



#### Introduction to the next edition of the Blueprint

Erin Fleckenstein, NC Coastal Federation

### **NC Oyster Restoration Efforts**

>1915: NC DMF started cultch plantings

- 1915-2020 ~22 million bushels of cultch material planted
- >1947: Shellfish Rehabilitation Program began
- >1995: Blue Ribbon Advisory Council on Oysters
- >1996: Oyster sanctuary program initiated
- >1997: Fisheries Reform Act
- ➤ 2001: Oyster Fishery Management Plan
- 2003: NGOs & research institutions ramp up efforts
- ➤ 2004: Coastal Habitat Protection Plan



#### Oyster Restoration and Protection Plan for North Carolina: A Blueprint For Action

➤ 2003 Oyster Forum yielded compilation of suggested actions

Incorporated recommendations from:

- Blue Ribbon Advisory Council on Oysters
- Fisheries Reform Act
- Oyster Fishery Management Plan
- Coastal Habitat Protection Plan
- Basinwide Water Quality Plans

Drafted into comprehensive, concerted & bold effort to take place over five years

2003-2008; 2008-2012; 2015-2020

Steering Committee and Regional Workgroups engaged



### **Oyster Restoration and Protection Plan** for North Carolina: A Blueprint for Action **Three Editions** OVSTER RESTORATION



Oyster Restoration and

Protection Plan for North Carolina:

Prepared by: N.C. Coastal Federation

**Oyster Restoration and Protection** Plan for North Carolina: A Blueprint **For Action - Second Edition** 2008 - 2012

A Blueprint for Actio

2003-2008

### Partnerships and Collaborations are Key to Success



## Major Accomplishments 2003-2013

- Government, private agencies and other shellfish stakeholders coordinated habitat, water quality and fisheries management activities.
- Funding for oyster related programs increased by a factor of ten from 2003-2013.
- Nearly 200 acres of oyster habitat were enhanced and restored, annual oyster harvests increased during this time, and a greater number of watershed restoration projects were implemented along the coast.



#### Major Accomplishments 2015-2020



North Carolina joined NOAA's National Shellfish Initiative

Oyster Restoration and Growing are good for both the economy and environment

Developed Strategic Mariculture Plan

- Shellfish aquaculture grew from \$1 million to nearly \$5 million industry
- Built ~50 acres of reef through oyster sanctuaries, living shorelines and patch reefs

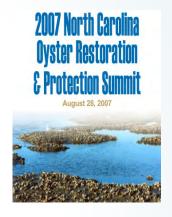
Built ~200 acres of harvestable reef

- Water quality degradation continues to be a concern but some localized improvements were observed
- Initiated methodology to assess oyster stock for management
- Researchers developed and refined tools to guide restoration, growing and enhancement efforts



#### **Blueprint Summits, Roasts & Forums**

- >2003 Oyster Forum, Ocean
- >2004 Encore for Oysters Summit, Morehead City
- ➤ 2005 Oyster Summit & Legislative Reception, Raleigh
- 2006 Regional Public Oyster Forums, Wilmington, Beaufort & Manteo
- 2006 Legislative Oyster Roast, Raleigh
- ➢ 2007 Legislative Oyster Roast, Raleigh
- >2007 Oyster Summit, Pine Knoll Shores
- >2014 Oyster Restoration Workshop, Beaufort
- >2015 Oyster Summit & Legislative Reception, Raleigh
- ➢ 2017 Oyster Summit & Legislative Reception, Raleigh
- >2019 Oyster Summit & Legislative Reception, Raleigh





Wednesday, May 24, 2006 12 noon to 2 pm Halifax Mall in Downtown Raleigh



#### Annual State of the Oyster Report



STATE OF THE OYSTER: 2015 Progress Report on the oyster restoration and protection plan for North Carolina Progred by the Worth Carolina Coasted Federation



STATE OF THE OYSTER: 2016 Progress Report on the oyster restoration and protection plan for progress of the pr



STATE OF THE OYSTER: 2017 Progress Report on the oyster restoration and protection plan for North Carolina

