NC Coastal Habitat Protection Plan Implementation Progress

Coastal Habitat Protection Plan Steering Committee
May 11, 2020

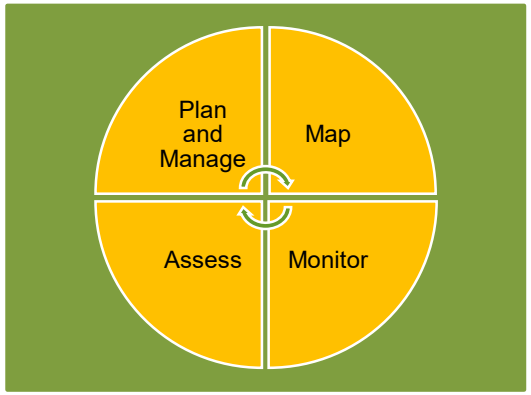
2021 CHPP Timeline

2021 CHPP Plan Sections	CSC Meeting (1st Review)
Executive Summary	
Ch 1. Background	
Ch 2. Implementation Progress, 2016-2020	5/11/2020
Ch 3. Climate Change and Coastal Resiliency	5/11/2020
Ch 4. Habitat Monitoring to Assess Status and Trends	
Ch 5. Environmental Rule Compliance to Protect Habitat and Water Quality	5/11/2020
Ch 6. Wetland Protection and Enhancement, with Focus on Nature-Based Methods	
Ch 7. Submerged Aquatic Vegetation Protection and Restoration, with Focus on Water Quality Improvements	
Ch 8. Reducing Inflow and Infiltration associated with Wastewater Infrastructure to Improve Coastal Water Quality	
Ch 9. Summary of Recommended Actions	
Final Document Review	

Status of 2016 Habitat Priorities – CHPP Implementation

Oyster Restoration

Living Shorelines



Developing Metrics

Sedimentation

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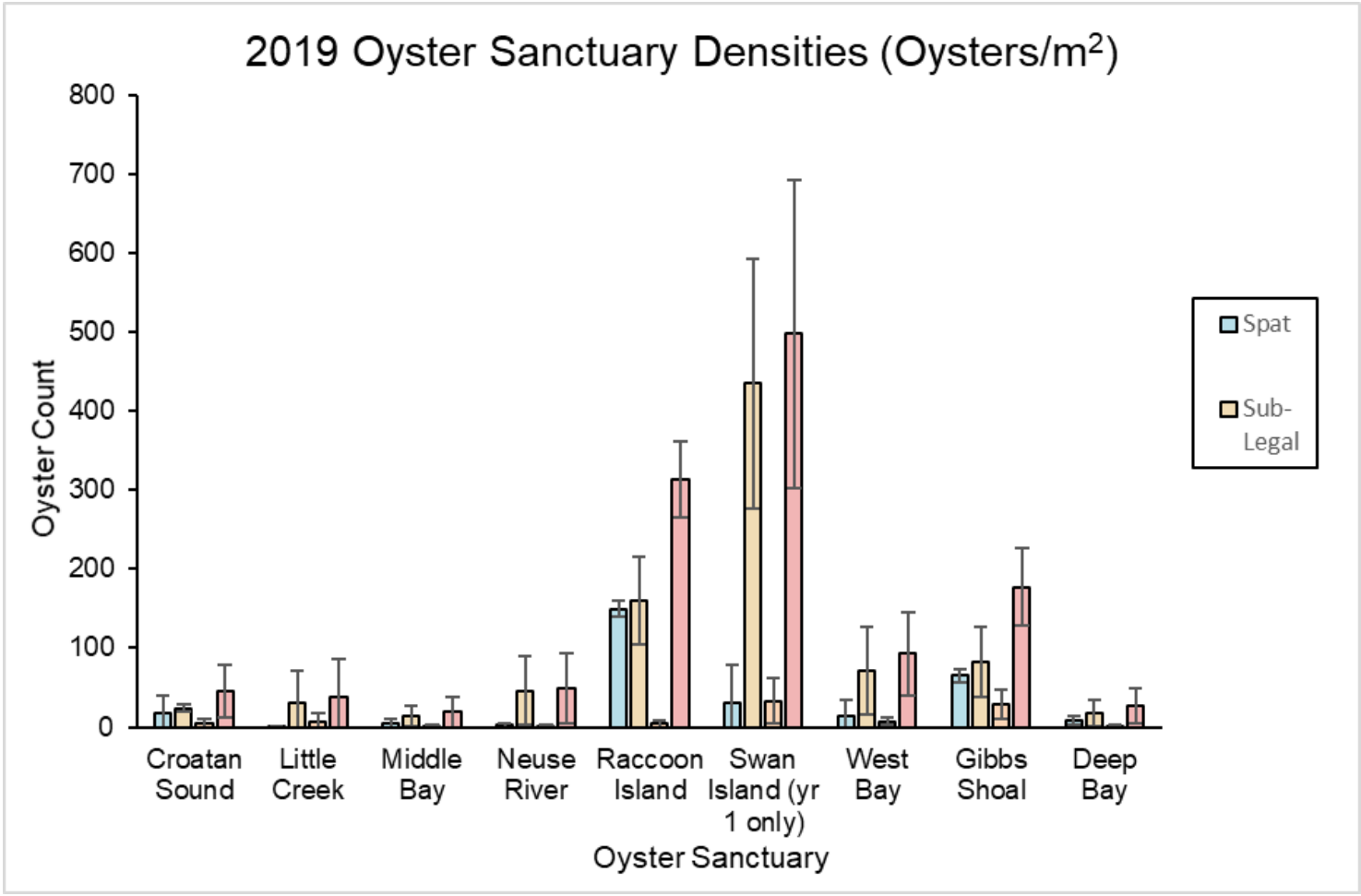
Status of 2016 Habitat Priorities –
Oyster Restoration

Cultch Planting (2016-2019)

- 261 acres of oyster habitat built
- Sidescan to quantify footprint and persistence
- Monitoring oyster spatset

Oyster Sanctuaries (2016-2019)

- 51 acres of oyster habitat built
- 81 acres of bottom protected
- Sidescan footprint and relief
- Monitoring recruitment and growth of oysters



Status of 2016 Habitat Priorities – Oyster Restoration

- Oyster restoration continues to be a CHPP priority
- DEQ agencies partner on drafting and implementing NC Oyster Blueprint
- 2021-2025 Oyster Blueprint includes water quality, oyster sanctuary, cultch planting, and living shoreline strategies
- DMF continues to construct new reefs, partners with others to leverage funding, and conduct monitoring

NORTH CAROLINA OYSTER BLUEPRINT
An Action Plan for Restoration and Protection

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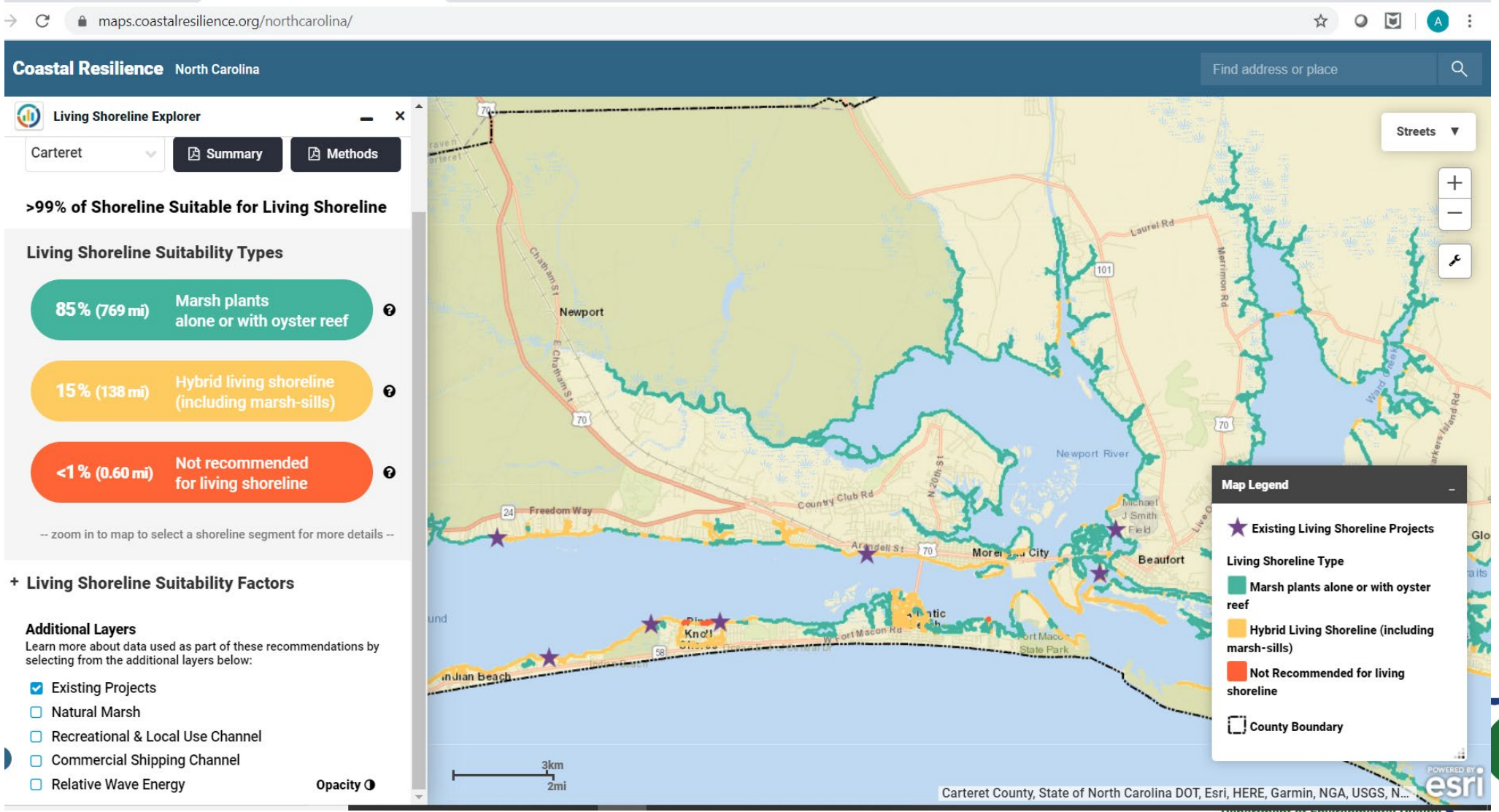
Status of 2016 Habitat Priorities – Living Shorelines

- Permit simplification - 14 marsh sill GP applications since 2017
- Living Shoreline Research on
  - performance over time
  - resilience to hurricanes - outperformed bulkheads
  - elevation change in natural and living shoreline marshes
  - the extent marsh reduces wave energy
- Coastal Reserve Living Shoreline Workshops
  - 9 since 2017; seeing progress
- Living Shorelines Steering Committee
  - to continue advancement of living shorelines
  - Co-led by APNEP and NCCF

https://deq.nc.gov/about/divisions/coastal-management/coastal-management-estuarine-shorelines/stabilization/resources-homeowners-professionals

Status of 2016 Habitat Priorities – Living Shorelines



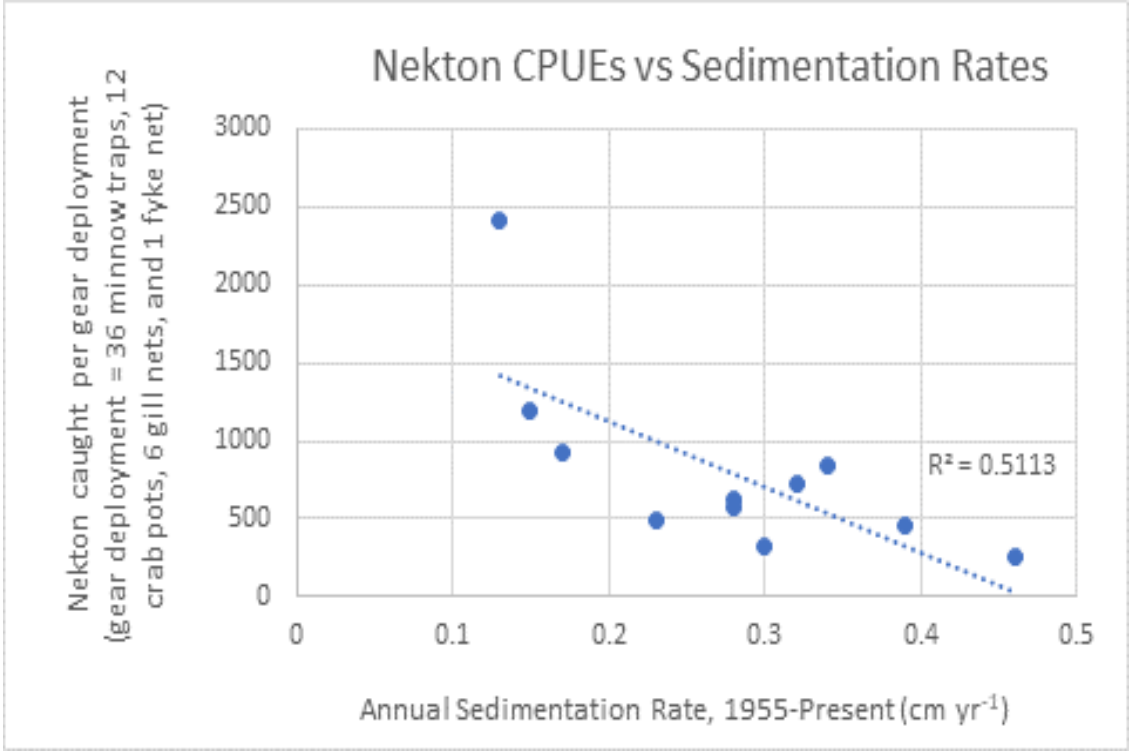
https://maps.coastalresilience.org/northcarolina/

Status of 2016 Habitat Priorities –
Reducing Sedimentation in Tidal Creeks

Research

- Sedimentation rates and sources – Corbett et al. 2017; Deaton 2018
  - Increase in rates associated with increasing development and land use change
  - Sedimentation rates were greater than increases in sea level rise rates
- Effect on nursery areas and productivity – CRFL study (Fodrie, final report pending)
  - Preliminary results – sedimentation had negative effect on fish and crab abundance

- Innovative methods for sediment and stormwater control
  - DEQ, DOT, NCSU collaboration on many projects – rain gardens, stormwater wetlands, drainage improvements
  - DWR 319 grants – several funded projects in coastal areas - Watershed Restoration Plans, stormwater volume reduction



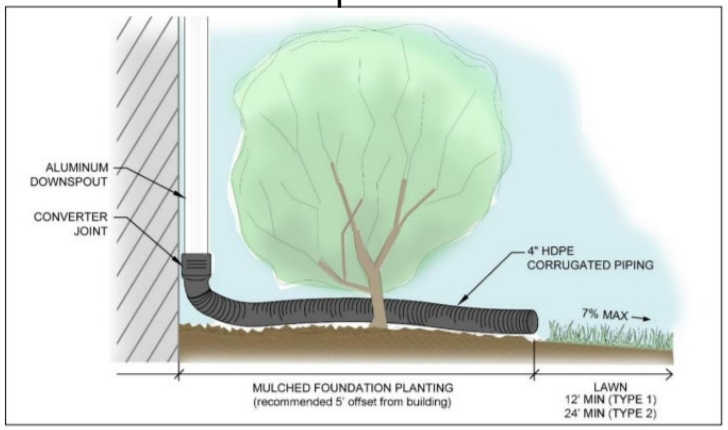
Status of 2016 Habitat Priorities –
Reducing Sedimentation in Tidal Creeks

