 to the Fishery management plan for the dolphin and wahoo fishery of the Atlantic). South Atlantic Fishery Management Council. Charleston, SC. 286 pp.

SAFMC. 2011. Comprehensive Annual Catch Limit (ACL) Amendment for the South Atlantic Region (Amendment 2 to the Fishery management plan for the dolphin and wahoo fishery of the Atlantic). South Atlantic Fishery Management Council. Charleston, SC. 286 pp.

SAFMC. 2013. Amendment 5 to the Fishery management plan for the dolphin and wahoo fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 132 pp.

SAFMC. 2014. Joint Generic Dealer Amendment (Amendment 3 to the fishery management plan for the dolphin and wahoo fishery of the Atlantic). South Atlantic Fishery Management Council. Charleston, SC.

SAFMC. 2015. Amendment 7 to the Fishery management plan for the dolphin and wahoo fishery of the Atlantic and Amendment 33 to the Fishery Management Plan for the Snapper Grouper Fishery of the South Atlantic Region. South Atlantic Fishery Management Council. Charleston, SC. 225 pp.

SAFMC. 2020. Amendment 12 to the Fishery Management Plan for the Dolphin Wahoo Fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 29 pp.

SAFMC. 2021. Amendment 10 to the Fishery Management Plan for the Dolphin Wahoo Fishery of the Atlantic. South Atlantic Fishery Management Council. Charleston, SC. 289 pp.

Theisen, T.C., and J.D. Baldwin. 2012. Movements and depth/temperature distribution of the ectothermic Scombrid, Acanthocybium solandri (wahoo), in the western North Atlantic. Marine Biology 159: 2249-2258.

TABLES

Table 1. Recreational harvest (number of fish landed and weight in pounds) and releases (number of fish) and commercial harvest (weight in pounds) of wahoo from North Carolina, 1986–2022. The (-) denotes years where there were no observations of released wahoo.

	Recreational			Commercial	
Year	Number Landed	Number Released	Weight Landed (lb)	Weight Landed (lb)	Total Weight (lb)
1986	11,085		21,298	6,014	480,416
1987	6,400	42	172,708	15,827	188,535
1988	2,043	-	14,342	19,783	34,125
1989	6,674	-	194,287	9,921	204,208
1990	5,290	-	114,060	16,653	130,713
1991	5,068	17	121,382	18,620	140,002
1992	6,326	1,061	1,726,842	14,383	1,741,225
1993	7,673	-	208,325	24,121	232,446
1994	12,182	1,286	308,986	20,319	329,305
1995	21,726	14	476,289	40,731	517,020
1996	15,259	1,300	397,335	26,675	424,010
1997	19,587	152	464,335	20,628	484,963
1998	11,195	51	253,128	22,600	275,728
1999	17,341	-	387,342	28,963	416,305
2000	18,183	1,126	412,824	19,905	432,729
2001	17,889	-	473,926	20,503	494,429
2002	32,783	398	1,056,010	19,952	1,075,962
2003	21,274	-	662,567	17,222	679,789
2004	61,153	-	2,220,765	22,006	2,242,771
2005	41,364	-	1,249,160	14,980	1,264,140
2006	21,834	594	490,904	16,426	507,330
2007	47,890	-	1,495,127	24,306	1,519,433
2008	21,777	-	527,736	11,643	539,379
2009	42,129	48	1,696,717	16,397	1,713,114
2010	19,703	2,532	571,575	12,626	584,201
2011	21,501	40	611,319	15,870	627,189
2012	37,423	12	994,195	23,521	1,017,716
2013	11,951	337	319,866	23,380	343,246
2014	29,362	22	804,473	22,783	827,256
2015	36,920	608	983,232	18,380	1,001,612
2016	39,565	5	1,056,969	25,393	1,082,362
2017	30,305	-	842,604	28,963	871,567
2018	10,690	182	280,644	22,619	303,263
2019	17,098	23	454,391	31,494	485,885
2020	19,055	87	462,937	12,079	475,016
2021	9,760	-	244,078	7,343	251,421
2022	9,657	-	232,436	7,924	240,360
Mean	20,733	452	634,006	19,485	653,491

Table 2. Total number of awarded citations for wahoo (>40 pounds landed) annually from the North Carolina Saltwater Fishing Tournament, 1991–2022.