Prepared by the North Carolina Coastal Federation



#### STATE OF THE OYSTER: Progress Report on the oyster restoration and protection plan for North Carolina

Prepared by the North Carolina Coastal Federation Published September 2019

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WHO WE ARE ABOUT OYSTERS THE BLUEPRINT NEWS & RESOURCES PROGRESS EVENTS Q



Since 2003, a diverse group of stakeholders involved in growing, harvesting, studying, educating, managing and eating oysters have voluntarily and productively worked together to protect and restore North Carolina's oyster habitats and fisheries. This website links their efforts to present a holistic approach to advancing the vision of North Carolina becoming "the Napa Valley of Oysters."

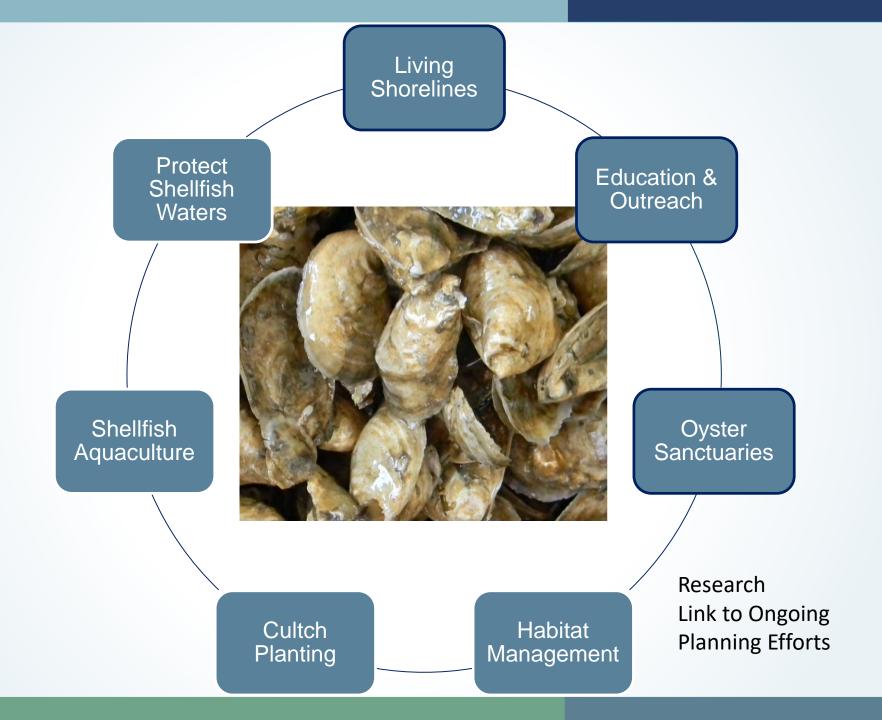
NCOysters.org is North Carolina's clearinghouse for oyster habitat restoration, planning, education/outreach and research. It is designed to:

News Grower Profile: Ryan Bethea Grower Profile: Katherine McGlade Senate Mulls Fisheries, Shellfish Overhauls | Coastal Review Online Genetic impacts of a commercial aquaculture lease 2019 Oyster Summit Held in Raleigh

SUBSCRIBE FOR UPDATES HERE



@NcOysters@NorthCarolinaOysterswww.ncoysters.org



### Vision for 4<sup>th</sup> Edition of the Oyster Blueprint

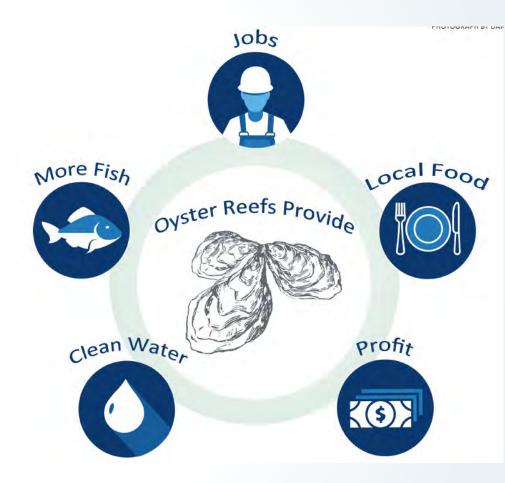


The vision of the Blueprint is to foster collaboration among partners, ensuring oysters in N.C. perpetuate a healthy and robust environment and economy.