Expand use of stormwater BMPs and LID

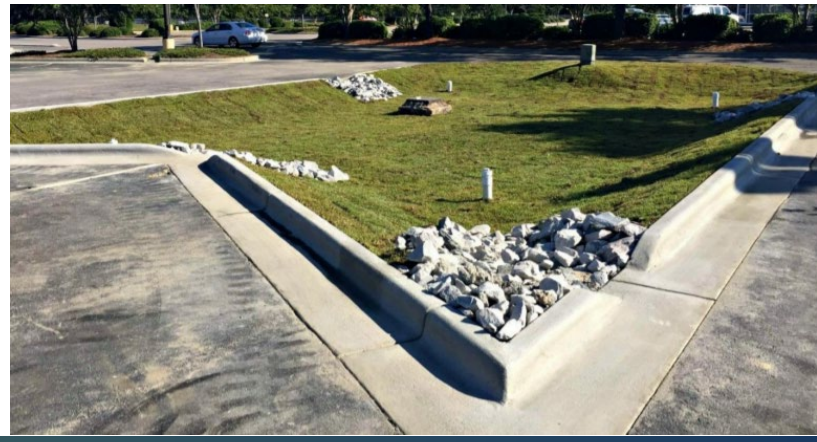
- 2016 legislative changes to stormwater rules- increased impervious surface limits under low density option
- DEMLR – updated Stormwater Design Manual in 2017
  - Greater incorporation of Stormwater Control Measures to infiltrate stormwater onsite
  - Increased stormwater BMP and LID options
  - New rules are more flexible and less costly

Infiltration Basin

Disconnected impervious surface



Bioretention swale



Status of 2016 Habitat Priorities – Reducing Sedimentation in Tidal Creeks

Improve effectiveness of sediment and erosion control programs

- Educate developers, contractors, public on why and how to control sediment and stormwater
  - Multiple design and training workshops
  - Sedimentation and Erosion Control Planning and Design Manual
  - Sediment Education Position filled
- Work with DOT to retrofit road ditches draining to estuarine waters
  - NPDES permit for roads requires
  - Post-Construction Stormwater Program - implement structural or non-structural BMPs
  - Retrofit Program – must do at least 70 retrofits per 5 yr
- Enhance local and state program monitoring capabilities, and provide educational, financial, and technical support
  - No additional financial resources provided

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Status of 2016 Habitat Priorities – Developing Habitat Metrics

Shell bottom

In 2019 DMF began pilot study mapping intertidal and shallow subtidal oyster reefs with drone technology to map sentinel sites

Submerged Aquatic Vegetation (SAV)

APNEP SAV Team developing monitoring protocol for high and low salinity SAV and establishing sentinel sites

Wetlands

In 2016, DWR assisted with National Wetland Conditional Assessment (NWCA). Expanding in 2021.

DCM, Coastal Reserve Program assists with wetland monitoring as part of NC Sentinel Site Cooperative Monitoring Program

Strategic Habitat Areas

Completed 2 yr of monitoring to validate SHAs in White Oak region. Sampling ongoing in Cape Fear region.

Status of 2016 Habitat Priorities – Other Implementation Progress

Outreach on fish habitat value, threats, and explanations of management measures

- DWR and DEMLR- Education specialist positions
- APNEP - Shad in the Classroom
- DCM – Coastal Reserve Workshops

Improve anadromous fish passage through obstruction removal/modification

DWR and DMS 2018-2020:

- 4 dam removals
- 14 culvert, ditch, pond modifications

Improve strategies to reduce nonpoint pollution

- DWR- Albemarle Sound Nutrient Criteria Development Program

Protect habitat from fishing gear

DMF/MFC- established additional Crab Spawning Sanctuaries at inlets

Questions?

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2021 Coastal Habitat Protection Plan: Climate Change

DEPARTMENT OF ENVIRONMENTAL QUALITY

Casey Knight | CHPP Steering Committee | May 11, 2020

Climate Change and Resiliency

Executive Order 80

- Executive Order 80 – North Carolina's Commitment to Address Climate Change and Transition to a Clean Energy Economy (EO80)
- Signed October 29, 2018
- Directs all cabinet agencies at integrate climate adaptation and resiliency planning
- Created Climate Change Interagency Council
  - Members of all cabinet agencies
  - DEQ tasked as lead agency

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Climate Change and Resiliency

Executive Order 80

- Staff from all Department divisions, other state and federal agencies, academics, and Non-governmental organizations were active in the development of:
  - North Carolina Climate Science Report (NCCSR)
  - North Carolina Natural Working Lands Report (NWL)
  - North Carolina Risk and Resiliency Plan
- The CHPP provided valuable information and recommendations were aligned where possible

North Carolina Institute for Climate Studies

NC STATE UNIVERSITY

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The Nature Conservancy
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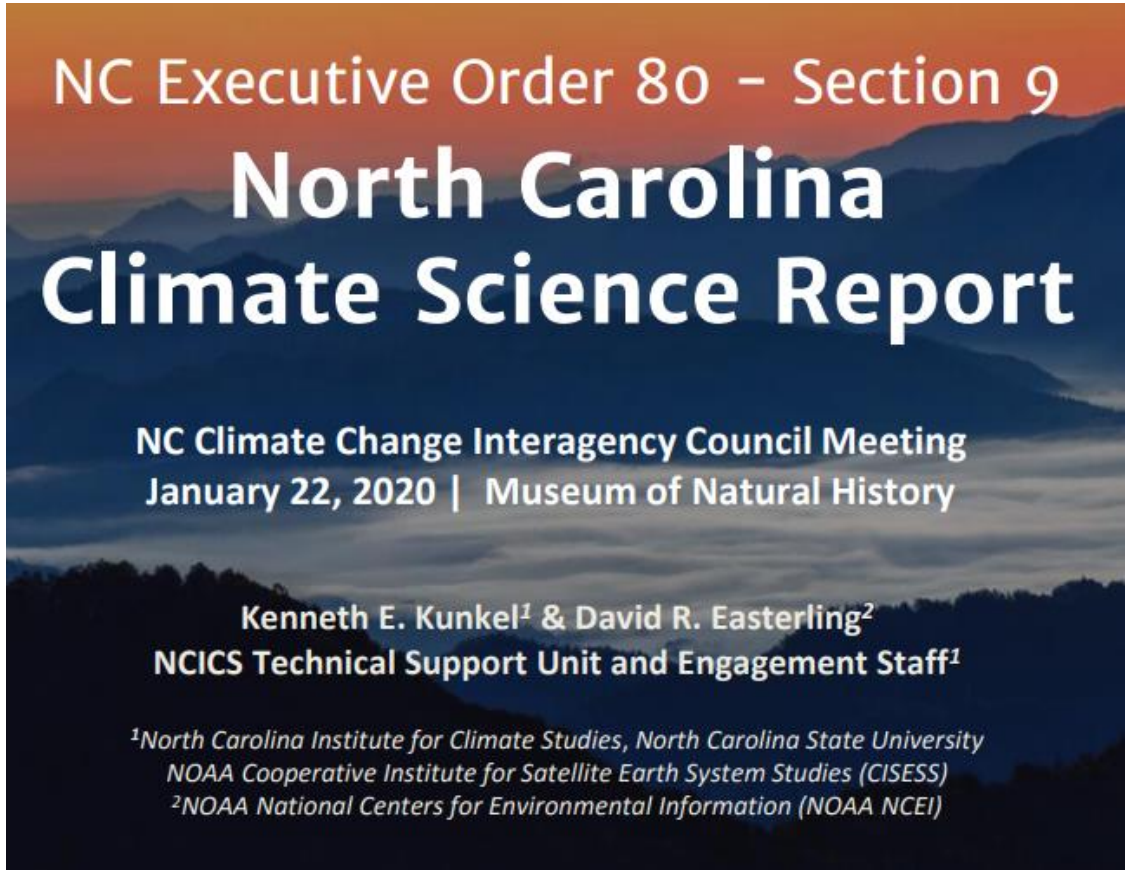
North Carolina Climate Science Report



Virtually Certain = 99-100% probability
Very Likely = 90-100% probability
Likely = 66-100% probability

Higher and Lower future greenhouse gas concentrations were considered

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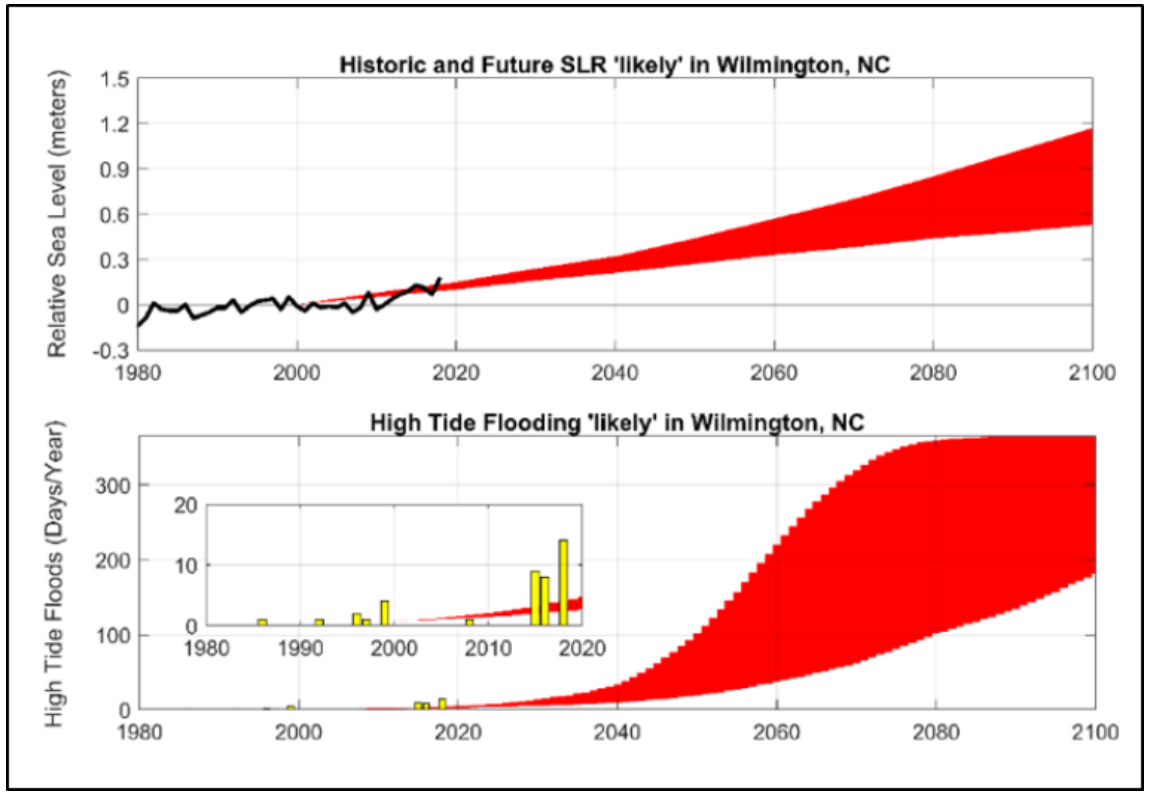
North Carolina Climate Science Report

Report Findings

- Large changes in North Carolina's climate are ***very likely*** by the end of this century
- Substantial temperatures increases in all seasons is ***very likely***
- The number of warm and very warm nights will ***very likely*** increase
- As the number of hot and very hot days is ***likely*** to increase, the number of cold days will ***likely*** decrease
- Continued sea level rise along the coast is ***virtually certain***



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North Carolina Climate Science Report

Report Findings

- The intensity of the strongest hurricanes is ***likely*** to increase
- Heavy precipitation accompanying hurricanes that pass near/over is ***very likely*** to increase
- The frequency of severe thunderstorms and the annual total precipitation will ***likely*** increase
- Extreme precipitation frequency and intensity is ***very likely*** to increase; ***likely*** leading to increases in inland flooding
- Increases in storm surge flooding on the coast is ***virtually certain***

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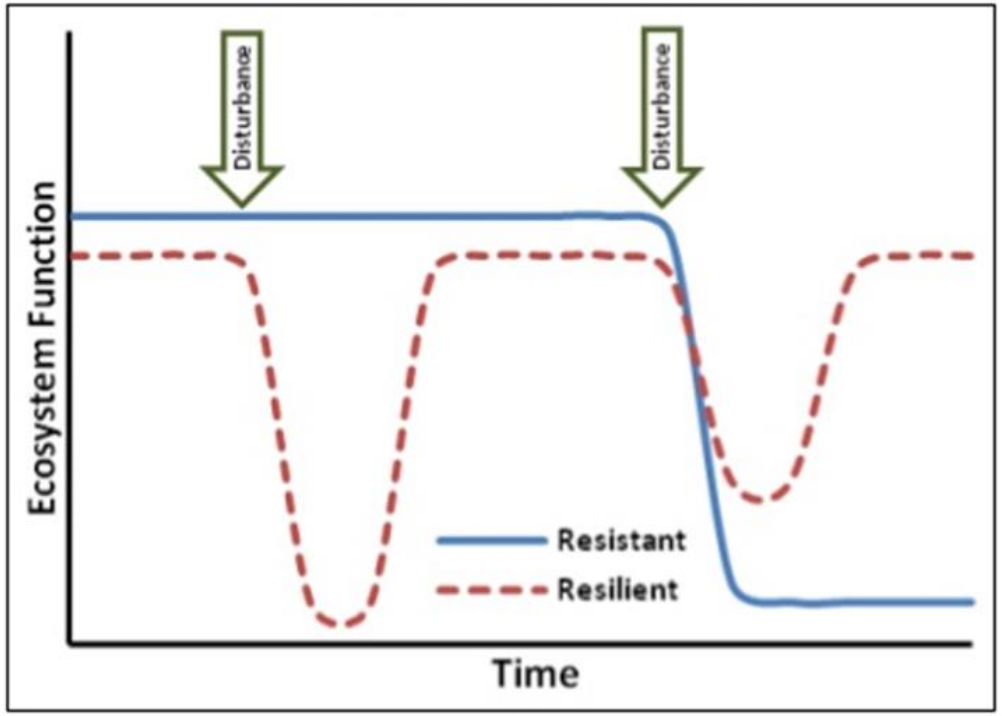
North Carolina Coastal Resilience

Coastal resilience can be broken down into two intertwined parts:

1) community resiliency – the ability of a community to withstand, respond to, and recover from a disruption, and
2) ecosystem resiliency – the ability of the natural environment to withstand, respond to, and recover from a disruption

Disruptions = hurricanes, storm events, and flooding



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Coastal Habitats and Climate Change

- Almost all coastal habitats will be affected by climate change
- Habitat along with their ecological functions and ecosystem services could be lost
  - Wetlands and intertidal shell bottom loss due to sea level rise
  - Loss/change in distribution of submerged aquatic vegetation (SAV) and shell bottom due to poor water quality resulting from increased flooding and decreased wetland buffering capacity
  - Loss of shell bottom due to ocean acidification
- Range/distributions shifts impacts
  - Affect the habitats and the species that use them
  - Direct – increasing water temperatures, degraded water quality, changes in salinity
  - Indirect – changes in habitat and prey availability
  - Management
  - Economic

Climate Change and the CHPP

Action	Recommended Strategies
Protect	Provide incentives to stakeholders for coastal habitat protection. Protecting coastal habitats, such as natural shorelines, coastal wetlands, oyster beds, and submerged aquatic vegetation (SAV), through landowner incentives will provide benefits to community and ecosystem resilience and increase carbon sequestration. Providing these incentives can ensure protection of coastal habitats and the ecosystem services they provide. This protection will result in increased hazard mitigation and decrease costs required to repair assets and property and restore coastal habitats after major storm events.
	Facilitate salt marsh migration through protection of migration corridors. There is significant need for the state to facilitate conservation of migration corridors (natural areas without barriers such as development) for salt marsh and other coastal habitats. Ensuring these migration spaces remain undeveloped is key to facilitating marsh migration with sea-level rise, and therefore preserving the coastal protection, ecological functions, and carbon benefits of North Carolina's marshes. Minimizing risk and expenses of hazard damage by ensuring protection and migration of salt marsh and other coastal habitats will increase ecosystem and community resilience.
Restore	Prioritize climate change and sea-level rise in coastal habitat restoration planning. Climate change and sea-level rise considerations need to be incorporated into planning processes for coastal habitat restoration by the state, federal, and local governments. Currently, federal habitat restoration programs consider the impacts of climate change and sea level rise (SLR), and North Carolina should also require these impacts be considered when planning habitat restoration projects. Improved restoration planning will allow for more targeted and cost-effective efforts that will increase coastal resilience and carbon sequestration.

