NC Oyster Blueprint 2021-2025

Natural Oyster Habitat Management Strategy

DRAFT Recommendations, May 2020

Goal

Sustainably Manage Natural Oyster Habitats Within Public Trust Areas to Perpetuate Ecosystem Services and Wild Harvest

Background

In response to the rapid decline in oyster landings over the past century, the N.C. Blue Ribbon Advisory Council on Oysters was formed in 1992 by the N.C. General Assembly. In its final report, the Council stated, "The health of North Carolina's oyster population is a good indicator of the overall health of our estuaries, and all prudent measures should be taken to ensure a viable oyster resource." The council concluded that there is no single explanation for the progressive loss of oysters over the proceeding century. It found that: (1) habitat destroyed by oyster harvesting has never been adequately replaced by oyster enhancement programs; (2) public trust waters have not been effectively developed for oyster mariculture; (3) coastal lands have been developed for agriculture, forestry and residences with little regard for impact on oysters or other aquatic resources. In addition, it found that the decline of the Eastern oyster throughout its range in the U.S. can be attributed to outbreaks of oyster diseases; to failure to preserve oyster reef habitat against degradation; to overharvest; and to substantial deterioration of coastal water quality.

The 2021-25 Oyster Blueprint builds on the success and lessons learned of many stakeholder efforts, and it recommends a number of goals and actions that will help to rebuild natural oyster stocks. These include goals that will improve water quality in shellfish growing areas, increase shellfish mariculture to reduce pressure on wild stocks, build oyster sanctuary reefs to help ensure that oyster recruitment stays viable, and to provide public sites for harvest on reefs created with planted cultch materials. Therefore, this goal focuses on what additional management actions should be taken in the next five years so that oyster populations in the state increase, and that the increased population is managed in a way that supports a sustainable fishery for generations to come.

Accomplishments Thus Far

Since 2001 oysters have been managed in North Carolina by the Division of Marine Fisheries (DMF) following a Fisheries Management Plan (FMP) adopted by the N.C. Marine Fisheries Commission. The original goal of the FMP was to restore the State's oyster population so that it might produce the optimum yield and regain its role in providing ecological benefits to North Carolina's estuaries. That goal was amended in 2017 to read: *Manage the state's oyster population so that it achieves sustainable harvest and maximizes its role in providing ecological benefits to North Carolina's estuaries*. To achieve the goal of the plan, the original FMP and its later amendments have consistently included the following objectives which if achieved would result in regaining some of the oyster habitats that have been lost during the past centuries:

1. Identify, restore, and protect oyster populations as important estuarine habitat.
2. Manage and restore oyster populations to levels capable of maintaining sustained production through judicious use of natural oyster resources, enhancement of oyster habitats, and development and improvement of oyster production on shellfish leases and franchises.
3. Minimize the impacts of oyster parasites and other biological stressors through better understanding of oyster disease, better utilization of affected stocks, and use of disease and other biological stress resistant oysters.
4. Consider the socioeconomic concerns of all oyster resource user groups, including market factors.
5. Recommend improvements to coastal water quality to reduce bacteriological-based harvest closures and to limit other pollutants to provide a suitable environment for healthy oyster populations.
6. Identify and encourage research to improve understanding of oyster population ecology and dynamics, habitat restoration needs, and oyster aquaculture practices.
7. Identify, develop, and promote efficient oyster harvesting practices that minimize damage to the habitat.
8. Initiate, enhance, and continue studies to collect and analyze economic, social, and fisheries data needed to effectively monitor and manage the oyster resource.
9. Promote public awareness regarding the ecological value of oysters and encourage public involvement in management and enhancement activities.

Since 2001, there have been four amendments to the FMP that have changed some of the management rules that were adopted to implement these objectives. None of these amendments have changed these objectives, and they still provide the framework used by the State to devise actions that need to be taken over the next five years to restore oyster stocks and improve the sustainability of oyster harvest of wild stocks.

