NORTH CAROLINA
COASTAL HABITAT PROTECTION PLAN

By

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Division of Marine Fisheries
Morehead City, NC 28557

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Dee Freeman
Secretary

August 11, 2010

Dee Freeman, Secretary
N.C. Department of Environment and Natural Resources
1601 Mail Service Center, Archdale Building
Raleigh, NC 27699-1601

Dear Secretary Freeman:

Enclosed is the draft 2010 Coastal Habitat Protection Plan (CHPP) approved for your review by the Marine Fisheries Commission, Coastal Resources Commission, Environmental Management Commission, and Wildlife Resources Commission. Please submit any comments or recommendations regarding the plan to Jimmy Johnson, CHPP Coordinator (jimmy.johnson@ncdenr.gov or 252-948-3952) within 30 days from the date it is received by your department.

The Fisheries Reform Act of 1997 [G.S. 143B-279.8] requires you transmit the CHPP to the Joint Legislative Commission on Seafood and Aquaculture for their review. They also have 30 days from the date they receive the plan to submit comments.

The overarching goal of the CHPP is long-term enhancement of coastal fisheries associated with each coastal habitat. The 2010 CHPP, the second iteration of the plan, updates information regarding the ecological functions, condition, and threats to our coastal fish habitats. The four commissions have approved the updated recommendations of the 2010 CHPP and are committed to accomplishing these through continued development of implementation plans and interagency cooperation.

Rob Bizzell, chairman
Marine Fisheries Commission
8/12/10
Date

Steve Windham, chairman
Wildlife Resources Commission
8/25/10
Date

Stephen Smith, chairman
Environmental Management Commission
Sept. 9, 2010
Date

Bob Emory, chairman
Coastal Resources Commission
9/17/10
Date

cc: Louis Daniel, DMF; Gordon Meyer, WRC; Coleen Sullin, DWQ; Jimmy Johnson, DENR; Jim Gregson, DCM; David Knight, DENR; Robin Smith, DENR; Manly Wilder, DENR

Enclosure
JJ/ad

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EXECUTIVE SUMMARY

This document is intended as a resource and guide for implementation of the goals and recommendations included at the end of this summary and in Chapter 9 (Table 9.1).

North Carolina's coastal fisheries are among the most productive in the United States because of the diversity of habitats available in the largest estuarine system (2.3 million acres) of any single Atlantic coast state. The state's coastal fisheries also benefit from the location of North Carolina at the transition between mid-Atlantic and south Atlantic regions and a management system that supports active citizen participation. The current management system was developed following the decline of some important fish stocks during the late 1980s and early 1990s (for example, river herring, weakfish, and summer flounder) as fish kills and water-borne disease outbreaks increased. Protection and enhancement of fish habitats utilized by such species was considered especially beneficial in supporting stock recovery.

Recognizing the critical importance of healthy and productive habitats to produce fish for human benefits, the North Carolina General Assembly included a provision in the Fisheries Reform Act of 1997 instructing the Department of Environment and Natural Resources (DENR) to prepare Coastal Habitat Protection Plans (CHPPs). ***The legislative goal of the plans is long-term enhancement of coastal fisheries associated with each habitat.*** Unlike other planning efforts, the Fishery Reform Act mandated that three environmental regulatory commissions (Environmental Management, Coastal Resources, and Marine Fisheries Commissions) must adopt and implement the plan, thus requiring a coordinated management approach.

The purpose of the CHPP is to compile the latest scientific information on each habitat so that management needs can be identified to protect, enhance, and restore associated fish populations. The CHPP area includes all habitats within the coastal draining river basins in North Carolina. Because the Fall Line is the upper limit for migration of almost all coastal fisheries species, emphasis is placed on the area downstream from that point. The plan is organized by six fish habitat categories: water column, shell bottom, submerged aquatic vegetation, wetlands, soft bottom, and hard bottom. Each habitat chapter includes information on the distribution, ecological function, status and trends, and threats to those habitats; and management needs to address the threats. The interdependence of these habitats and the need to manage them at an ecosystem level is discussed in the Ecosystem Management and Strategic Habitat Areas Chapter. CHPP goals and recommendations are included in the final chapter.