- Actions should be taken to make coastal habitats more resilient to these disturbances ensuring coastal habitats and their valuable ecosystem services continue to persist.
- Recommendations and actions from CHPP will continue to support and align with the those of North Carolina's Natural Working Lands report and Risk and Resiliency Plan

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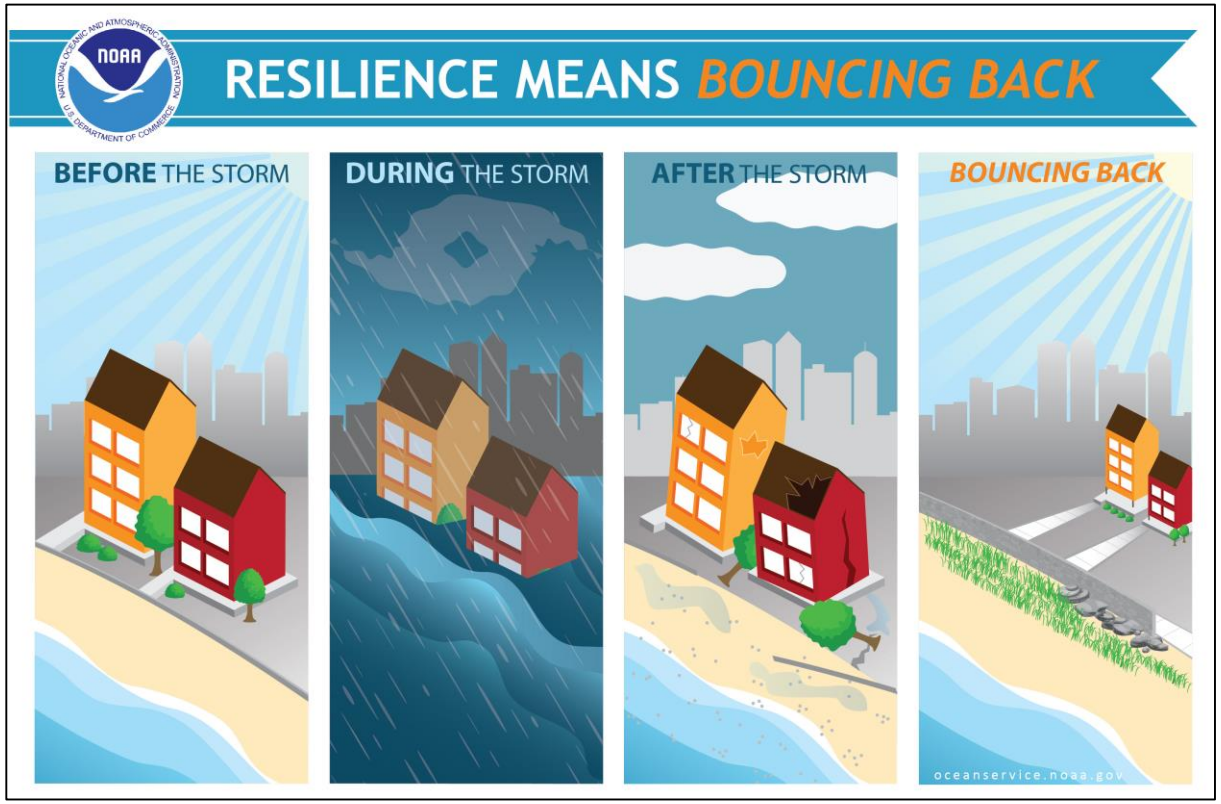
Climate Change and the CHPP

- Some 2021 CHPP Priority Habitat Issues will further examine threats and recommend actions to protect and restore coastal habitats:
  - Wetland Protection and Enhancement, with Focus on Nature-Based Methods
  - Protecting SAV with a Focus on Water Quality
  - Habitat Monitoring to Assess Status and Regulatory Effectiveness
- These actions not only benefit the coastal habitats, but also increase community and ecosystem resilience to climate change stressors.



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Questions?

NC Gov. Cooper's Executive Order 80: https://files.nc.gov/ncdeq/climate-change/EO80--NC-s-Commitment-to-Address-Climate-Change---Transition-to-a-Clean-Energy-Economy.pdf
NC Climate Change Interagency Council: https://deq.nc.gov/energy-climate/climate-change/nc-climate-change-interagency-council
NCDEQ Climate and Energy: https://deq.nc.gov/energy-and-climate
NOAA Resilience: https://oceanservice.noaa.gov/facts/resilience.html
NC Institute for Climate Studies: https://ncics.org/
NC Coastal Community Resiliency Guide: https://ncdenr.maps.arcgis.com/apps/MapSeries/index.html?appid=e2eb18546943471b93f0264659744a81

2021 Coastal Habitat Protection Plan: Priority Habitat Issue Paper – Environmental Rule Compliance and Enforcement to Protect Coastal Habitats

DEPARTMENT OF ENVIRONMENTAL QUALITY

Anthony Scarbraugh | May 11, 2020

Compliance and Enforcement

Background and Issue

- Historically emphasis has been on the permitting of impacts to wetland and surface water of the North Carolina.
- Staff time is dominated by meeting permit processing deadlines.
- Compliance and enforcement lag due to time prioritization and funding shortfalls.
- Limited literature exists on the effectiveness of compliance and enforcement efforts
  - Estimates of further loss and impairment of wetlands and surface waters can only be inferred.
- However, the extent of existing impaired waters in North Carolina is significant.

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Compliance and Enforcement

Benefits

- A more balanced approach between compliance and enforcement programs' efforts and permitting
  - Will ensure transparency and fairness
- Predictability of the compliance efforts and possible enforcement action
  - Would reinforce reason for property owners and/or permittees to adhere to permit conditions and other applicable laws and regulations
- Serves as a deterrent for potential violators
  - Risk of receiving monetary losses in civil penalties and/or criminal penalties

Virginia Creek

Compliance and Enforcement

Historical Program Efforts for Wetlands and Waters

- Only limited literature is published regarding success of compliance and enforcement efforts on a state or national scale.
- Most publication are limited to only individual states compliance and enforcement policies or federal jurisdiction.
- A study conducted in 1995 indicated that less than 50% of NC Sediment and Erosion Control Program site inspections conducted were compliant with the written plan (Burby1995; Dorney et al. 2015).

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Compliance and Enforcement

Historical and Existing Wetlands and Surface Waters in North Carolina

- Prior to European colonization, ~11 million acres of wetlands were thought to exist.
  - By mid-1980's only 5.7 million acres remained (Dahl 1990).
- An estimated 3.7 million acres of woody and emergent herbaceous wetlands are present within the CHPP area.
  - Representing 21% of the total land area (Jin et al. 2013; CHPP 2016).
- The Albemarle-Pamlico Sound estuary is the second largest estuary by area in the Eastern United States (APNEP n.d.).
  - Estimated area of 31,478 square miles
- Approximately 20% of the total CHPP area, consists of surface waters (2,813,620 acres) (CHPP 2016).

Drummond Point

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Services that Wetlands and Surface Waters Provide

- Wetlands serve as flood protection by storing of both surface and subsurface waters.
  - An estimated 330,000 gallons of water in restored in one acre of wetlands (PUCES 1990)
- Improve water quality by intercepting runoff and acting as nutrient and suspended sediment sink.
  - Inhibits these pollutants from entering downstream surface waters
- Provide habitat for flora and fauna across many life stages.
  - North Carolina is home to 61 federally threatened or endangered species that spend part of their lives in wetlands or waters (USFWS 2019)

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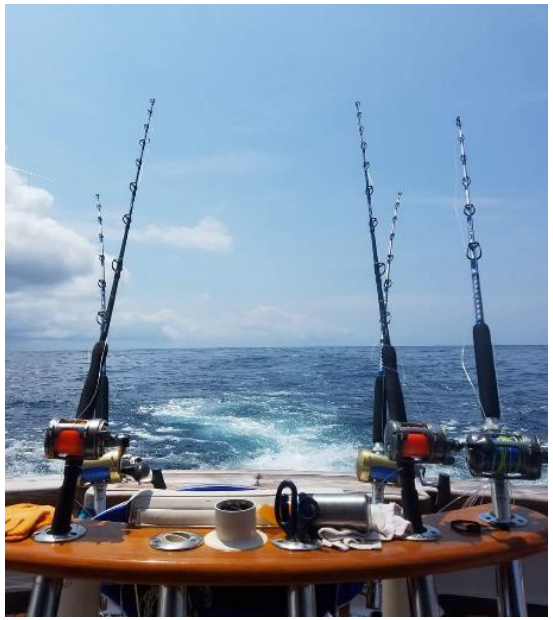
Services that Wetlands and Surface Waters Provide



- Industries such as fisheries, silviculture and agriculture are dependent on wetlands and surface waters for consumer goods.
  - Such as shellfish, timber, blueberries, etc.
- Recreational benefits of wetlands and surface waters range from hunting and fishing to hiking and birdwatching.
  - In North Carolina ~$156.9 billion of economic impact was generated from recreational anglers, hunting, and wildlife watching (USFWS 2018)

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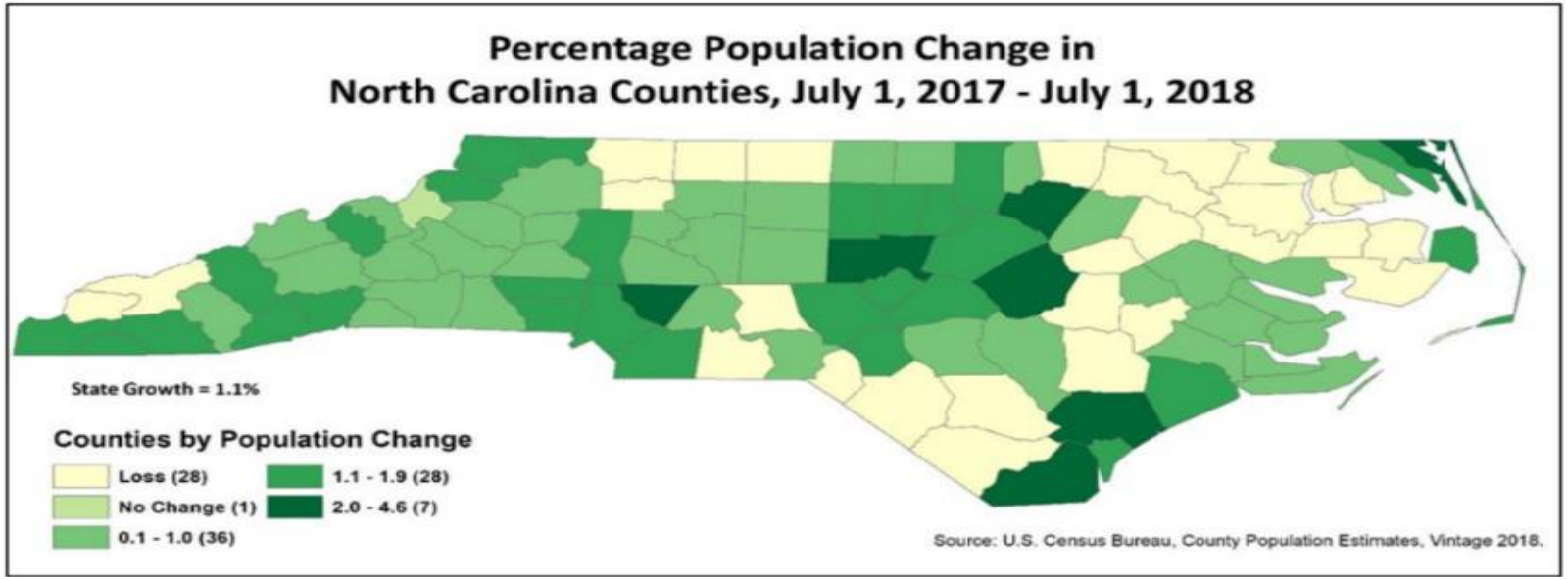
Compliance and Enforcement

Demography and Demands of the Wetlands and Surface Waters of North Carolina

- North Carolina's population was estimated to be 10.4 million in 2018 (Tippett 2018)
  - Projected growth of an additional 1.4 million by 2030 (NCOBM 2018).
- The majority of the projected growth is to occur within the Charlotte and Triangle Regions (74% of State growth)
  - Additional projected growth ranging from 6 to more than 18% is also to occur in the coastal plain counties of Currituck, Dare, Pitt, Carteret, Duplin, Cumberland, Onslow, Pender, New Hanover, and Brunswick (Tippett 2015)



https://www.thinkcurrituck.com/news-events-currituck-county-nc/2018-census-data-shows-growth-for-currituck-county

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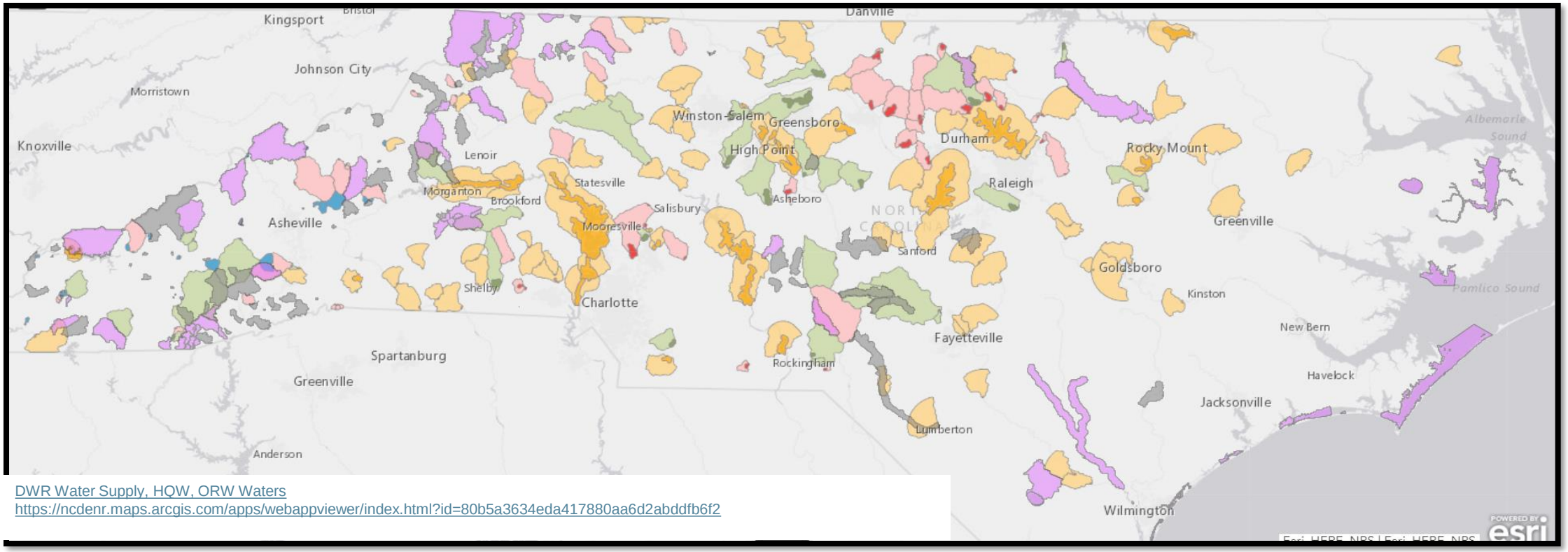
Demography and Demands of the Wetlands and Surface Waters of North Carolina

- A recent estimate from the EPA states that ~7 million of North Carolina's residents depend on the State's surface water as their primary potable water source (DWR n.d.).