- 2001 Original Oyster FMP:
    - Set up process for designation of additional areas limited to hand harvest methods around Pamlico Sound
    - Recommended several statutory changes to the shellfish lease program including higher fees, training requirements, and modified lease production requirements
- 2003 Amendment 1:
    - Changed one of the criteria for designation of hand harvest areas from waters generally less than 10 feet deep to waters less than six feet deep
- 2008 Amendment 2:
    - Adopted 15-bushel harvest limit in Pamlico Sound and 10-bushel harvest limit for all gears (hand and mechanical) in designated areas around the sound
    - Reduced available harvest season
    - Changed method for lease production averages calculations
    - Limited lease applications to five acres
    - Recommended expansion of oyster sanctuary construction efforts

    - 2010 Supplement A raised the potential harvest limit in Pamlico Sound to 20 bushels and created a monitoring system for determining when to close mechanical harvest in that area
- 2014 Amendment 3:
    - Created two seed oyster management areas in Onslow County.
- 2017 Amendment 4:
    - Continuation of the monitoring system for when to close mechanical harvest off public bottom in an area (if sampling by DMF indicates that oysters of legal size have been reduced to below 26% of the live oysters)
    - Reduction of the culling tolerance from ten to 5% in the commercial fisheries off public bottom
    - Reduction of the daily harvest limit for holders of the Shellfish License off public bottom to two bushels per person per day maximums, four bushels per vessel
    - Continuation of the six-week open season to mechanical harvest off public bottom in the bays with changes in the timing of the six-week opening,
    - Modifications to shellfish lease provisions
    - Adding convictions of theft on shellfish leases and franchises to the types of violations that could result in license suspension or revocation.

Status and Trends

North Carolina commercial oyster landings have been in decline for most of the past century. This decline was likely initiated by overharvest and compounded by habitat disturbance, pollution, and biological and environmental stressors. After 1991, oyster stocks and harvests experienced additional significant declines from disease mortalities, toxic algae blooms and low spawning stock biomass. Harvests began to rise again around 2002, and have fluctuated annually near or above about 100,000 bushels since then.

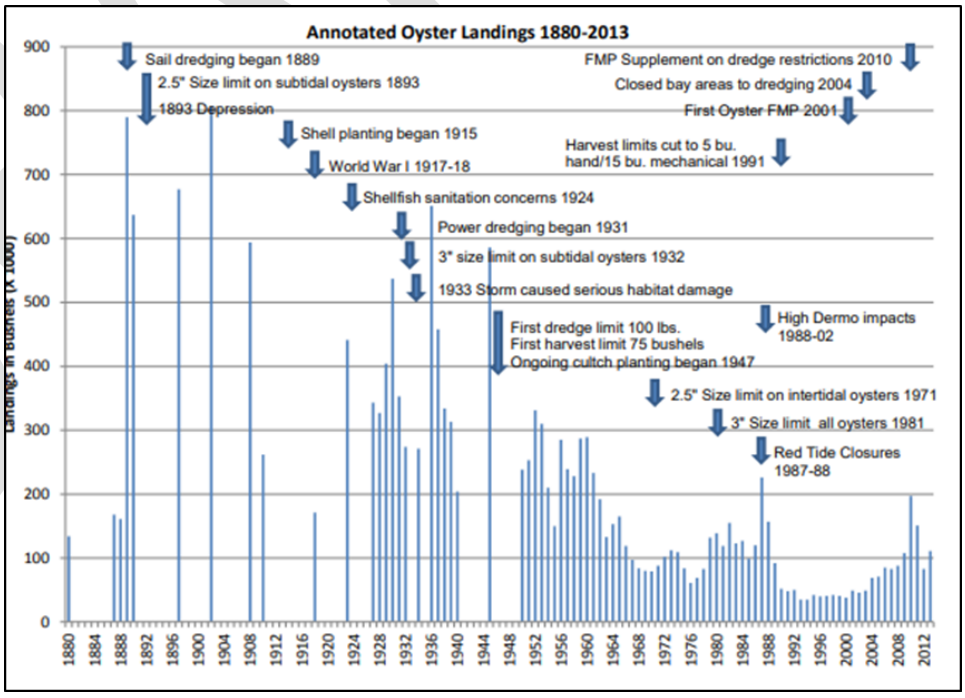

Figure 1. Factors affecting the North Carolina oyster fishery, 1880 2013. NCDMF FMP Amendment 4, 2017

Figure 2 shows the annual landings of oysters by harvest method and from public areas versus private (leased, franchise) areas. This annual rate of landings been coupled with decreases in oyster disease mortality and increased reef restoration, enhancement and sanctuary development as outlined in the FMP. In addition, areas of the coast have experienced a trend of relatively stable spatfall indicating larval availability, connectivity, and recruitment potential for restored and existing reefs. However, a series of recent hurricanes have disrupted harvest and altered oyster populations and reefs coastwide.