The first edition of the CHPP was adopted in December 2004, and published in January 2005. The recommendations provide the framework to guide CHPP implementation. Each participating division, commission and the Department agreed to develop bi-annual implementation plans. Implementation plans have been developed for the 2005-07, 2007-09, and 2009-2011 fiscal years. The Intercommission Review Committee (IRC), consisting of two members of each commission, was transformed into the CHPP Steering Committee (CSC) following CHPP adoption. The CSC's new charge was to meet quarterly and discuss progress in implementation, how to resolve complex habitat issues and exchange information on emerging issues. The CSC was also responsible for carrying back CHPP related information to their full commissions to enhance communication and coordination. The CSC asked the WRC to join their committee in 2009 as they saw increasing implementation actions that required coordination and cooperation with them. Other agencies participate in a non-obligatory manner, including the Division of Forestry, Ecosystem Enhancement Program (EEP), and Soil and Water Conservation Districts.

During the first five years of CHPP implementation, the CHPP was an active part of the decision making process for DENR, the divisions, and regulatory commissions. Numerous implementation actions were accomplished or begun. In the first year, most of the implementation work involved securing funding and

positions to support implementation work. In the second year, many implementation actions were initiated and substantially advanced in the following year. Budget shortfalls somewhat constrained implementation success in 2008-2009. The CSC, in reviewing CHPP progress, concluded that the six most significant accomplishments and advancements of the CHPP were:

- Interagency coordination/cooperation – established a CHPP coordinator position, CHPP Steering Committee and interagency quarterly meetings
- Stormwater runoff management – adopted and implemented EMC Phase 2 and coastal stormwater rules
- Habitat mapping – initiated coastwide SAV mapping organized by APNEP workgroup, shellfish and shellfish closures mapping with new positions, SHA process to prioritize habitat areas, and shoreline mapping through grant funding
- Compliance monitoring – established new positions in multiple divisions, cross training marine patrol, increased permit fees and fines
- Beach nourishment management – drafted the Beach and Inlet Management Plan through grant funding, and adopted CRC sediment criteria rules
- Oyster reef restoration – established new positions and funding for sanctuary development and monitoring, construction of a shellfish hatchery, and creation of an oyster shell recycling program

The FRA required that the CHPP be reviewed and updated every five years. The updated CHPP follows the same organizational format as the initial plan, with additional focus on fisheries ecosystem management. The following information is a brief summary of the 2010 CHPP, highlighting new information, status, accomplishments, and priority research and management needs.

Habitat maps throughout the plan were updated to include newly mapped areas (foldout map). While much progress has been made on mapping, about 10% of shell bottom remains to be mapped, updated SAV maps are incomplete, more detailed mapping of nearshore hard bottom is needed, and wetland and bathymetry maps are in need of updating.

Since 2005, land-use patterns continued to change with population growth along the coast. During and just after completion of the first CHPP, there was a coastal boom in development. Rapidly accelerating property values made once small coastal mainland counties targets for large new developments. Marketed as the “Inner Banks”, Pamlico, Chowan, Bertie, Washington, Brunswick, and Down East Carteret counties experienced rapid increase in population and subsequent decline in farmland, fish houses, and water access. While coastal North Carolina has historically supported a strong commercial fishing industry, the past five years showed a decline of about 10% in the number of licensed commercial fishermen (~ 8565 in 2008) and a 13% decline in fish dealers (~738 in 2008). Although commercial fishing has declined, recreational fishing has increased (~ 1.9 million anglers in 2007). The economic recession beginning in 2008 has greatly slowed new development. However, because population along the coast has been growing for decades, pollutants and habitat stressors from a diversity of sources remain a significant threat to coastal fish habitat.

The **water column** is the habitat in which all fish live, and the physicochemical characteristics of specific water bodies determine the fish assemblages that will utilize it. The DWQ use support assessments are used to assess status of water quality. The last available assessment (2004-2006) indicated little change in impairment. However, DWQ ambient monitoring coverage for estuaries remains low and only about 30% of freshwater streams are assessed where the majority of ambient stations are located. Fish kill events, which can be an indication of eutrophication, hypoxia, or toxic chemical issues, did not show an increasing trend over the past five years, though total mortality of fish was greater in recent years. Drought conditions from 2006-2008, reducing stormwater runoff, could have