#### **Ecosystem Services**

Ecosystem Services defined as Benefits people gain from thriving coastal habitats and clean waters.

Setting goals based on Ecosystem Services.



#### Stakeholder Survey



o Benefits

o Threats

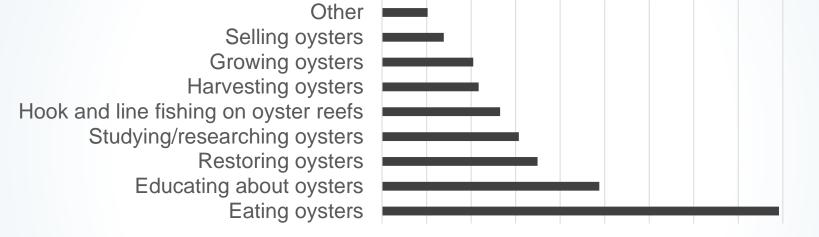
o Actions

### **Results of Stakeholder Survey**

**Professional Affiliation of Survey Respondents** 

	Recreational fisher	State gov't agen		Academic institution	
			Local gov't staff	Commer cial fisher	
Other	Non-profit organization	Oyster grower	Seafood wholesaler/d istributor/r…	Federal gov't Elect	

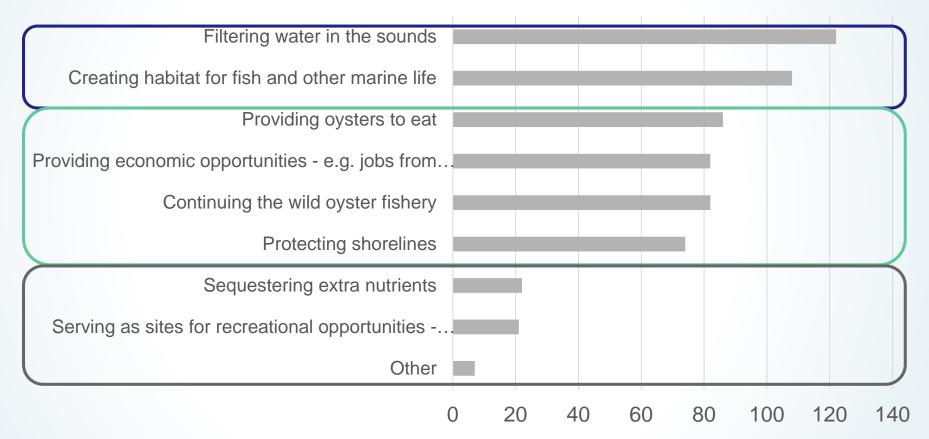
#### Survey Respondents' Oyster Related Activities



0% 10% 20% 30% 40% 50% 60% 70% 80% 90% 100%

### Survey respondents' participation in oyster related activities as a percent of all respondents

## Survey Respondents Selected the Benefits of Oysters that were Most Important to Them



Number of Times an Oyster Benefit was Selected by Survey Respondents

#### Direct Threats to Oysters Most to Least Concerning

**Physical Destruction to Reefs from Human Related Activities** 

(other than harvest)

**Overharvest of Resource** 

Siltation/Burying of Reefs

**Incompatible Fishing Practices (e.g. dredging)** 

Low Dissolved Oxygen

Lack of Spawning due to Low Oyster Population

**Shellfish Diseases** 

Salinity Changes (too high/too low)

Lack of Settlement due to Low Substrate Availability

**Introduced Invasive Species** 

**Ocean Acidification** 

**Physical Destruction to Reefs from Storms or Natural Causes** 

**Predation** 

Lack of Sufficient Food for Oysters

What do you consider to be the single greatest threat to oysters in North Carolina in the next 5-10 years and why?