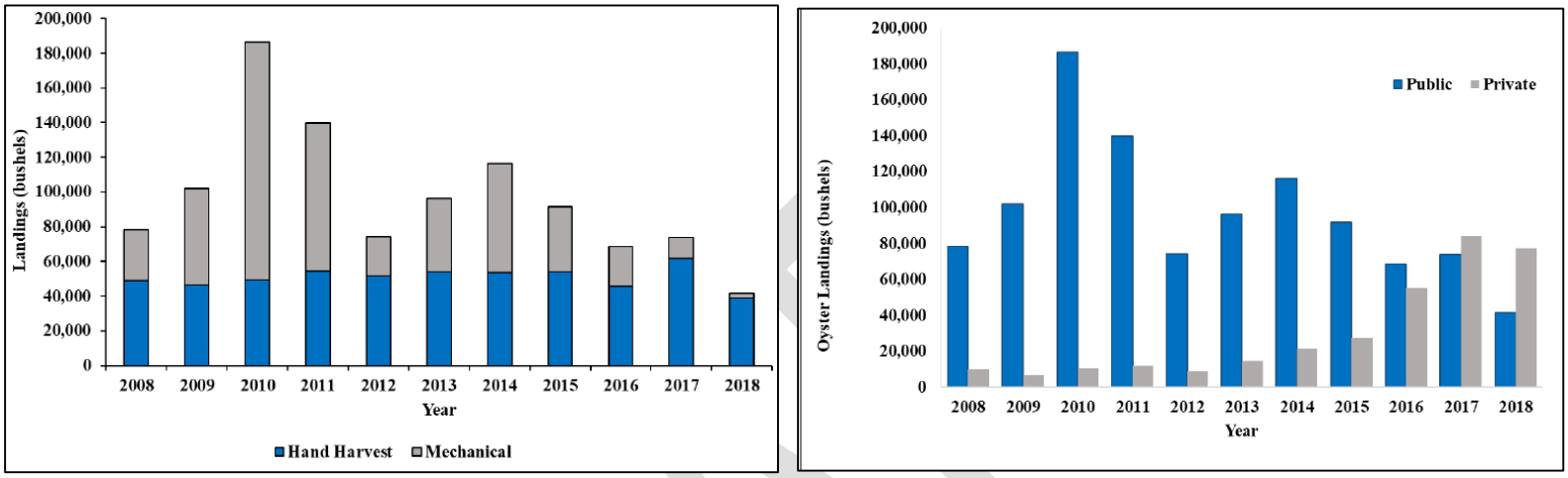

Figure 2. Annual commercial oyster landings (bushels) from: A) public bottom separated by mechanical and hand harvest methods 2008-2018; B) separated by private and public bottom in North Carolina, 2008-2018 (NCDMF Trip Ticket Program). Fishery Management Plan Update, Eastern Oyster, August 2019

Stock Assessment

The oyster stock assessment is a scientific study that uses available data to estimate: (1) the abundance of wild oysters in North Carolina; (2) the fraction of oysters that die each year from natural causes including disease; and (3) the fraction of oysters that are harvested each year by fishing. This assessment develops biological reference points for fishery management plans in North Carolina—benchmarks used to determine if abundance and removals are at sustainable levels—and determines the overall stock condition.

An oyster stock assessment has been attempted by DMF, but data are not available to perform a traditional assessment. It has not been possible to estimate population size, demographic rates, or removals from the population of oysters in the state. The only data representative of the stock were the commercial landings and associated effort.

To address this issue, the following activities have been initiatied:

- A pilot project is underway over the next three years by The Nature Conservancy and North Carolina State University, with guidance from DMF, to develop a subtidal oyster

population survey with the potential to become a long-term biological sampling program in DMF.

- Concurrent with these efforts and outside the scope of this pilot project, The Nature Conservancy is collaborating with the DMF and commercial oystermen to refine the collection of harvest data to gather more accurate information on harvest levels and effort, as well as discard mortality from dredges.
- The DMF is developing a biological sampling program for intertidal oysters using existing bottom mapping sampling program data to delineate oyster reefs and evaluate changes over time for intertidal oysters in the southern region of the state.

Results from these projects will be used to form a stock assessment for oysters in North Carolina. However, due to the necessary extensive sampling, data collection and analysis, the stock assessment will most likely not be operational for the entire coast during the next five years of the Oyster Blueprint and the next FMP. Therefore management actions taken will still need to be based upon existing knowledge and professional expertise.