Year	Citations
1991	247
1992	349
1993	390
1994	422
1995	400
1996	378
1997	391
1998	474
1999	493
2000	706
2001	501
2002	537
2003	448
2004	827
2005	680
2006	614
2007	913
2008	327
2009	377
2010	419
2011	358
2012	673
2013	737
2014	718
2015	697
2016	694
2017	978
2018	719
2019	786
2020	527
2021	310
2022	462

Table 3. Mean, minimum, and maximum lengths (fork length, inches) of wahoo collected from the commercial and recreational fisheries, 1986–2022.

Year	Commercial				Recreational			
	Mean Length	Minimum Length	Maximum Length	Total Number Measured	Mean Length	Minimum Length	Maximum Length	Total Number Measured
1986	51.2	47.6	55.9	3	53.2	31.0	64.0	28
1987	36.2	36.2	36.2	1	46.6	24.0	72.4	72
1988	53.2	39.8	65.4	15	47.9	28.9	72.8	96
1989	53.3	41.9	72.0	20	46.8	28.3	59.8	91
1990	54.6	41.7	68.3	7	44.5	16.9	59.6	143
1991	47.9	41.3	53.5	5	45.6	21.1	64.2	105
1992	55.0	42.9	70.3	11	47.3	29.5	66.0	139
1993	45.3	38.4	57.1	15	46.9	21.9	71.0	154
1994	53.5	40.9	63.4	4	47.0	4.3	66.5	320
1995	51.7	39.4	60.4	6	45.4	3.9	72.1	391
1996	56.5	46.5	63.0	4	48.0	25.6	67.5	253
1997	-	-	-	0	45.6	23.2	70.6	302
1998	-	-	-	0	45.5	28.2	61.0	327
1999	51.9	32.3	65.0	11	44.7	31.7	68.5	275
2000	49.8	40.9	57.1	5	44.9	33.1	83.5	247
2001	45.5	41.7	50.0	3	46.1	36.0	77.1	249
2002	41.3	41.3	41.3	1	48.0	33.0	68.0	260
2003	52.9	44.5	61.8	4	48.2	37.3	68.0	58
2004	41.7	31.9	50.0	4	52.3	35.6	66.1	151
2005	55.1	48.8	62.6	8	48.1	34.4	67.2	75
2006	61.4	61.0	61.8	2	45.0	28.2	67.3	87
2007	26.7	24.6	29.4	4	50.4	24.3	62.0	110
2008	44.8	40.9	52.2	3	46.1	30.3	68.0	113
2009	45.4	39.5	52.0	10	53.6	34.0	68.2	145
2010	50.4	38.1	87.3	6	49.0	28.0	67.6	184
2011	47.9	41.1	63.4	16	49.0	31.0	68.1	227
2012	49.3	35.4	70.0	101	48.2	32.0	70.6	393
2013	45.5	41.3	49.6	2	48.4	39.8	65.6	97
2014	46.2	39.7	54.3	30	48.2	26.0	59.0	133
2015	53.2	50.3	56.5	8	47.9	31.7	78.0	135
2016	49.8	39.5	68.3	18	48.1	30.9	62.6	211
2017	54.4	50.0	60.0	4	48.8	36.3	68.0	163
2018	53.0	35.9	69.5	14	47.7	28.1	68.5	126
2019	55.5	41.7	71.1	50	47.1	32.1	78.4	104
2020	46.9	35.0	65.7	5	46.9	26.0	70.5	93
2021	48.3	43.6	52.6	4	46.0	26.0	71.9	39
2022	46.3	41.0	53.4	5	47.4	5.6	68.0	59