DWR Water Supply, HQW, ORW Waters
https://ncdenr.maps.arcgis.com/apps/webappviewer/index.html?id=80b5a3634eda417880aa6d2abddfb6f2

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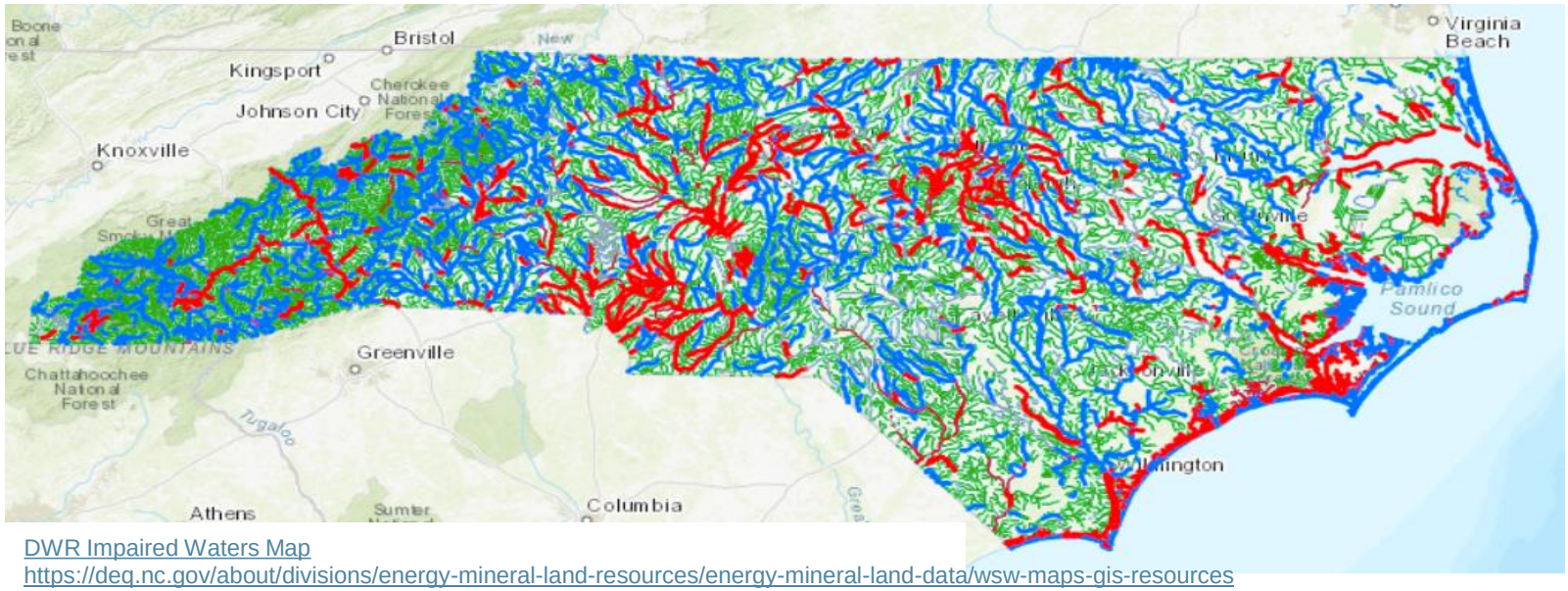
Demography and Demands of the Wetlands and Surface Waters of North Carolina

- As development pressure rises expansion of impervious surface coverage will increase the amount of stormwater runoff entering downstream receiving waters.
  - Amplifying the potential for both point and non-point pollution
- Currently over 750,000 acres of the State's waters are considered impaired and listed on the Section 303 (d) of the Clean Water Act (DWR 2018).



DWR Impaired Waters Map
https://deq.nc.gov/about/divisions/energy-mineral-land-resources/energy-mineral-land-data/wsw-maps-gis-resources

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Compliance and Enforcement

State Regulatory Authority for Wetlands and Surface Waters

- Division of Coastal Management (DCM) issues permits and conducts compliance and enforcement activities under the authority of:
  - Memorandum of Understanding with US Army Corps of Engineers (USACE), 1969 NC State Dredge and Fill Law, 1972 CZMA, 1975 Coastal Area Management Act, and other associated state regulations
- Division of Energy, Mineral, and Land Resources (DEMLR) issues permits and conducts compliance and enforcement activities funder the authority of:
  - Section 402 of the Clean Water Act (National Pollution Discharge Elimination System program), Sedimentation Pollution Control Act (SPCA) of 1973, North Carolina Mining Act of 1971, North Carolina Dam Safety Law of 1967, and other related subsequent laws, regulations and amendments to regulate activities associated with erosion and sediment control, mining, and dam safety activities
- Division of Water Resources (DWR) issues permits and conducts compliance and enforcement activities for under the authority of:
  - Section 401 and 402 of Clean Water Act and associated Water Quality Standards associated with Stream and Wetland Standards

Compliance and Enforcement

State Permits Impacting Wetlands and Surface Waters

- From 1999 to 2019, DWR issued certifications under Section 401 of Clean Water Act for USACE, DCM, and Federal Energy Regulatory Commission permits or licenses within the 7 coastal draining river basins
  - Representing 8,125 acres of wetlands and 1.3 million linear feet of stream impacts.
- Other impacts not included are permanent wetland and waters from the issuance of CAMA general permits and USACE Nationwide Permits 12, 27, 33, and Regional General Permit 030
- From 2014 to 2019, DWR reported wetlands impacts authorized under 401-WQCs of ~1,499 acres within the 7 coastal draining river basins

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Compliance and Enforcement

Reported Compliance Inspections and Percent Compliance from 2014 to 2019

Agency	Program Type	Initial Site Inspections (#)	Compliance (%)
DWR	401 WQC, buffers, wetland and stream standards - DOT	2,230	88.7
DWR	401 WQC, buffers, wetland and stream standards – non DOT; routine inspection	794	68.2
DWR	401 WQC, buffers, wetland and stream standards – non DOT; complaint	493	22.5
DCM	GP and Major permits	4,688	99.8
DEMLR	NPDES State and Phase 2 Stormwater	4,910	72.0
DEMLR	Erosion and Sedimentation Control	8,188	38.0
Forest Service	Forest Practice Guidelines Related to Water Quality	11,545	98.5

Compliance and Enforcement

Typical Non-Compliance Issues

Failure of Erosion and Sediment Control devices resulted in sediment entering coastal wetlands (below) and tidal creek (right).

Sedimentation in wetland and waters can cause loss of aquatic organism community, decreases flood storage and nutrient cycling capacities.

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Compliance and Enforcement

Typical Non-Compliance Issues

Failure to establish adequate ground cover in violation of E&S Plan (bottom) resulted in turbidity in downstream receiving waters (right)

Turbidity in waters can cause smothering or impeded growth in living organism such as Submerged Aquatic Vegetation, finfish, and shellfish.

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Compliance and Enforcement

Typical Non-Compliance Issues

Ditching of coastal first order stream and sidecasting of spoil in adjacent floodplain wetlands.

Conversion of forested wetlands via mass grading and installation of drainage ditches, placement of fill.

The effects of impact on coastal stream and wetland systems can result in habitat loss and ability to buffer pollutants such as metals and sediment from entering downstream receiving waters.

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Compliance and Enforcement

DWR's Compliance and Enforcement Grant Work

- Pilot project was conducted by DWR from 2007 to 2011 under an EPA program development grant.
  - Provided funding for 3 full time compliance positions (1 position per regional office) in Washington, Raleigh, and Mooresville
- DWR estimated that prior to pilot project, staff conducted inspections on less than one percent of authorized sites per year, mainly based on complaints received by the Regional or Central Office (Dorney et al. 2015)
- Over the grant period, the reported number of annual site inspections associated with written approvals rose along with the rate of compliance and cost of civil penalties dropped.

Compliance and Enforcement

DWR's Compliance and Enforcement Grant Work

- Comparing the rate of DWR's compliance from the grant reporting period of 2007 to 2011 to 2014 to 2019 reporting period, the rate of compliance for routine inspection of Non-DOT projects has dropped from 82% (2011) to 69% (2019).
- The rate of DWR's compliance for complaint inspections has fallen from 68.2% (2011) to 22.5% (2019).
- Over the last 6 fiscal years, the DWR reported unauthorized jurisdictional wetland impacts exceeded authorized impacts by margin of 1.54:1.

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Secretary
LINDA CULPEPPER
Director

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Month XX, YEAR

CERTIFIED MAIL #xxxx xxxx xxxx xxxx xxxx
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Contact Person
Owner/Financially Responsible Party/Permittee
Address
City, ST Zip code

CERTIFIED MAIL #xxxx xxxx xxxx xxxx xxxx
RETURN RECEIPT REQUESTED

Contractor/Co-owner Contact Person
Company
Address
City, ST Zip code

Subject: **NOTICE OF VIOLATION and RECOMMENDATION FOR ENFORCEMENT**

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Compliance and Enforcement

What's the Need for Successful Compliance and Enforcement Program

- Clean Water Act: It was reported that between 2015 and 2018, as CWA permit inspections declined, there was a 10% increase in serious water pollution incidents

- Clean Air Act: Similarly with CAA inspections, there was a 28% increase in permit violations (Gallay 2019)

- In a 2005 study, 63% of the companies examined took additional compliance related actions after learning that other companies had received penalties for environmental law violations.

Compliance and Enforcement

What's the Need for Successful Compliance and Enforcement Program

- This is attributed to the "deterrence model" that applicants are deterred from violating environmental regulations if the risk of penalties is real, compliance is cheaper than the expected penalties, as well as concern over reputation (Gallay 2019; Benami et al 2020).

Photo from NCDPS website: https://www.ncdps.gov/Our-Organization/Law-Enforcement

Compliance and Enforcement

Shortcomings in Implementation of Regulatory Mandate

- Although an overlap in regulatory jurisdiction may exist between USACE, DCM, and DWR, the USACE and DCM authority is limited to activities resulting in discharge of dredge and/or fill material to wetlands and/or waters under their jurisdiction.
- Additionally, exemptions exist from both State and federal permitting and regulatory requirements resulting in impacts to wetlands and waters.
- With DWR's regulatory authority differing in scope from DCM and USACE and limited staffing resources, implementation of any effective compliance and enforcement program has become more problematic.

Department of Environmental Quality

NORTH CAROLINA
Department of Environmental Quality

Compliance and Enforcement

Possible Solutions

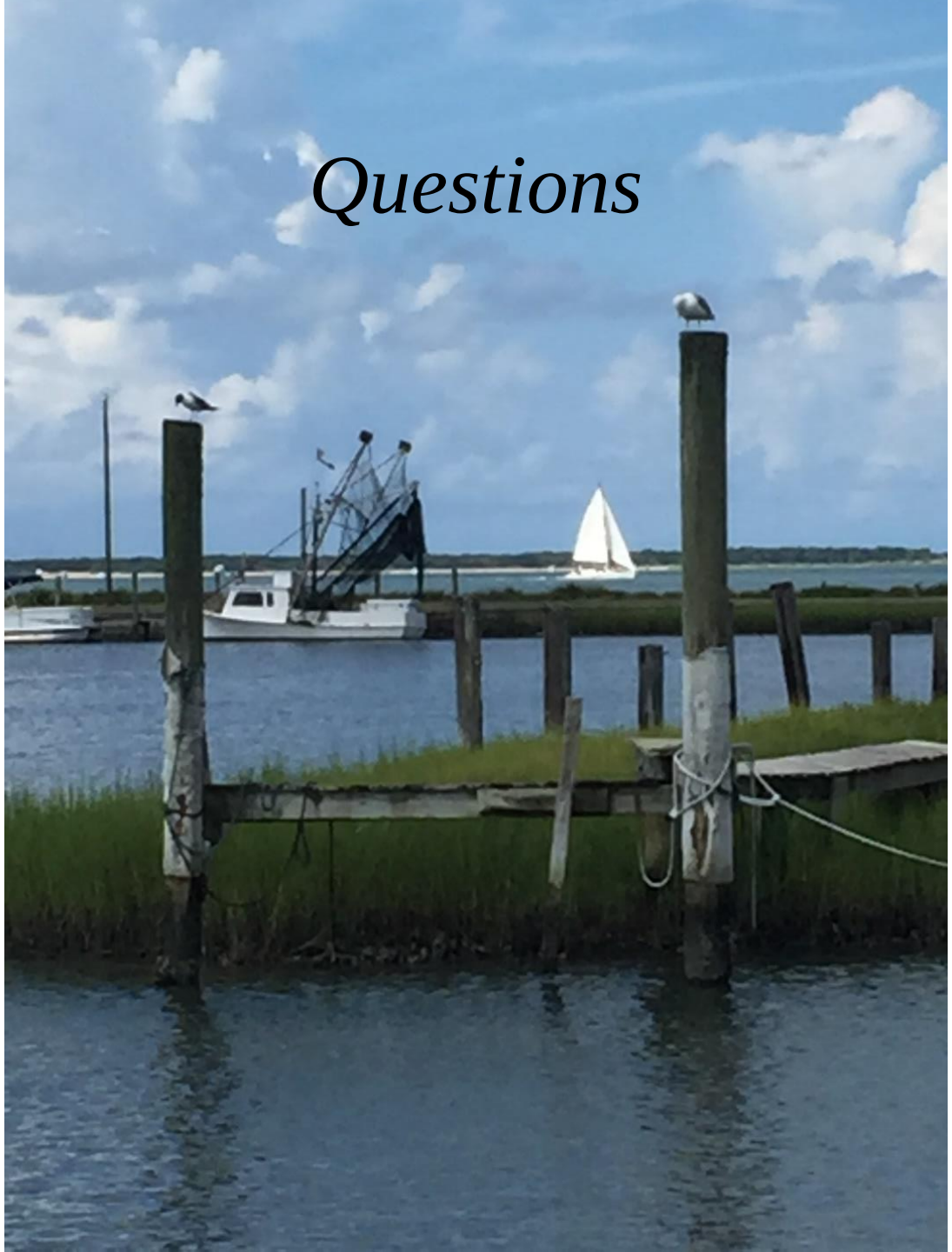
- Compliance Staffing
  - Increase compliance staffing in DWR and DEMLR in the Washington and Wilmington Regional Office by a minimum of two staff (one per agency per office).
- Funding
  - Seek funding through grants to supplement compliance efforts.
- Watch List
  - Establish a Watch List on DEQ's website for repeat violators.
- Cooperative Effort
  - Work with Riverkeepers, NGO's, or citizens on reporting on the reporting on potential violations.