Shellfish Mapping

To support the stock assessment and aid in oyster management, up-to-date and reliable maps of oyster reefs/shell bottom are critical. As of October 2020, all shellfish waters less than 12 ft. deep had undergone shell bottom habitat mapping within Coastal Habitat Protection Plan (CHPP) Management Units. This program defines shell habitat (shell bottom) as significant cover (>30% of bottom) of living or dead shells. The DMF Shellfish Habitat and Abundance Mapping Program indicated the existing extent of mapped shell bottom in North Carolina as:

- Subtidal Shell Bottom: 16,551 acres
- Intertidal Shell Bottom: 5,185 acres
- Total Shell Bottom: 21,736 acres

The southern estuaries have the greatest relative area of shell bottom, mostly intertidal. The Cape Fear River had the greatest relative area of subtidal shell bottom. The largest area of subtidal shell bottom was in Core/Bogue Sound, followed by Pamlico Sound areas, New and White Oak Rivers, followed by the southern estuaries (NC Oyster FMP Amendment 4, DMF, 2017).

Designating and Managing Protected Oyster Habitat Areas

The Chesapeake Bay 2000 Agreement was developed in cooperation by scientists, managers, watermen, and environmentalists to determine an appropriate acreage for oyster sanctuary designation in the Chesapeake Bay. The agreement called for setting aside at least ten percent of traditional oyster reef acreage as sanctuaries (Keiner 2009). Applying this model to North Carolina would yield a recommendation of at least 2,170 acres of restored and/or healthy oyster reefs that should be protected. This is based on the 21,736 acres of oyster reef/ shell bottom habitat mapped in North Carolina.

To achieve this goal, existing and planned protected areas can be included; additional areas identified and evaluated; and a number of considerations will need to be evaluated.

- Protected oyster habitat areas will include existing and future sanctuaries.
- They may also include areas that restrict mechanical bottom disturbing gear, military protected zones, or waters closed to harvest containing viable or restored oyster reef habitat However, the oyster habitat in these areas will need to be evaluated to ensure that they are healthy or have the potential for successful restoration.
- The CHPP Strategic Habitat Area (SHA) identification and designation process can be used to evaluate and designate areas for oyster habitat protection and restoration.
- These protected areas should be evenly distributed throughout the coast.
- In addition, these areas should be protected from habitat losses from shellfish relay, water-dependent development, and water quality degradation.
- In the waters south of Pamlico Sound, the percentage of polluted shellfish water increases significantly (48%), and these closed areas have been previously viewed as de facto sanctuaries and a protected source of spawning oyster stocks. However, all polluted closed areas may not necessarily function as broodstock reserves. These areas are affected by stressors associated with urbanized drainages which may lead to altered sex ratios, burial of reefs, lower populations and higher incidence of disease (Ravit et al. 2014; UNCW Tidal Creek Studies). In addition, the southern region (New River to Little River Inlet) generates significant landings even though the area only encompasses 6% of the total coastal water body area of the state, and only 5% of the total area which is open to shellfishing.

Recommended Actions:

Listed below are the draft recommended actions for inclusion in the 2021-2025 Blueprint. They build on the previous recommendations and efforts put forth by many stakeholders over many years. They are ambitious, and they not designed for one entity to undertake. Please consider them for their potential, and provide input on how they can be implemented.

1. <u>Conduct sampling, analyze data and implement the methodology to establish a stock assessment of the oyster population in North Carolina</u>. The oyster steering committee will support and assist with securing needed resources for the DMF, TNC and other stakeholders' collaboration to establish the assessment methodology, complete sampling, and analyze data create a stock assessment. Development of the stock assessment and information gained will be used to assist in management strategies. As the initial data collection and establishment of the stock assessment methodology work is underway, any resulting recommendations should be considered in the update of the oyster FMP and CHPP.

2. <u>Develop a fishery independent oyster abundance index to assist with oyster management decisions.</u> Planning for an oyster abundance index is underway at DMF, and the effort will be coordinated with the stock assessment development. Trends from

this independent abundance index, as well as input from harvesters and dealers would be used to inform and enact any closures or other management actions. The establishment of sentinel sites, or standardized sampling stations, would be the foundation for a fishery independent index of oyster abundance. Sites located in both open and closed shellfishing waters could be employed to assess the impacts of harvest on the regions oyster resources.