FIGURES

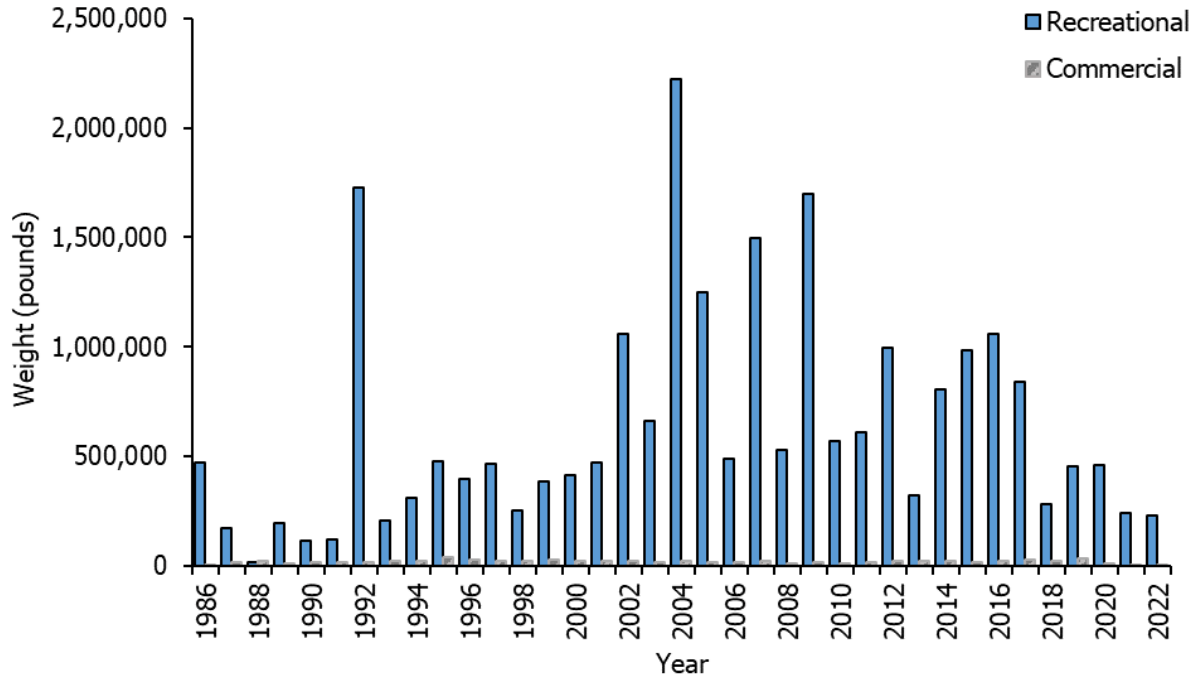

Figure 1. Annual commercial and recreational landings in pounds of wahoo in North Carolina, 1986–2022.

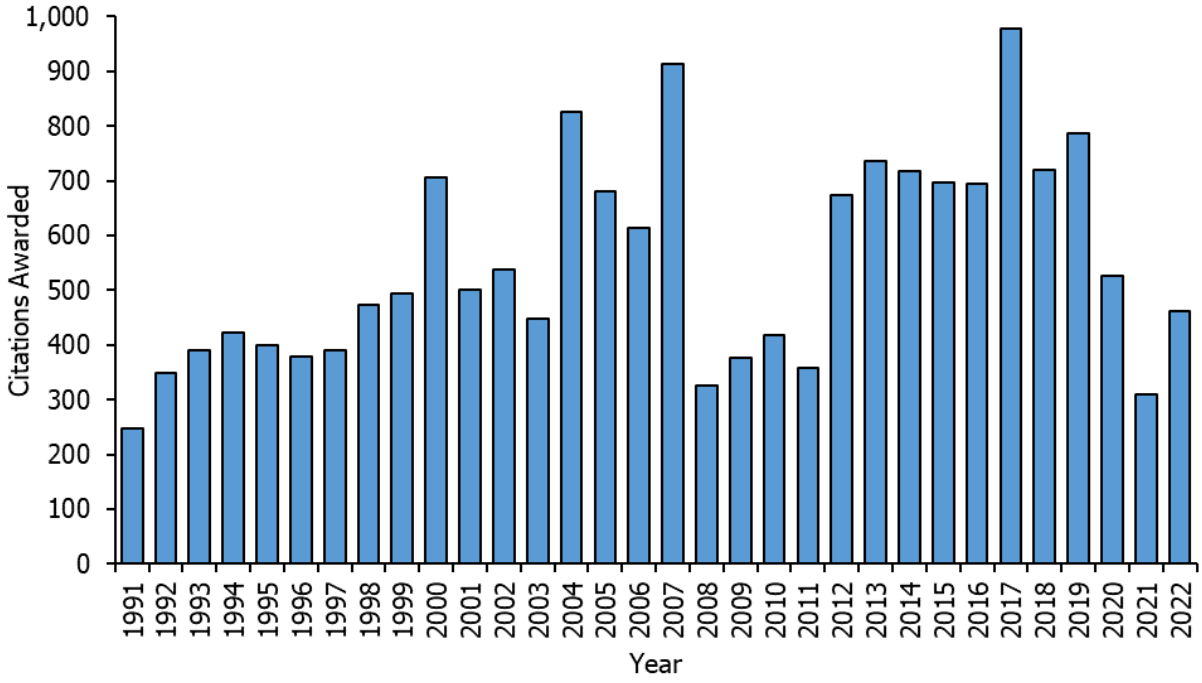

Figure 2. Total number of awarded citations for wahoo (>40 pounds landed) annual from the North Carolina Saltwater Fishing Tournament, 1991–2022.