https://www.pngkit.com/bigpic/u2q8w7u2e6i1u2o0/

https://www.iemoji.com/

Department of Environmental Quality

Questions



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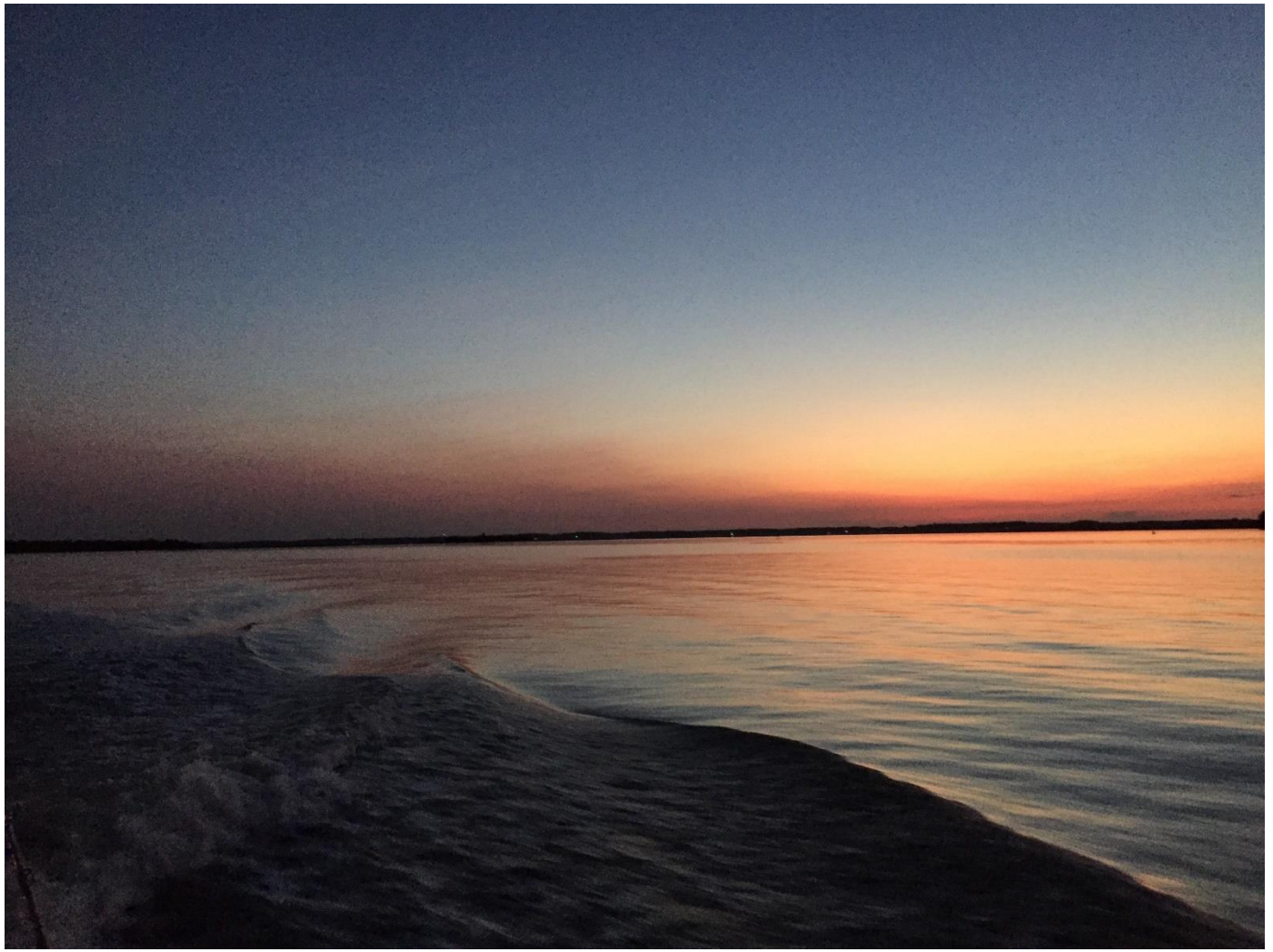
15 Minute Break



2021 Coastal Habitat Protection Plan: Priority Habitat Issue – Protecting SAV with a Focus on Water Quality

DEPARTMENT OF ENVIRONMENTAL QUALITY

Trish Murphey | CHPP Steering Committee | May 11, 2020

Clean Waters and SAV: Making the Connection

A technical workshop to develop water quality strategies to protect and restore submerged aquatic vegetation

March 4, 2020
NC Museum of Natural Sciences, Raleigh

Albemarle-Pamlico National Estuary Partnership

NORTH CAROLINA MARINE FISHERIES

THE PEW CHARITABLE TRUSTS

Submerged Aquatic Vegetation

Habitat Protection and Restoration

Photo credit: Martha's Vineyard Gazette

- Issue
- Origination
- Background
- Authority
- Discussion
- Proposed Implementation Actions

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Department of Environmental Quality

Submerged Aquatic Vegetation

Issue

Submerged Aquatic Vegetation (SAV) habitat is critical for:

- healthy fisheries
- valuable ecosystem benefits

Water quality and clarity

- most significant factor limiting SAV survival and expansion.
- Data indicate that water quality is having an adverse impact on SAV

SAV the perfect indicator of water quality and other issues within the estuarine system

Photo credit: APNEP

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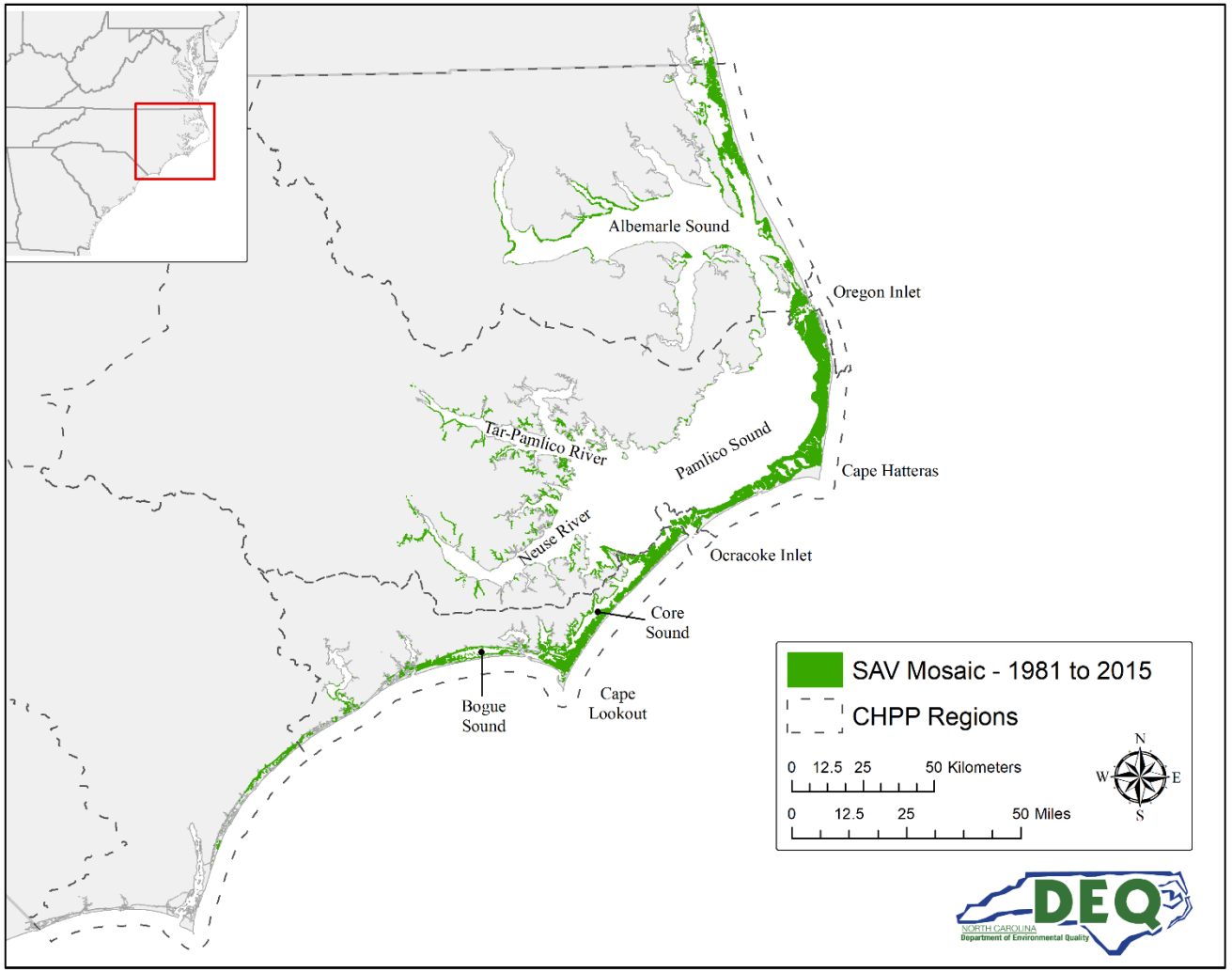
Department of Environmental Quality

Submerged Aquatic Vegetation

Background



- Biodiverse SAV resource
- Second largest on the Atlantic coast
- Two SAV Ecosystems:
  - Low Salinity - Freshwater to low salinity (<10 ppt)
  - High Salinity - Moderate to high salinity (>10 ppt)
- Eel grass is a temperate species at the southern limit
- Shoal grass is a tropical species that reaches its northernmost extent in the state.
- Widgeon grass grows best in moderate salinity

DEQ
NORTH CAROLINA
Department of Environmental Quality

APNEP Indicator Report: Extent of Submerged Aquatic Vegetation, High-Salinity Estuarine Waters

SAV Monitoring & Assessment Team

NORTH ZONE - 5.9%

CENTRAL ZONE - 2.67%

SOUTH ZONE - 10.38%

Submerged Aquatic Vegetation

Background

Change in Linear Extent of SAV in Low Salinity

Estuary	Historical SAV LE (m)	2014-2017 SAV LE (m)	No Change in SAV LE from Historical (m)	Change in SAV LE (GAIN?)	Change in SAV LE (LOSS ?)	% change in SAV LE (LOSS?)
Albemarle Sound	117,778	90,565	56,457	+34,108	-61,321	-52.06
Pamlico River	29,223	6,036	756	+5,280	-28,467	-97.41
Neuse River	10,512	9,519	2,827	+6,692	-7,685	-73.11
TOTAL	**157,513**	**106,120**	**60,040**	**+46,080**	**-97,473**	**-61.88**

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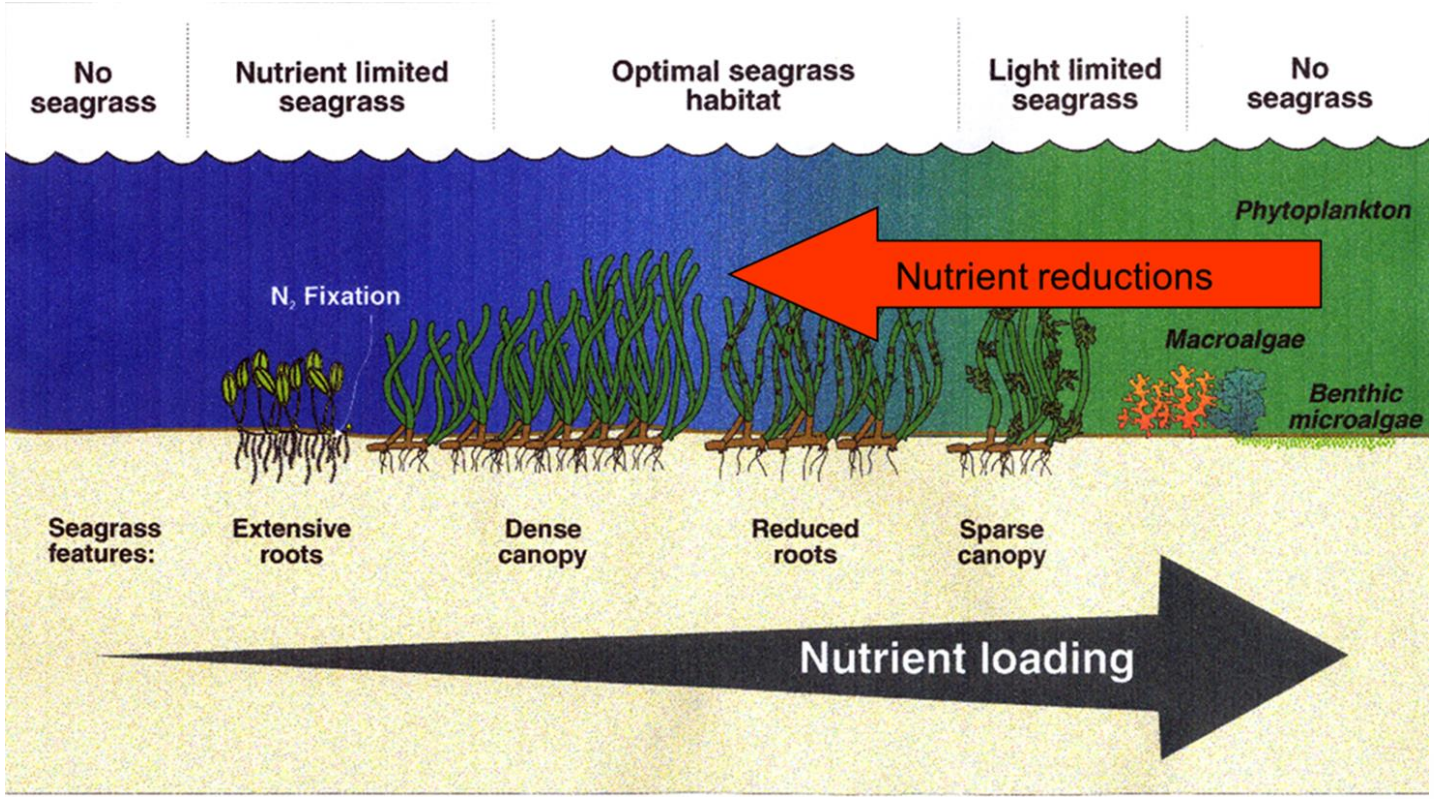
Department of Environmental Quality

Submerged Aquatic Vegetation

Background

Water Quality Impacts



Submerged Aquatic Vegetation

Case Study: Chesapeake Bay

- Historical SAV Extent
- Water Clarity Criteria
  - Minimal Light requirements
    - High Salinity – 20% light availability
    - Low Salinity – 13% light availability
- Collaboration
  - Scientists
  - Managers
  - Public

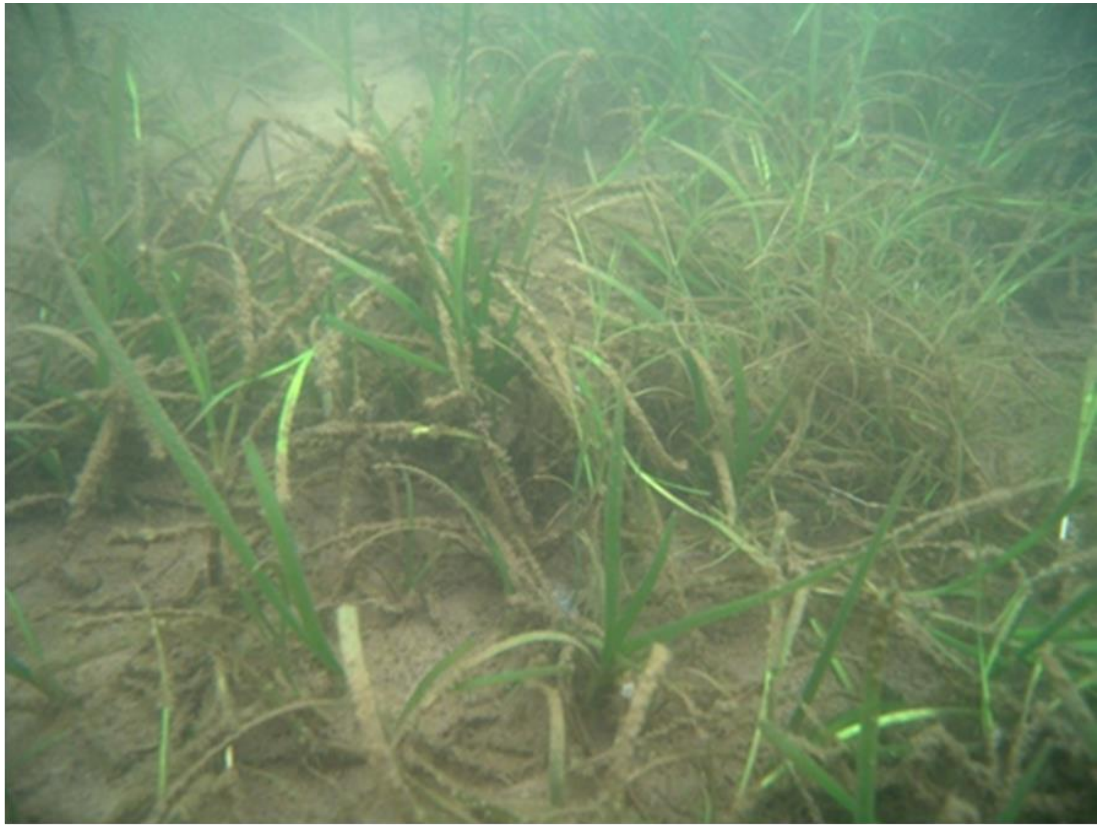


Photo credit: Rich Batiuk

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Submerged Aquatic Vegetation

Case Study: Tampa Bay

Photo credit: Tampa Bay Estuary Program

- Based on acreage in the 1950s
- Light requirements for SAV
- Nutrient Management
  - Chlorophyll-a targets
  - Nitrogen loading targets
- Public-Private Partnership
  - Local Governments
  - Regulators
  - Industry

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Department of Environmental Quality

Submerged Aquatic Vegetation

Albemarle Sound and Chowan River

Photo credit: NC DEQ

- Increased Algal Blooms
- Health Advisories
- Nutrient Strategies
  - Algal Blooms
  - Fish Kills
- Nutrient Criteria Development Plan
- Endpoints

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Submerged Aquatic Vegetation

Setting NC SAV Goals and Connecting to Nutrient and Sediment Load Reductions

Set SAV Goals

High Salinity
Low Salinity

↓

Percent Light Needed

Optic Model

↓

Chlorophyll *a* concentration target- Interim nutrient criteria

Based on results of the Optic Model

↓

Nutrient load (or concentration)

↓

Contributions by source and location in watershed

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Submerged Aquatic Vegetation

Non Water Quality Issues

- Climate Change
- Pathogens
- Physical Disturbance
  - Bottom disturbance
  - Aquaculture
  - Docks and Piers
- Chemical Control

Photo credit: FL FWCC.