Due to highly variable oyster demographics within regions of a specific oyster reef, and across reefs in a water body, careful consideration must be given to abundance index sampling strategies, and to the scale to which any management action is applied. Two superficially similar and adjacent oyster reefs may vary greatly in the percentage comprised of legal oysters and interpreting local size distributions as representative of entire regions can be erroneous. Oyster abundance should also play an important role in determining closures, as solely relying on percent legal composition as a trigger may result in inappropriate management actions. Significant time and energy will need to be spent to design and implement an effective and robust abundance index. A working group made up of stakeholders will be formed in 2021 to determine the methodology, entities, and resources needed to establish the index.

3. <u>Refine oyster landing data collection to provide more information to assist with management.</u> To support the stock assessment development and assist in management of wild oyster stocks, new procedures need to be developed 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. A work group will be formed in 2022 to examine how these landing estimates can be obtained and to determine if any changes need to be made in how these data are collected and reported.

4. <u>Enhance, maintain and link habitat mapping efforts to develop a substrate budget, guide restoration efforts, and support the stock assessment development.</u> Shellfish habitat mapping is critical to assessing and developing a substrate budget. The blueprint outlines strategies for the extremely important efforts to return substrate to the water through sanctuary construction and cultch planting. However, neither of these on-going programs were designed to help to establish a balanced substrate budget for the estimated 21,000 acres of oyster habitat along our coast.

   In addition, updating and maintaining baseline shellfish habitat mapping using the most appropriate technology, and selectively monitoring the condition and status of those habitats are critical needs for guiding oyster restoration and management. Linking the CHHP Strategic Habitat Areas, historical Winslow Maps and ground-truthing efforts by researchers and others with the shellfish habitat mapping efforts will ensure a comprehensive approach. In the future, change analysis in a subset of areas remapped by DMF, particularly where major changes are suspected, is needed to assess trends in

this habitat. DMF is currently working to modify the shellfish mapping program by selecting certain sites to remap more frequently, using more rapid technology (i.e., drones, sonar).

In 2021 and 2022, a work group will be assembled by the Oyster Steering Committee to look at the need to establish a substrate budget for areas where wild harvest is occurring, and it will assist DMF with enhancing its shellfish mapping efforts, and coordinating with other mapping efforts, and increasing outreach efforts. If the work group determines that there is a need to take actions to increase substrate in areas where harvest occurs, then it should then develop a set of management proposals for rebuilding substrate over large geographic areas at a rate and scale that compensates for the amount of substrate being removed each year as oysters are harvested.

5. Develop a plan to enhance wild oyster resources in waters south of Pamlico Sound. The oyster steering committee will form a work group in 2021 to develop an oyster resource enhancement strategy and priority action plan for coastal waters south of Pamlico Sound. This group will look at available data to determine locations within waters that are both open and closed to harvest where populations of oysters appear to be depressed, and whereby placement of increased substrate for those populations can be increased. There are also some closed areas that have robust oyster populations (C. Peterson, UNC-CH, pers. com., 2003). The value of closed shellfishing waters as de facto oyster sanctuaries and how any effects from a greatly diminished shellfish relay program should be evaluated. Creation of additional Shellfish Management Areas in locations of intense hand harvest or considering a relay program from open waters could potentially reduce habitat damage and enhance spatfall of oysters and clams.

   This program will be undertaken to achieve a variety of objectives, including increasing sustainable wild harvest, improving the capacity of oysters to remove nutrients and other pollutants to improve water quality; to increase fish habitat and productivity; and to provide increased recreational fishing opportunities. The priorities generated through this planning process will be focused on increasing the overall health and productivity of the estuaries in the southern half of the coast and will complement but not replace the state's priorities for building sanctuaries and planting cultch to increase oyster harvest. Work on this plan should be on an aggressive timetable, linked with the shellfish mapping work, completed as soon as possible and reported to the N.C. General Assembly and Administrative agencies upon completion.

6. Incorporate Blueprint Recommendations and Actions into the Oyster FMP and CHPP. The next update to the Oyster Fisheries Management Plan is scheduled to occur in 2022 through 2024. Also, the CHPP is due to be updated in 2021. The actions listed within this goal (and elsewhere under other goals in this blueprint) will be submitted to the plan development teams and advisory committees for their consideration and review through the FMP and CHPP update process.