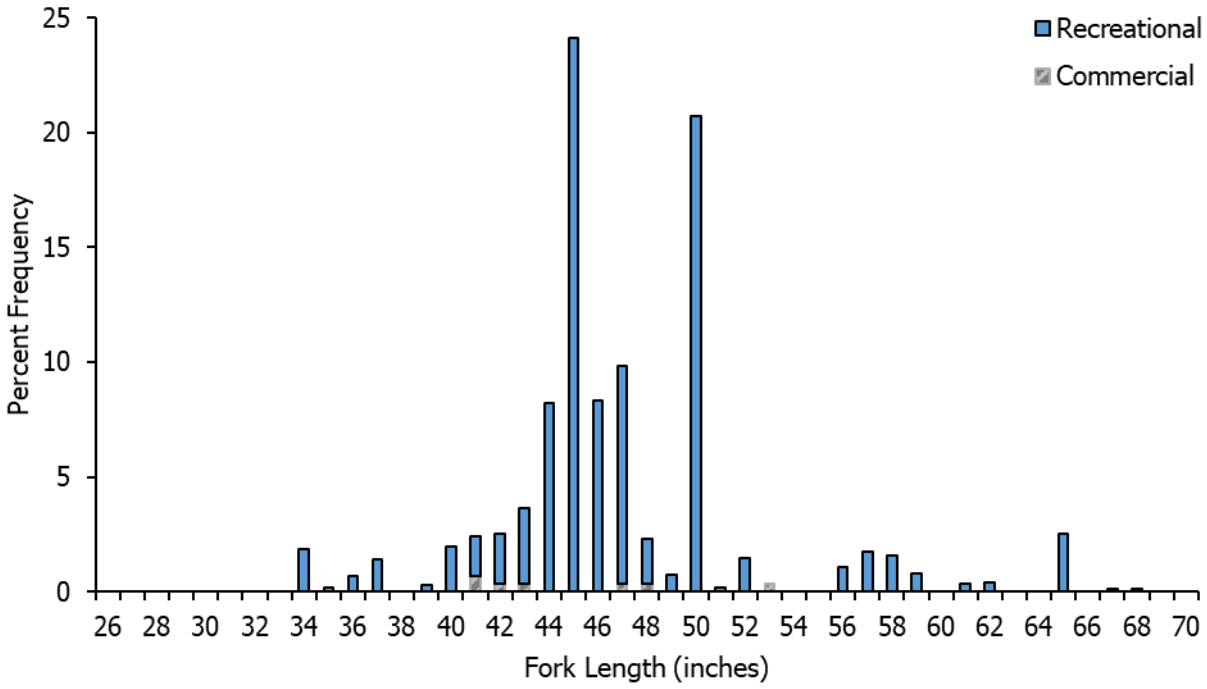

Figure 3. Commercial and recreational length frequency distribution for wahoo harvested in 2022.

