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
- Steering Committee and Regional Workgroups engaged
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.
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
Annual State of the Oyster Report
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:
Living Shorelines

- Protect Shellfish Waters
- Education & Outreach
- Oyster Sanctuaries
- Shellfish Aquaculture
- Cultch Planting
- Habitat Management

Research Link to Ongoing Planning Efforts
Vision for 4th 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 defined as *Benefits people gain from thriving coastal habitats and clean waters.*

Setting goals based on Ecosystem Services.
Stakeholder Survey

- **Benefits**
- **Threats**
- **Actions**
Results of Stakeholder Survey

Professional Affiliation of Survey Respondents

166 Respondents
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

- Filtering water in the sounds
- Creating habitat for fish and other marine life
- Providing oysters to eat
- Providing economic opportunities - e.g. jobs from...
- Continuing the wild oyster fishery
- Protecting shorelines
- Sequestering extra nutrients
- Serving as sites for recreational opportunities -...
- Other

Number of Times an Oyster Benefit was Selected by Survey Respondents
# Direct Threats to Oysters
Most to Least Concerning

<table>
<thead>
<tr>
<th>Threat</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Physical Destruction to Reefs from Human Related Activities</strong></td>
<td></td>
</tr>
<tr>
<td>(other than harvest)</td>
<td></td>
</tr>
<tr>
<td><strong>Overharvest of Resource</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Siltation/Burying of Reefs</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Incompatible Fishing Practices (e.g. dredging)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Low Dissolved Oxygen</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lack of Spawning due to Low Oyster Population</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Shellfish Diseases</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Salinity Changes (too high/too low)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lack of Settlement due to Low Substrate Availability</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Introduced Invasive Species</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Ocean Acidification</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Physical Destruction to Reefs from Storms or Natural Causes</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Predation</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Lack of Sufficient Food for Oysters</strong></td>
<td></td>
</tr>
</tbody>
</table>
What do you consider to be the single greatest threat to oysters in North Carolina in the next 5-10 years and why?

<table>
<thead>
<tr>
<th>Threat</th>
<th># of Times Selected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Quality</td>
<td>11</td>
</tr>
<tr>
<td>Incompatible Fishing Practices</td>
<td>8</td>
</tr>
<tr>
<td>Overharvest of Resource</td>
<td>5</td>
</tr>
<tr>
<td>Land-based Development</td>
<td>4</td>
</tr>
<tr>
<td>Storms</td>
<td>4</td>
</tr>
<tr>
<td>Ocean Acidification</td>
<td>3</td>
</tr>
<tr>
<td>Shellfish Diseases</td>
<td>3</td>
</tr>
<tr>
<td>Physical Destruction to Reefs</td>
<td>3</td>
</tr>
<tr>
<td>Management</td>
<td>3</td>
</tr>
<tr>
<td>Lack of Spawning</td>
<td>2</td>
</tr>
<tr>
<td>Lack of Substrate</td>
<td>2</td>
</tr>
<tr>
<td>Siltation</td>
<td>2</td>
</tr>
<tr>
<td>Swings in Salinity</td>
<td>1</td>
</tr>
<tr>
<td>Lack of Awareness</td>
<td>1</td>
</tr>
<tr>
<td>Multiple Threats/Interactions</td>
<td>66</td>
</tr>
</tbody>
</table>
Respondents provided 241 actions to be considered for Oysters

<table>
<thead>
<tr>
<th>Action Related to:</th>
<th>Number of Times Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>Habitat Enhancement</td>
<td>85</td>
</tr>
<tr>
<td>Water Quality Improvements</td>
<td>52</td>
</tr>
<tr>
<td>Shellfish Aquaculture</td>
<td>52</td>
</tr>
<tr>
<td>Fisheries Management</td>
<td>38</td>
</tr>
<tr>
<td>Education/Awareness</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>8</td>
</tr>
</tbody>
</table>
www.ncoysters.org/2020blueprintupdate
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
Factors affecting the North Carolina oyster fishery, 1880 – 2013. DMF FMP Amendment 4, 2017
Stock Status and Trends

Commercial Landings

Oyster Landings (bushels)


Public

Private

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

<table>
<thead>
<tr>
<th>Shell Bottom</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtidal</td>
<td>16,551</td>
</tr>
<tr>
<td>Intertidal</td>
<td>5,185</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>21,736</strong></td>
</tr>
</tbody>
</table>
Shellfish Mapping

All Shellfish by Region

Region

- Albemarle Sound System (1)
- Pamlico Sound System (2)
- White Oak River Basin (3)
- Cape Fear River Basin (4)

# of shellfish/m²
Shellfish Mapping

INTERTIDAL
- Vegetation
  - Shell
  - No Vegetation
- Firm
- Hard

SUBTIDAL
- Vegetation
  - Shell
  - No Vegetation
- Firm
- Hard

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
Managing Protected Oyster Habitat

- Military Protected Areas
- Closed Waters
- Santuaries
- Gear Restrictions
- Restoration

Protect ~2,170 Acres Oyster Reefs
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 + CHPP = 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?
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.
Recommended Actions

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
Recommended Actions

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.
Recommended Actions

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).
Recommended Actions

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
Recommended Actions

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

- Assess
- Plan
- Action
Assessing

- Blueprint Accomplishments
- Stakeholder Survey
- Strategy Workgroup Recommendations
Planning

Workgroup Recommendations

Virtual Meeting

Oyster Steering Committee Review

Public Review of Draft Plan

Input

Workgroup Recommendations
Thank you!

Whitney Jenkins
NC Coastal Reserve

Laura Alexander
NC Coastal Federation

Leslie Vegas
NC Coastal Federation
www.ncoysters.org/2020blueprintupdate