Threat	# of Times
	Selected
Water Quality	11
Incompatible Fishing Practices	8
Overharvest of Resource	5
Land-based Development	4
Storms	4
Ocean Acidification	3
Shellfish Diseases	3
Physical Destruction to Reefs	3
Management	3
Lack of Spawning	2
Lack of Substrate	2
Siltation	2
Swings in Salinity	1
Lack of Awareness	1
Multiple Threats/Interactions	66

# Respondents provided 241 actions to be considered for Oysters

Action Related to:	Number of Times Made
Habitat Enhancement	85
Water Quality Improvements	52
Shellfish Aquaculture	52
Fisheries Management	38
Education/Awareness	6
Other	8



#### www.ncoysters.org/2020blueprintupdate





#### **Oyster Habitat Management Strategy** NC DEPARTMENT OF ENVIRONMENTAL QUALITY Jacob Boyd | NC Division of Marine Fisheries N.C. Oyster Blueprint Update | June 9, 2020



### Goals and Objectives

- Sustainably manage natural oyster habitats for ecosystem services and wild harvest
- Build on successes and lessons learned
- Recommend additional management actions to increase and protect oyster populations





### Accomplishments

- 2001: Original Oyster Fishery Management Plan (FMP)
- 2001 2017: Four amendments
- Included objectives to regain oyster habitats lost during the past centuries
- Provided framework to restore oyster stocks and improve sustainability of oyster harvest



### Accomplishments

- 2001: Original Coastal Habitat Protection Plan (CHPP)
- 2010 and 2016 Two full revisions
- Increased outreach and education
- Increased use of living shorelines
- New mapping and research
- Increased oyster restoration and cultch planting
- Compliance with existing regulations



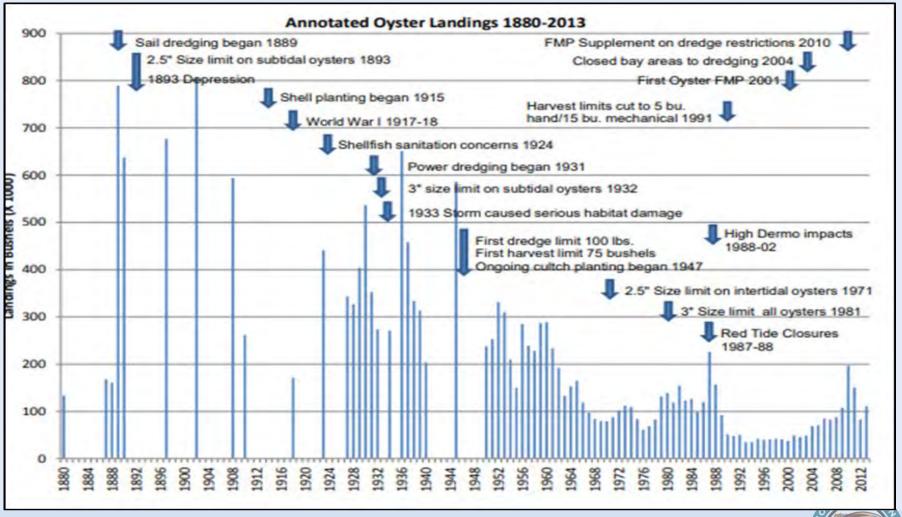
#### North Carolina Coastal Habitat Protection Plan

2016 Plan NC Department of Environmental Quality Enhancing coastal fisheries through habitat protection and restoration





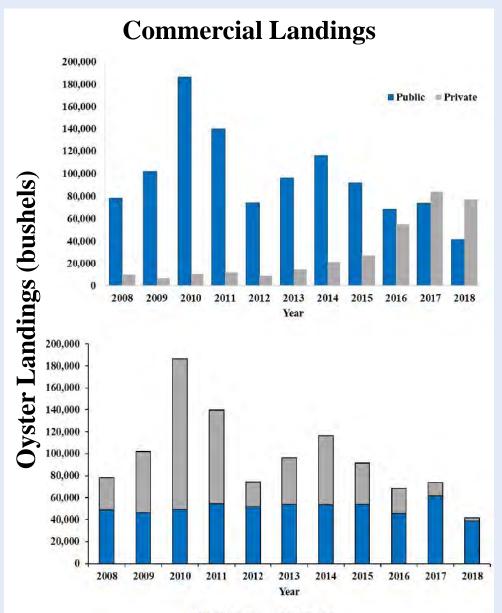
### Stock Status and Trends



Factors affecting the North Carolina oyster fishery, 1880 – 2013. DMF FMP Amendment 4, 2017