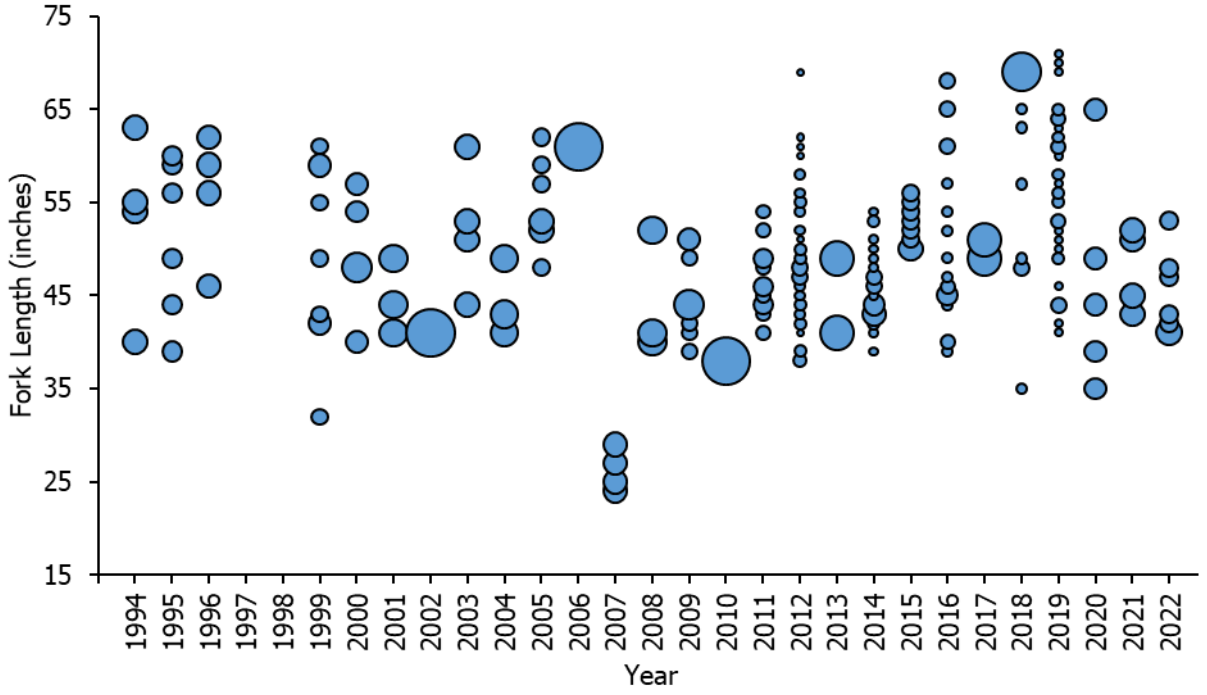

Figure 4. Commercial length frequency (fork length, inches) of wahoo harvested, 1994–2022. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.

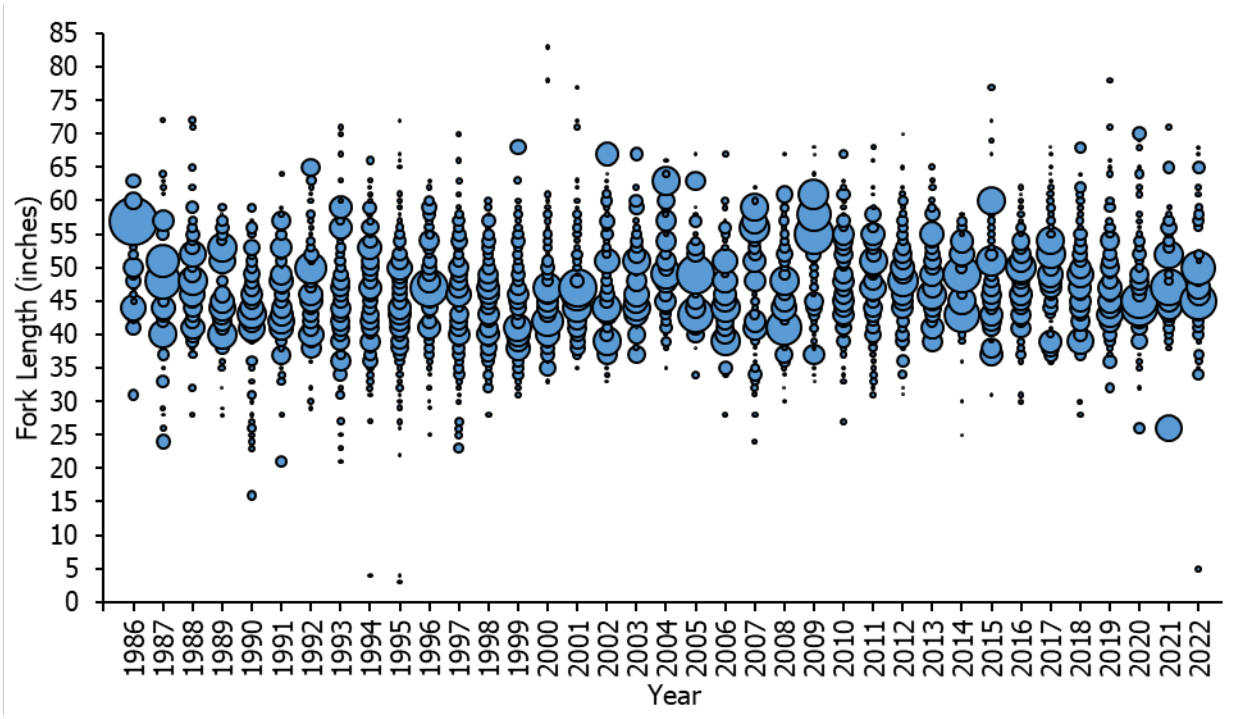

Figure 5. Recreational length frequency (fork length, inches) of wahoo harvested, 1986–2022. Bubbles represent fish at length and the bubble size is proportional to the number of fish at that length.