Submerged Aquatic Vegetation

Remaining Issue Paper Sections

Photo credit: APNEP

Authority – lists who and what authority the issue can be addressed through NC General Statues and NCAC Rules

Discussion – how to address the issues? Provides a discussion of pros and cons of potential management options

Proposed Implementation Actions – list of potential actions for ways to resolve the issue


Questions?
Trish.Murphey@ncdenr.gov

North Carolina Coastal Federation

NC Marine Debris Action Plan

North Carolina
Coastal Federation
Working Together for a Healthy Coast

Sarajh@nccoast.org

North Carolina Coastal Federation

Working Together for a Healthy Coast

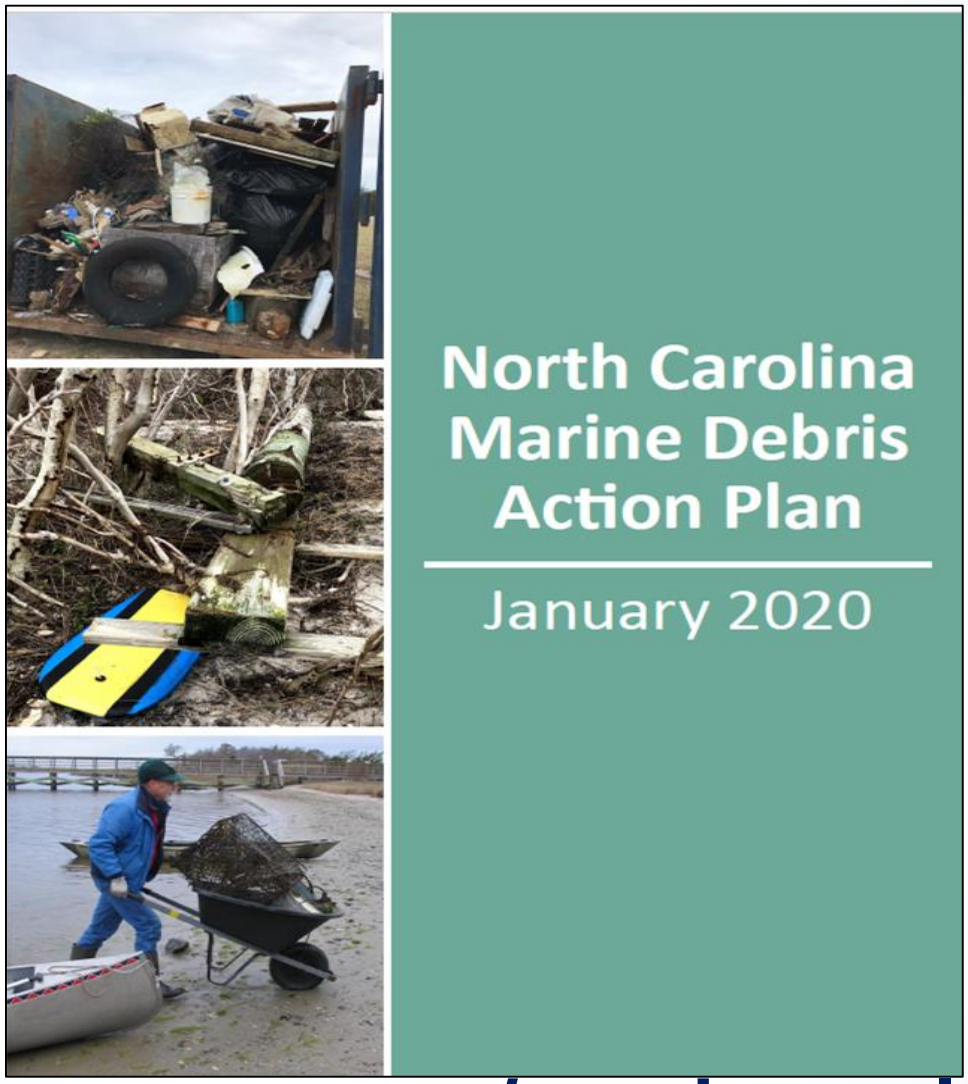
Northeast Regional Office
637 Harbor Road, P.O. Box 276
Wanchese, NC 27981
252-473-1607

Headquarters & Central Regional Office
3609 N.C. 24
Newport, NC 28570
252-393-8185

Southeast Regional Office
309 W. Salisbury Street
Wrightsville Beach, NC 28480
910-509-2838

www.nccoast.org

First ever N.C. Marine Debris Action Plan



nccoast.org/actionplan

N.C. Marine Debris Action Plan

Purpose: To facilitate the strategic reduction of marine debris in North Carolina through the collaborative efforts, over the next 5 years.

Goal: Reduce the amount of marine debris and its impacts in coastal North Carolina.

Major Goals outlined in the Action Plan:

1. **Lead and Coordinate**
2. **Prevent** Marine Debris
3. **Remove** Marine Debris and Cleanup the Coast
4. Prevent and Remove **Abandoned and Derelict Vessels**
5. Conduct **Research and Assessment**

Strategic Plan

nccoast.org/actionplan

Goal 1: Lead and Coordinate
Lead, coordinate, and communicate in a way that effectively engages partners and other stakeholders to carry out the Action Plan and advance the issue of marine debris at the state level.

Objectives

- Identify core leadership team and establish marine debris stakeholder advisory and implementation committee to support the state Action Plan.
- Publish, distribute, and implement the Action Plan.
- Encourage state level planning, coordination, and assistance for marine debris issues.
- Create a communications strategy centered around the Action Plan that includes at least two stakeholder engagement events per year.

Goal 2: Prevent
Prevent the introduction of marine debris with programs that increase awareness, improve policy, and inspire behavior change.

Objectives

- Collaborate with businesses to implement marine debris reduction strategies.
- Develop a marine debris education strategy for K-12 students.
- Develop two marine debris prevention programs specific to target audiences.
- Implement and promote North Carolina Shellfish Mariculture Best Management Practices.
- Work with state and local governments to improve public policy that supports the prevention of marine debris.

Goal 3: Remove
Remove chronic and storm debris in a strategic and efficient way, inspiring and assisting citizens and other stakeholders to participate as appropriate.

Objectives

- Target select volunteer groups to assist with marine debris cleanups, while maximizing participant and public awareness of the issue.
- Establish an annual paid cleanup of marine debris
- Increase readiness and capacity for engaging in storm response.
- Devise and implement a microplastic wastewater reduction strategy.

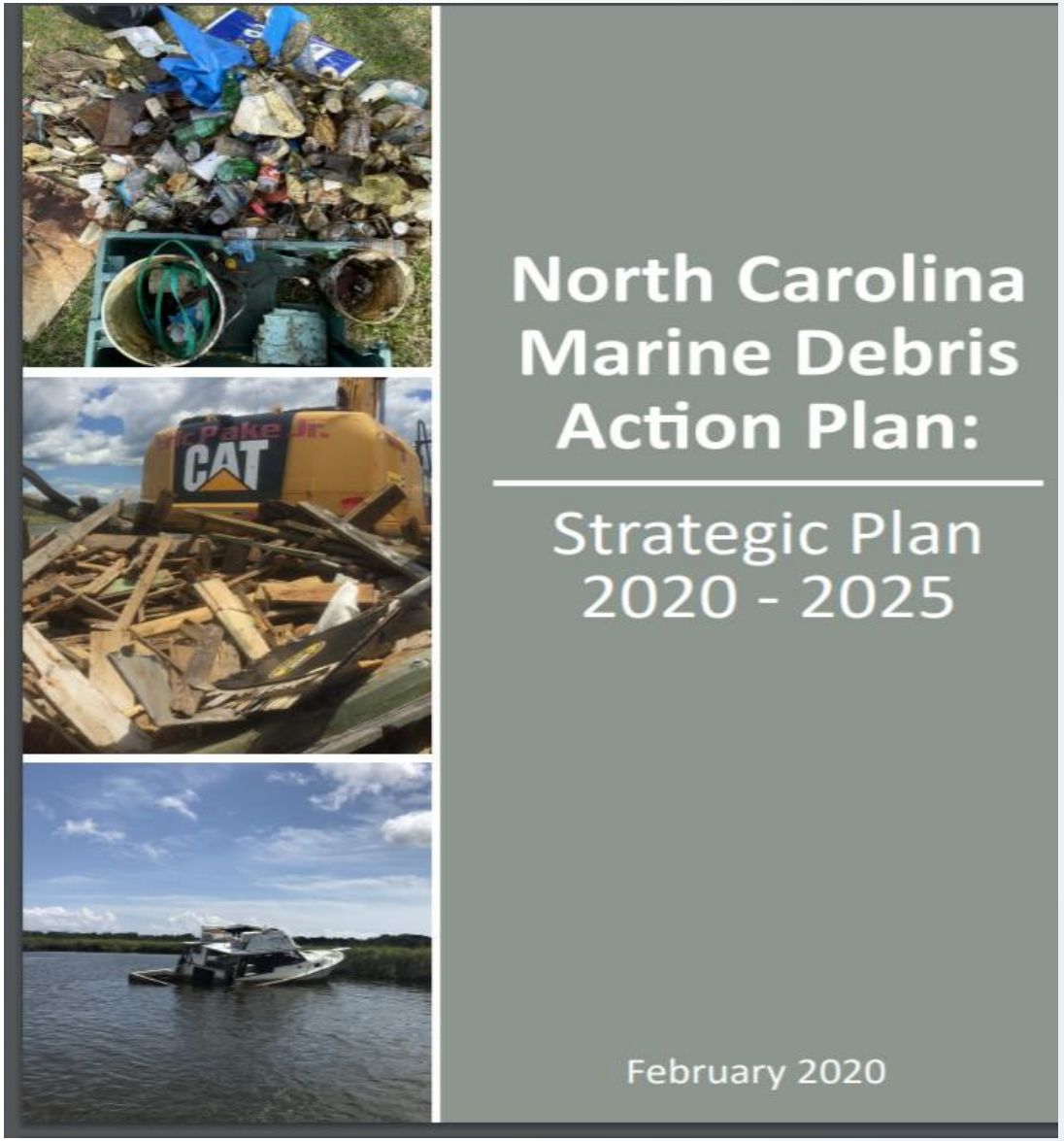
Road Map

Appendix D

Roadmap of Goals, Objectives, Strategies, and Actions

GOAL 1: LEAD AND COORDINATE *Lead, coordinate, and communicate in a way that effectively engages partners and other stakeholders to carry out the plan actions and strategies to advance the issue of marine debris at the state-level.*	
Objective 1.1: Publish, distribute, and implement the Action Plan.	
Strategies and Actions	**Partner(s)**
1.1.1 Develop a communications strategy for distributing and promoting the Action Plan.	Action Plan Leadership Team, Action Plan Advisory and Implementation Committee
1.1.2 Develop a strategy to coordinate Action Plan implementation.	Action Plan Leadership Team, Action Plan Advisory and Implementation Committee
Objective 1.2: Identify core leadership team and establish marine debris stakeholder advisory and implementation committee to support the Action Plan.	
Strategies and Actions	**Partner(s)**
1.2.1: Confirm participation of organizations that expressed interest in joining the committee.	Action Plan Leadership Team
1.2.2: Establish a schedule and guidelines for the committee.	Action Plan Advisory and Implementation Committee
Objective 1.3: Create a communications strategy centered around the Action Plan that includes at least two stakeholder engagement events per year.	
Strategies and Actions	**Partner(s)**
1.3.1: Establish a marine debris stakeholder email list-serv for North Carolina.	Albemarle-Pamlico National Estuary Partnership
1.3.2: Establish guidelines for the use of the list-serv and send out to subscribers.	USFWS
1.3.3: Coordinate at least two stakeholder engagement events per year.	Action Plan Leadership Team, and Action Plan Advisory and Implementation Committee, N.C. Marine Debris Symposium
Objective 1.4: Coordinate and lead the Action Plan in a way that is complementary to the S.E. regional plan and collaborate with local governments.	
Strategies and Actions	**Partner(s)**
1.4.1: Review the draft S.E. regional plan and incorporate strategies and actions as appropriate for the N.C. plan.	Action Plan Leadership Team, Duke University Marine Lab (Dan Rittschoff), Jennette's Pier, NOAA Marine Debris Program, NCDWQ, NCWRC, USFWS
1.4.2: Share the N.C. Marine Debris Assessment and Action Plan with coastal and environmental agencies, programs, and the General Assembly.	Action Plan Leadership Team, Action Plan Advisory and Implementation Committee, NCWRC, USFWS, NCDWQ, Jennette's Pier

- An overview of the N.C. Marine Debris Action Plan.
- Outlines how partners are working together to reduce marine debris along the coast.



nccoast.org/strategicplan

Action Plan Leadership Team

Paula Gillikin – N.C. Coastal Reserve & National Estuarine Research Reserve

Lisa Rider – N.C. Marine Debris Symposium, Coastal Carolina River Watch

Gloria Putnam – N.C. Sea Grant

Sara Hallas, Rachel Bisesi, Sarah Bodin, Bonnie Mitchell, Leslie Vegas– N.C. Coastal Federation

North Carolina Coastal Federation
Working Together for a Healthy Coast

Sea Grant North Carolina

NC Coastal Reserve & National Estuarine Research Reserve

North Carolina Marine Debris Symposium

Advisory and Implementation Committee

For the NC Marine Debris Action Plan

LEAD AND COORDINATE

: Support effective and sustainable communication and collaboration amongst marine debris stakeholders

✓Strategy 1.1: Establish a marine debris stakeholder list-serv for N.C.
- ✓ Action 1: Identify organization that will create and populate list-serv
- ✓Action 2: Establish guidelines for the use of the list-serv and send out to subscribers

✓✓ Strategy 1.2: Establish marine debris stakeholder advisory committee that meets on an established schedule to review and communicate plan progress.
- ✓ Action 1. Participants in final action plan workshop will indicate if their organization or agency is interested in joining the committe
- Action 2. Identify + engage partners (adapted from Assessment)

✓ Strategy 1.3: Coordinate and lead the N.C. Marine Debris Action Plan in a way that is complimentary to the S.E. regional plan.
- ↓ Action: Review the draft S.E. regional plan and incorporate strategies and actions as appropriate for the N.C. plan.
- ✗Action: N.C. Marine Debris Action Plan leadership team participate in the S.E. Regional marine debris reduction workshop hosted by N.O.A.A. in Wilmington, NC.