### Stock Status and Trends





Hand Harvest Mechanical

### Stock Assessment

- Insufficient data to conduct a traditional stock assessment
- Work is being done to develop methodologies for completing a stock assessment
  - The Nature Conservancy, North Carolina State University, NC Division of Marine Fisheries



Shellfish Mapping

### **Shell Bottom**

Acres

Subtidal

Intertidal

5,185

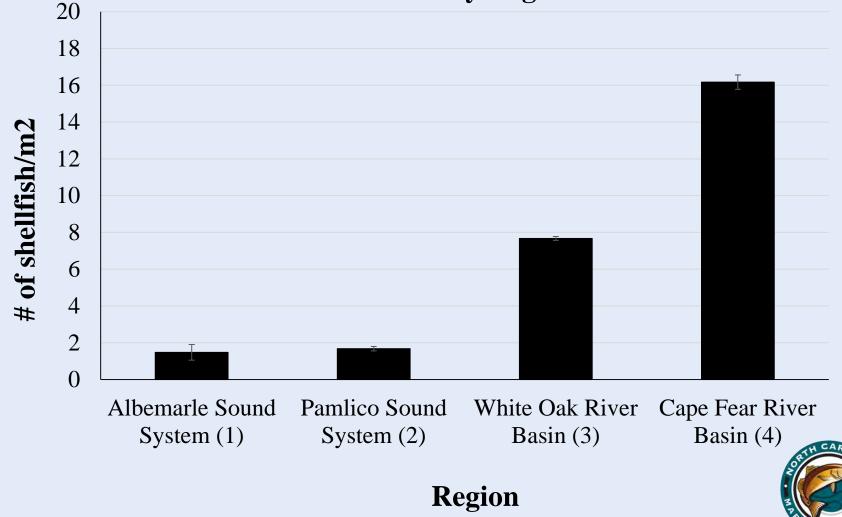
16,551

Total

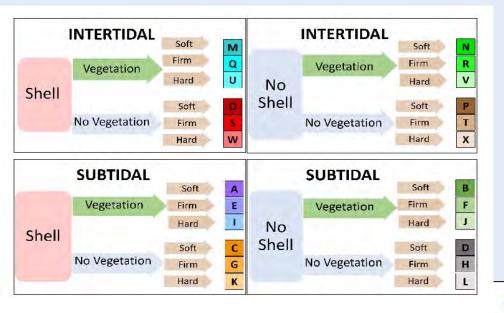


### Shellfish Mapping

#### All Shellfish by Region



### Shellfish Mapping

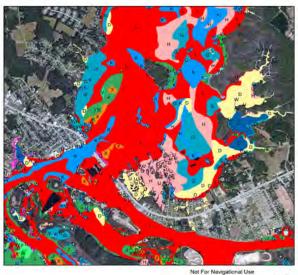




NC DMF ESTUARINE BENTHIC HABITAT MAPPING PROGRAM

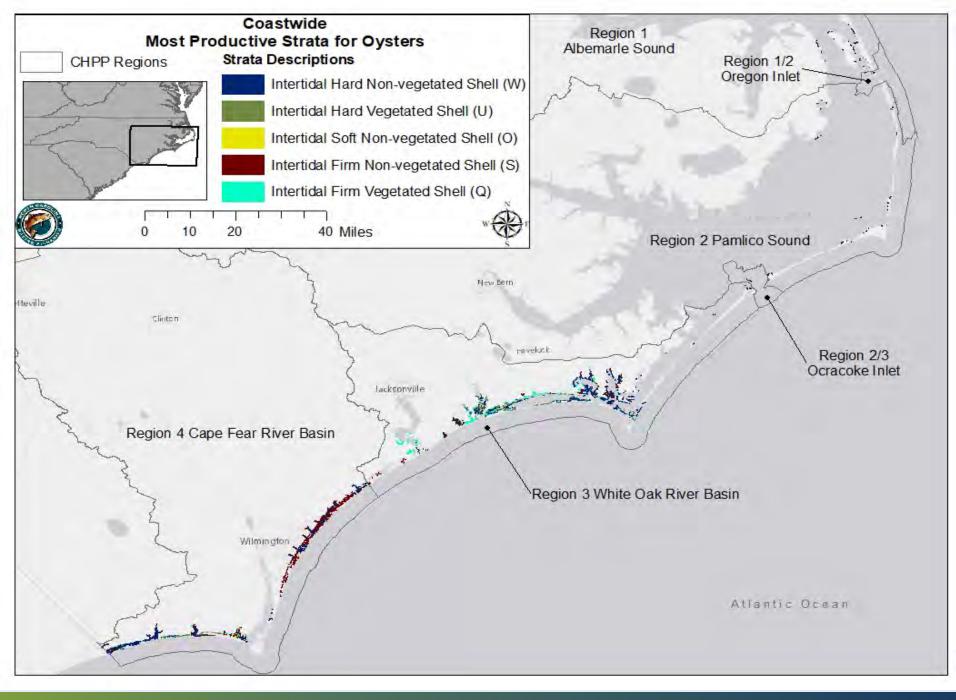
Lower White Oak River

Legend A - Subtidal Soft Vegetated Shell B - Subtidal Soft Vegetated w/o Shell C - Subtidal Soft Non-vegetated Shell D - Subtidal Soft Non-vegetated w/o shell E - Subtidal Firm Vegetated Shell F - Subtidal Firm Vegetated w/o Shell G - Subtidal Firm Non-vegetated Shell H - Subtidal Firm Non-vegetated w/o Shell I - Subtidal Hard Vegetated Shell J - Subtidal Hard Vegetated w/o Shell K - Subtidal Hard Non-vegetated Shell L - Subtidal Hard Non-vegetated w/o Shell M - Intertidal Soft Vegetated Shell N - Intertidal Soft Vegetated w/o Shell O - Intertidal Soft Non-vegetated Shell P - Intertidal Soft Non-vegetated w/o Shell Q - Intertidal Firm Vegetated Shell R - Intertidal Firm Vegetated w/o Shell S - Intertidal Firm Non-vegetated Shell T - Intertidal Firm Non-vegetated w/o Shell U - Intertidal Hard Vegetated Shell V - Intertidal Hard Vegetated w/o Shell W - Intertidal Hard Non-vegetated Shell X - Intertidal Hard Non-vegetated w/o Shell Not Mapped



2,800 5,600

Feel



### Managing Protected Oyster Habitat

#### Restoration

Military Protected Areas

#### Closed Waters

#### Gear Restrictions

Protect ~2,170 Acres Oyster Reefs

Sanctuaries

### Managing Protected Oyster Habitat

- Protected Areas:
  - Evaluate/designate using CHPP SHA identification
  - Evaluate effectiveness of closed waters as de facto sanctuaries
  - Evenly distribute along coast
  - Protect from habitat losses

### Lessons Learned

## FMP CHIPP

Sustainable Harvest AND Ecosystem Services

#### Oyster Blueprint 2021-2025 Natural Oyster Habitat Management Strategy Workgroup Members and Reviewers

- Jacob Boyd, Tina Moore, Anne Deaton, Joe Facendola, Jeffrey Dobbs, Jason Peters, NC DMF
- Dr. Martin Posey, Troy Alphin, UNCW CMS
- Dr. Dave Eggleston, NC State CMAST

- Dr. Brandon Puckett, NCNERR
- Dr. Niels Lindquist, UNC IMS
- Dr. Brian Boutin, TNC
- Erin Fleckenstein, Todd Miller, Ted Wilgis, NC Coastal Federation





Oyster Blueprint 2021-2025 Natural Oyster Habitat Management Strategy Major Recommendations

As we're reviewing these recommendations, consider:

- 1. Are they important and achievable in 5 years?
- 2. What did we miss?
- 3. What resources (funding, legislation, research) are needed?