✗Strategy 1.4: Increase awareness of the N.C. Marine Debris Assessment and Action Plan by State departments, agencies, and General Assembly as issues arise that are related to marine debris (e.g. abandoned vessels after hurricane Florence).
- ✗ Action: N.C. Coastal Federation distribute *The State of Marine Debris in North Carolina:* An Assessment of Prevention and Removal Efforts to select legislative contacts.
- ✗ Action: Action plan leadership team or steering committee send assessment and action plan to all relevant stakeholders via email.

✗ Strategy 1.5: Support establishment of a dedicated lead on marine debris planning, coordination and assistance in N.C.
- ✗ Action: Highlight/quantify the impact of the former NC Big Sweep program.
- ✗ Action: Share the NC Marine Debris Assessment and Action Plan with coastal and environmental management agencies, programs, eneral Assembly.
- tion: Identify potential funding sources and mechanisms to support a coordinator, to include the value of volunteer marine debris moval contributions as match.

✗ Strategy 1.6: Collaborate with local governments
- ✓Action: Assist local governments with adopting policies and practices that support prevention of marine debris (e.g., Ocean Friendly Establishments, building codes for water dependent structures and construction site management)
- Action 2:

Strategy 1.7: Establish a method for engaging underserved areas, including unincorporated coastal areas.
- ✓Action 1: Test engagement project in the Stump Sound area*
- Action 2:

Purpose and Action Plan Development Process

NC Marine Debris Action Plan Implementation

N.C. Marine Debris Symposium

Advisory and Implementation Committee

Goal 1: Lead and Coordinate

Goal 2: Prevent Marine Debris

- K-12 Student Education

https://www.nccoast.org/distance-learning-lab/

- Work with state and local governments to improve public policy
- Collaborate with Businesses
- Expand **Ocean Friendly Establishments**
  - Recognize reduction in single use plastics

Ocean Friendly Establishments

- Voluntary program encouraging the reduction of single use plastics in business practices.
- Focused on
  - Aiding businesses to earn more “stars” in the tiered system
  - The positive economic impacts of investing in reusables versus single use products for businesses

www.nccoast.org/oceanfriendly

Goal 3: Remove Marine Debris

- Volunteer cleanups
- Hired contractor led removal
- Storm response capacity
- Microplastic wastewater reduction

Remove Marine Debris

The contracted work is now in Onslow, Pender, New Hanover and Brunswick counties through an effort funded with a two-year, $249,657 removal grant to the Federation from the NOAA Marine Debris Program.

Photos from Watermen

At the end of March, the crew had collected almost 90 tons of debris from Topsail Sound and Middle Sounds.

Goal 4: Prevent and Remove Abandoned and Derelict Vessels

NOAA/National Fish and Wildlife Foundation Emergency Marine Debris Coastal Federation ($650K)

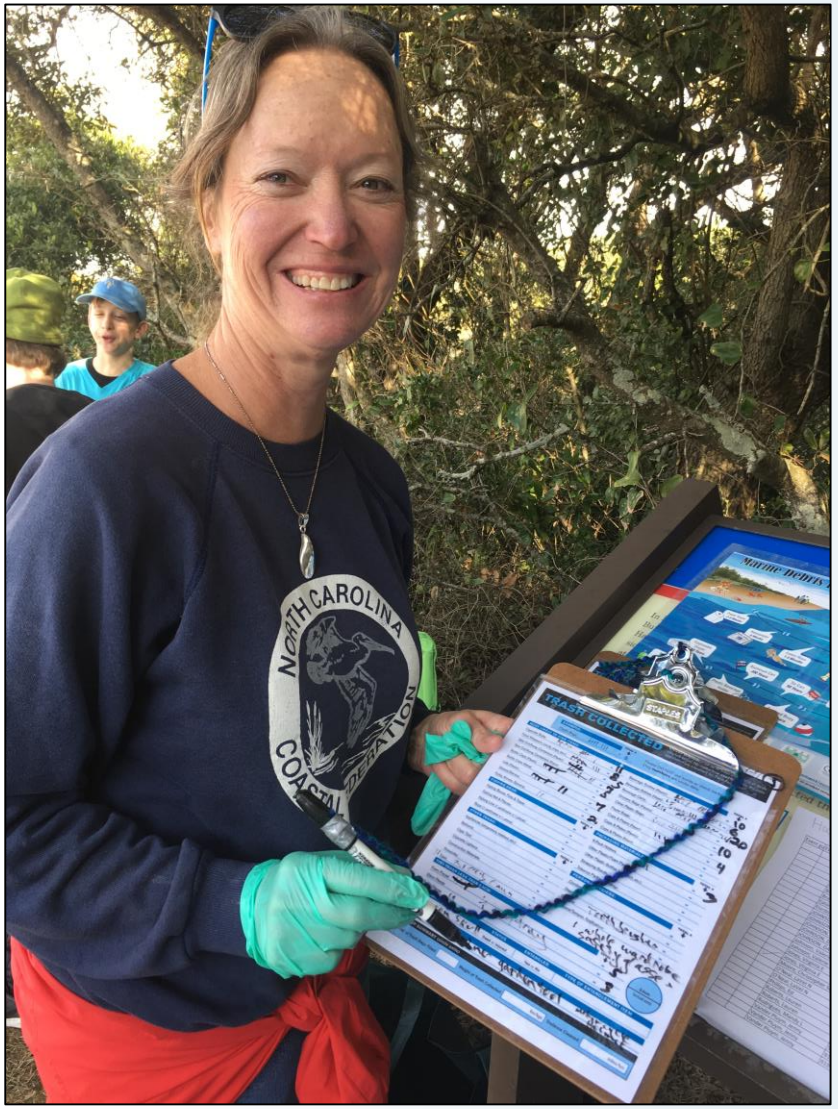
Wildlife Resources Commission - Through $1 M appropriation

NRCS/Emergency Watershed Program – Through DCM would contract the removal of ADVS ($2M)

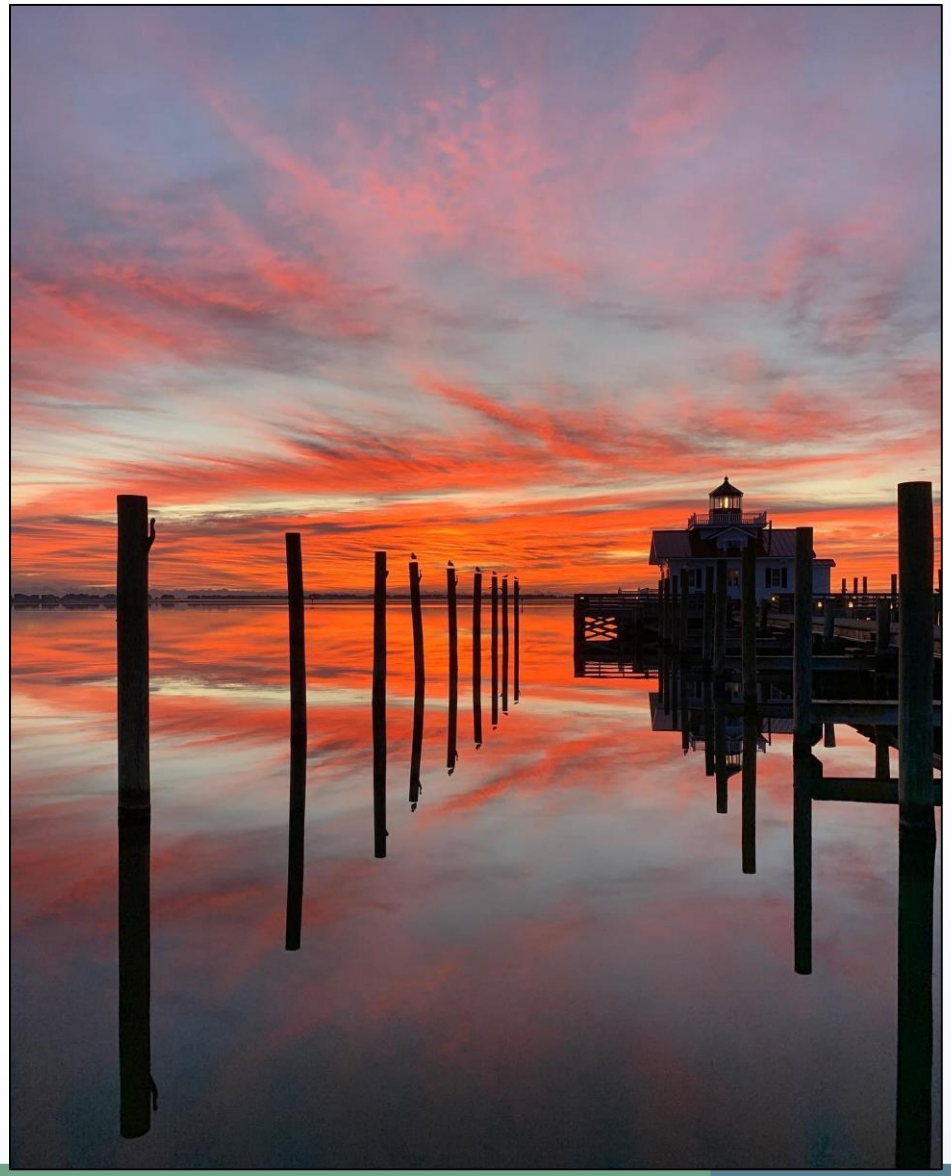
Next steps are vessel reassessment that Wildlife Resources Commission will head up and conduct prioritization of vessels for removal with all three funding sources.

Goal 5: Research and Assessment

- Establish/promote data collection
- Create an annual list of research priorities
- Improve understanding



“Imagine if people and wildlife of coastal North Carolina never encountered marine debris. What would that be like?”



How can I help?

- Help spread the word about the new Action Plan and Strategic Summary
  - nccoast.org/actionplan
  - nccoast.org/strategicplan
  - Check in with local communities and municipalities

- **#DebrisFreeNC** and @Debris Free NC social media pages

- Check out:

  recyclemorenc.org

Questions and reflection

North Carolina
Coastal Federation

Working Together for a Healthy Coast

Northeast Regional Office
637 Harbor Road, P.O. Box 276
Wanchese, NC 27981
252-473-1607

Headquarters & Central Regional Office
3609 N.C. 24
Newport, NC 28570
252-393-8185

Southeast Regional Office
309 W. Salisbury Street
Wrightsville Beach, NC 28480
910-509-2838