### **Oyster Blueprint 2021-2025**

**Natural Oyster Habitat Management Strategy Major Recommendations** 

- 1. Conduct sampling, analyze data and implement the methodology to establish a stock assessment of the oyster population in North Carolina.
- 2. Develop a fishery independent oyster abundance index to assist with oyster management decisions.
- 3. Refine oyster landing data collection to provide more information to assist with management.
- 4. Enhance, maintain and link habitat mapping efforts to develop a substrate budget, guide restoration efforts, and support the stock assessment development.
- 5. Develop a plan to enhance wild oyster resources in waters south of Pamlico Sound.
- 6. Incorporate Blueprint Recommendations and Actions into the Oyster FMP and CHPP.



Conduct sampling, analyze data and implement the methodology to establish a stock assessment of the oyster population in North Carolina.

- Establish the assessment methodology, complete sampling, and analyze data to create a stock assessment.
- Incorporate resulting recommendations into the oyster FMP and CHPP.



https://www.umces.edu/oyster-stock-assessment



# Develop a fishery independent oyster abundance index to assist with oyster management decisions

- Use trends from abundance index to determine closures or other management actions
- Establish sentinel sites in both open and closed shellfishing waters
- Significant time and energy will need to be spent to design and implement an effective and robust abundance index





# Refine oyster landing data collection to provide more information to assist with management.

- Develop procedures so that oyster harvest landings can be attributed to the following: (1) wild stocks for commercial purposes; (2) cultch planted reefs created by DMF; (3) recreational harvest estimates (through surveys); and (4) farm raised oysters from shellfish leases.
- Use date to support stock assessment development and assist in management of wild oyster stocks

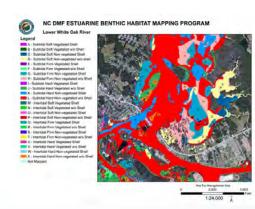




Enhance, maintain and link habitat mapping efforts to develop a substrate budget, guide restoration efforts, and support the stock assessment development.

- Establish a balanced substrate budget for the estimated 21,000 acres of oyster habitat along our coast.
- Update and maintain baseline shellfish habitat mapping
- Conduct change analysis in a subset of remapped areas to assess trends
- Support increased use of more rapid technology (drones, sonar).







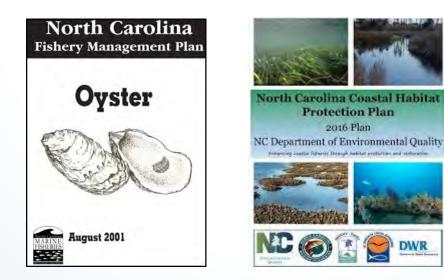
# Develop a plan to enhance wild oyster resources in waters south of Pamlico Sound

- Develop an oyster resource enhancement strategy and priority action plan
- Determine locations in open and closed waters for enhancement and restoration
- Consider additional protection measures for these areas if needed
- Evaluate health of oyster habitat in closed areas (pollution, management, military)
- Consider transitioning diminished relay program to relay from management areas in open waters



# Incorporate Blueprint Recommendations and Actions into the Oyster FMP and CHPP

- Submit the recommended actions and strategies within this goal to the plan development teams and advisory committees
- Blueprint stakeholders engage in the review and development of the FMP and CHPP









#### Wrap up and Next Steps

Erin Fleckenstein, NC Coastal Federation

## Process of Updating the Blueprint



## Assessing

Blueprint Accomplishments Stakeholder Survey Strategy Workgroup Recommendations

## Planning

Public Review of Draft Plan

**Oyster Steering Committee** 

Review

Virtual Meeting Input

Workgroup Recommendations

## Thank you!





#### Whitney Jenkins NC Coastal Reserve

#### Laura Alexander NC Coastal Federation

Leslie Vegas NC Coastal Federation





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