Sarajh@nccoast.org

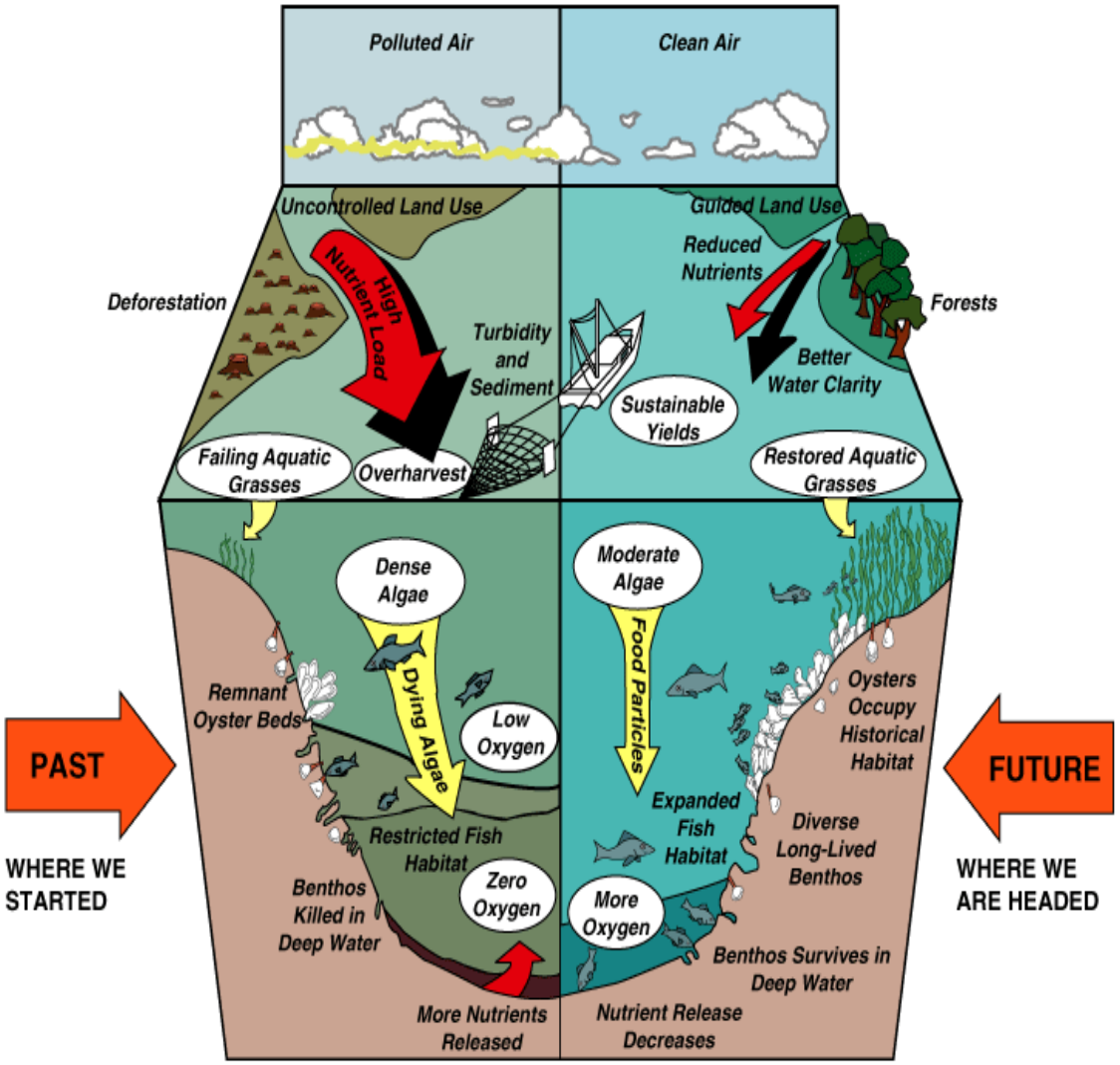
www.nccoast.org

New Ways to Solve the Resource Challenges of Today's Restoration Projects

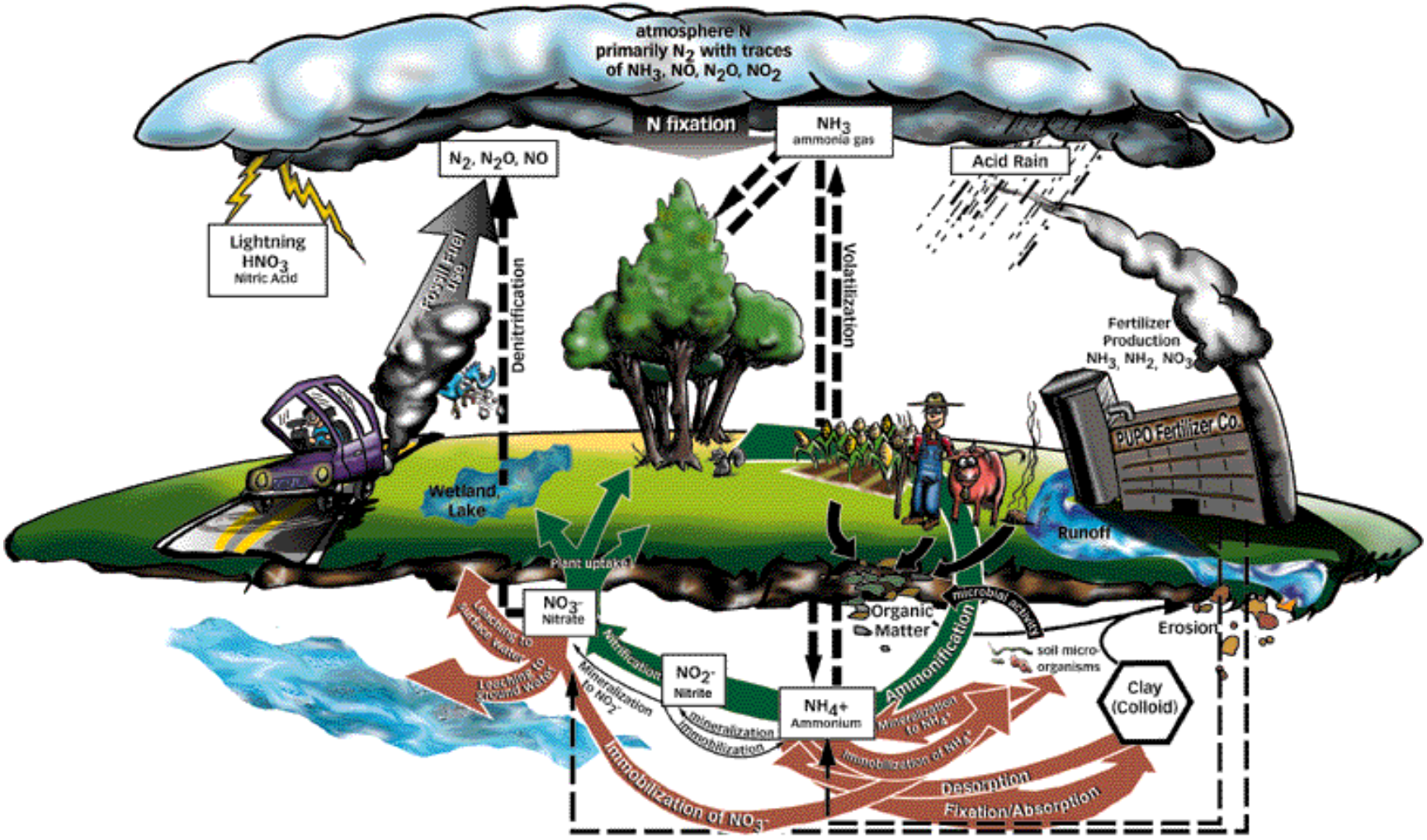
Presented by Tolar Nolley – Founder of OCVA Holdings, LLC

May 11, 2020

The Mission


Polluted Air
Clean Air
Uncontrolled Land Use
Guided Land Use
Deforestation
High Nutrient Load
Turbidity and Sediment
Reduced Nutrients
Forests
Better Water Clarity
Sustainable Yields
Failing Aquatic Grasses
Overharvest
Restored Aquatic Grasses
Dense Algae
Dying Algae
Remnant Oyster Beds
Low Oxygen
Restricted Fish Habitat
Zero Oxygen
Benthos Killed in Deep Water
More Nutrients Released
Moderate Algae
Food Particles
Oysters Occupy Historical Habitat
Expanded Fish Habitat
Diverse Long-Lived Benthos
More Oxygen
Benthos Survives in Deep Water
Nutrient Release Decreases
PAST
WHERE WE STARTED
FUTURE
WHERE WE ARE HEADED

It's All Tied Together




Help! We're dissolving

Oysters-
The Organic
In Situ Remediator

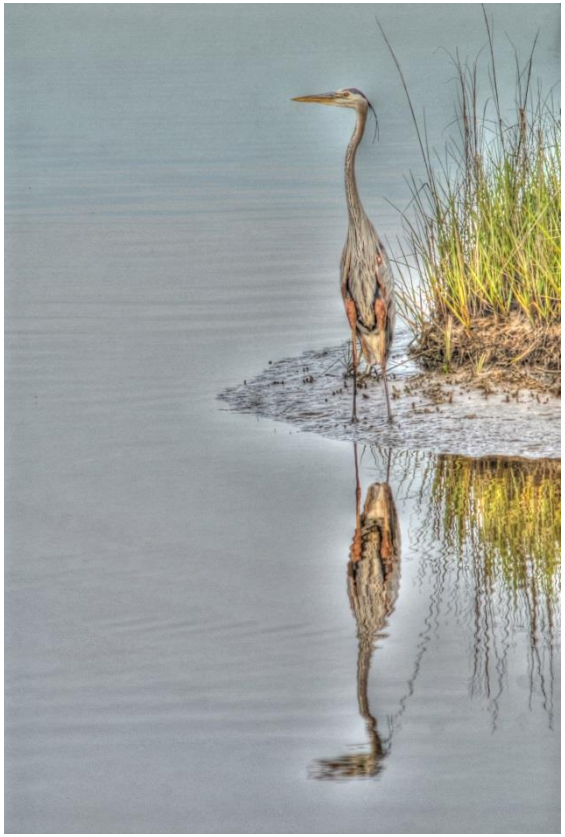
The health of our Bays and estuaries are closely linked to a large and healthy Oyster population. Each Oyster's filtering capacity is documented at approximately 50 gallons of water per day. *While feeding on phytoplankton, oysters filter out sediment, carbon and nutrients including nitrogen and phosphorous.*

The immediate impact is reduced turbidity, clearer water allowing sunlight to support submerged aquatic vegetation (SAVs) creating conditions that produce oxygen to reverse eutrophic conditions. These actions restore habitat for diverse aquatic species and water fowl that work in a sustainable symbiotic balance for a healthy Bay ecosystem.

ITS' ALL TIED TOGETHER!

Fisheries

Restoration



Critical: Hatchery/Nursery Operations

Help Provide Sustainable Jobs

Instant Mini Reefs with Cages

Provide a Renewable, High Value Lean Protein “Eco Food”!

Saving Shells For Restoration & Calcium Buffering

Creating Permanent Reefs

Interlocking Reeftek “Sentinel”

Single Unit being Studied in 2005

Science Drives New Technologies

Per Oyster Nutrient and Carbon Remediation

In Grams/Pounds:		*Total Carbon*	*Total Nitrogen*	*Total Phosphorus*
Class	Size (mm/inches)	TC (gram/pounds)	TN (gram/pounds)	TP (gram/pounds)
Cocktail	<76 / 2-3”	1.26g / .00277	.042g / .00009	.006g / .000013
Regular	<102 / 3”-4”	3.823g/ .00841	.132g /.00029	.019g / .000042
Jumbo	>=102 / 4”	8.396g /.01847	.298g / .00065	.041g / .00009

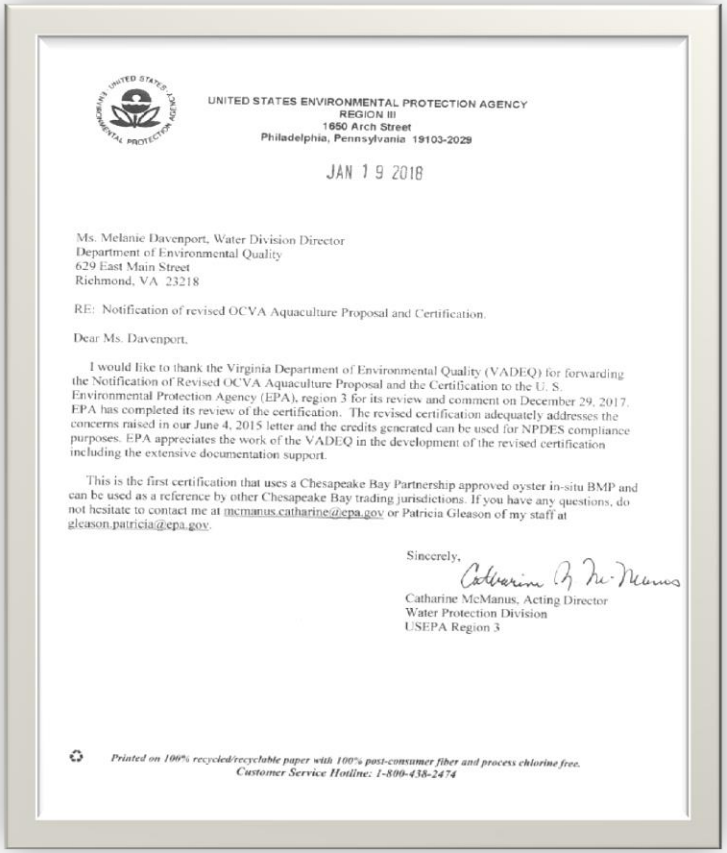
Per Cage at 80% Grow Out = 1600 oysters

Per Cage Nutrient and Carbon Remediation

Regular	3”- 4”	13.456 pounds	0.46 pounds	0.0672 pounds

Reference: Nutrient Bioassimilation Capacity of Aquacultured Oysters: Quantification of an Ecosystem Service. Colleen B. Higgins, Kurt Stephenson and Bonnie L. Brown
https://www.crops.org/publications/jeq/articles/40/1/271

Aquaculture Oyster Program Authorized as BMP



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029

JAN 19 2018

Ms. Melanie Davenport, Water Division Director
Department of Environmental Quality
629 East Main Street
Richmond, VA 23218

RE: Notification of revised OCVA Aquaculture Proposal and Certification.

Dear Ms. Davenport,

I would like to thank the Virginia Department of Environmental Quality (VADEQ) for forwarding the Notification of Revised OCVA Aquaculture Proposal and the Certification to the U. S. Environmental Protection Agency (EPA), region 3 for its review and comment on December 29, 2017. EPA has completed its review of the certification. The revised certification adequately addresses the concerns raised in our June 4, 2015 letter and the credits generated can be used for NPDES compliance purposes. EPA appreciates the work of the VADEQ in the development of the revised certification including the extensive documentation support.

This is the first certification that uses a Chesapeake Bay Partnership approved oyster in-situ BMP and can be used as a reference by other Chesapeake Bay trading jurisdictions. If you have any questions, do not hesitate to contact me at mcmanus.catharine@epa.gov or Patricia Gleason of my staff at gleason.patricia@epa.gov.

Sincerely,

Catharine McManus, Acting Director
Water Protection Division
USEPA Region 3

Printed on 100% recycled/recyclable paper with 100% post-consumer fiber and process chlorine free.
Customer Service Hotline: 1-800-438-2474

"ISNRP" Authorization by USEPA 2018

The “New” Market Menu

Food…


















Restoration

The Living Memorial Reef Program

Memorial ashes interred in layer

Creating Life in Perpetuity

The Nutrient Credit Opportunity

Opportunity for Both Compliance & Voluntary Market Participation

- Over *One Billion Dollar* market in mandated BMP compliance
- ISNRP™ contracts with NPDES Permit Holders (WWTP's; MS4's; CAFO's; Municipalities) accelerates oysters for nutrient credits and commodity supply. Voluntary through all entities including general public, corporations, organizations and foundations
- Monetizes the oyster for its environmental benefits providing significant reduction of "internal" capital needed to provide equipment, increase oyster supply, credits and revenues.
- Scalable for increase in sustainable jobs (watermen; aquaculture farmers; former military (Vets); environmentalists and conservationists (entry level to high tech & special needs).
- Provides significant resources for restoration projects
- Showcasing "Capitalism with Social and Environmental Responsibility" (CAPSER) for global mission.

“Yes Carolina…You Can Have Your Oyster…& Eat Them Too!

Blue Crab FMP

Draft Blue Crab FMP Amendment 3

DEPARTMENT OF ENVIRONMENTAL QUALITY

Marine Fisheries

CHPP Steering Committee| Anne Deaton| May 11, 2020

Appendix 4.3: Addressing Water Quality Concerns Impacting The North Carolina Blue Crab Stock

Issue: Improving water quality by addressing pollution sources, especially agricultural runoff, may positively impact the North Carolina blue crab stock

- Concerns due to mass mortality events of peeler blue crabs, mortality during hypoxic events, effect of endocrine disruptor compounds
- EMC and CRC have authority over activities and development affecting water quality
- Agricultural contributions to runoff are managed primarily through voluntary participation
- Water quality restoration projects take time and collaboration
  - Neuse River Basin in 1998 set goal of reducing nitrogen load by at least 30%
  - Have yet to achieve goal

Appendix 4.3: Addressing Water Quality Concerns Impacting The North Carolina Blue Crab Stock

The NCMFC has no regulatory authority over land use and other practices that impact water quality

The NCMFC could:

1. Highlight problem areas and potential solutions to other regulatory agencies (CRC, EMC, DWR, DEMLR, US Army Corps of Engineers, and local and state governments).
2. Create a joint interagency working group to facilitate cooperation and efforts in monitoring and restoring water quality. This should include coastal monitoring which is currently limited; including increased USGS sampling downstream from wastewater treatment plants.
3. Work with state agencies and interest groups to support maintaining the Clean Water Act at a national level.

Appendix 4.3: Addressing Water Quality Concerns Impacting The North Carolina Blue Crab Stock

4. **Task the CHPP Steering Committee to prioritize blue crab water quality impacts. These should include hypoxia and toxins, while researching specific sources of water quality degradation and their effects on blue crabs.**
5. Send letters to the NCDA&CS Division of Forest Resources, Division of Environmental Programs, Division of Soil and Water Conservation, and Department of Transportation to share their concerns about water quality and the importance of Best Management Practices, especially buffer zones abutting coastal waters.
6. Invite these agencies to future MFC meetings in order to present mitigation efforts on water quality impacts, monitoring, and rehabilitation. These may include pesticide and herbicide policies, Best Management Practices reviews, and enforcement.

Appendix 4.3: Addressing Water Quality Concerns Impacting The North Carolina Blue Crab Stock

7. Public outreach is recommended to encourage the public to report crab and fish kills.

REPORT CRAB KILLS

Why? Fishermen are often the first to see dead or dying crabs. Such events may occur due to weather or human-induced causes. Water quality conditions that can contribute to crab kills include low dissolved oxygen, rapid salinity change and elevated levels of pesticides in the water. Distress or mortality of peeler crabs in shedders can be an early sign of water quality problems. Rapid reporting of kills helps state agencies determine the cause and how to prevent them in the future.

What to look for: Blue crabs exposed to pesticides may exhibit unusual behavior, such as difficulty moving (flipping over, legs falling off) prior to dying. Crabs stressed by low oxygen or extreme changes in temperature or salinity are more likely to become inactive.

What to do: Immediately report crab or fish kills when observed at your shedder or on the water. Calls may be anonymous. When abnormal behavior is observed, freeze several crabs and collect water samples. Store the water sample in a clean jar or bag and keep cold.

Who to contact:

Weekdays: N.C. Department of Environmental Quality
Washington Office: 252-946-6481; 800-338-7804
Wilmington Office: 910-796-7215; 800-248-4536

Weekends/evening: **Environmental Emergency hotline: 800-858-0368**

Appendix 4.3: Addressing Water Quality Concerns Impacting The North Carolina Blue Crab Stock

Blue Crab AC, DMF, and MFC Recommendation

- Support all management options presented
- Recommend Option 4 as the highest priority
- **Division habitat staff shall regularly report back to the Shellfish/Crustacean AC with progress on each management option**

Option 4. Task the CHPP Steering Committee to prioritize blue crab water quality impacts. These should include hypoxia and toxins, while researching specific sources of water quality degradation and their effects on blue crabs.