contributed to good water quality during the past few years. There was however an increase in reported wastewater treatment plant Notices of Violation and sewage spills, which contribute substantially to pollutant loading in coastal waters. Completion of several studies indicates that sea level rise is expected to increase in North Carolina at least 1 m per 100 yr. The effect of this rise, along with other weather changes associated with climate change will have a great influence on water quality, salinity, water depth, and temperature, all of which will alter fish distribution and abundance. Accomplishments of the CHPP which will benefit the water column include adoption of coastal stormwater rules by EMC, designation of Anadromous Fish Spawning Areas by MFC and WRC, additional DWQ, DCM, and Forestry compliance positions, advancements in swine farm wastewater management, and removal of two dams and USACE funding for dam modification to allow fish passage past Lock and Dam 1 on the Cape Fear River. Continued priority management needs include removing obstructions to anadromous fish passage, improving water monitoring coverage in gap areas identified by modeling, and developing tools (i.e., TMDLs) to address cumulative impacts. Emerging management needs include reducing pollutant loading from wastewater (including endocrine disrupting chemicals) through increased treatment and prevention of spills and violations, conducting research on rapid infiltration systems before further use, developing rules to enhance physical and water quality characteristics for designated Anadromous Fish Spawning Areas, and expanding the implementation of a drug take-back program to reduce endocrine disrupting chemicals in surface waters.

Shell bottom is both an important fish habitat and a historical fishery, requiring a careful balance in management. The ecological value of shell bottom has been recognized to be as or more significant than the fishery, due to the many species it supports and the ecosystem services it provides. Subtidal shell bottom habitat significantly declined in the 1900s due to previous oyster dredging practices and has not substantially recovered due to disease, sedimentation, declining water quality, and fishing gear impacts. Since the 2005 CHPP was completed, additional habitat was mapped by DMF (90% complete), but no comparisons were done to assess change. However oyster spatfall in northern areas improved slightly from 2003-2006 and spatfall in the southern areas continues to be stable. Fishery rules currently restrict all bottom disturbing gear from 36% of the shell bottom area year-round, Over 70% of shell bottom area have either trawling, dredging , mechanical shellfish harvest or a combination of these restrictions. Accomplishments of the 2005 CHPP regarding shell bottom include accelerated oyster shell recycling program, additional oyster sanctuary habitat designation/creation (from state appropriated funds and federal stimulus project), and several research studies on larvae dispersal and oyster restoration. Continued priorities include completing baseline mapping, refining programs for determining status and trends in shell bottom resources, and continuing scientifically based shell bottom restoration efforts. An emerging issue is the need for research on the effect and prevalence of endocrine disruptor chemicals on shellfish.

Submerged aquatic vegetation is another important fish habitat known to support a high diversity of invertebrates and fish, and provides valuable ecosystem services as a primary producer and water quality enhancer. New ecological information in the plan includes information on the light and optical water quality conditions needed and available for SAV growth in North Carolina. In addition, resource valuation studies indicate that the monetary value of the ecosystem services provided by SAV such as waste management, food production, and climate regulation are very high, making SAV habitat protection a priority. The major threats to SAV remain channel dredging and water quality degradation associated with excess nutrient and sediment accumulation. Since completion of the 2005 CHPP, coastwide imagery of SAV was obtained in 2007-2008 through a multi-agency effort. Preliminary delineation in Bogue and Core Sounds noted an increase in patchiness of SAV compared to historical maps. There were anecdotal reports of an increase in SAV abundance in low salinity areas and high salinity areas south of New River. The observed increase could be attributed to drought and lack of storms during that period. Although a quantified estimate of SAV abundance or change over time has not been completed in North Carolina, a metadata study found a global and national decline in SAV. Accomplishments of the 2005 CHPP that

may benefit SAV include adoption of coastal stormwater rules by EMC, a modified SAV definition by MFC, and revised dock rules by CRC. Continued priority needs include completing delineation of SAV imagery, and modeling water quality parameters necessary to identify potential SAV habitat for restoration and establishment of appropriate water quality standards. Emerging issues include developing comprehensive monitoring programs to determine trends, initiating monitoring of SAV indicators, and assessing sea level rise effects.

Wetlands are the fish habitat occupying the transition between land and water. By storing and filtering land runoff, they enhance coastal water quality and play a vital role in providing refuge and food for juvenile fish. It is estimated that over 95% of the commercial finfish and shellfish fisheries are dependent on wetlands for some portion of their life cycle. Like SAV, valuation studies indicate wetlands provide beneficial ecosystem services through water filtration, carbon sequestration, and production of food fish. Precolonial estimates of wetlands in North Carolina are approximately 7.2 million acres, and current estimates are approximately 5.1 million acres. No new mapping information was available since the 2005 CHPP. However, there is data suggesting a loss of marsh islands from erosion. Between 2001 and 2008 approximately 1,700 acres of permitted wetland impacts were documented. Conversion for development and shoreline alterations are the major cause of wetland loss. Wetland losses and gains through mitigation are difficult to track, but it appears that mitigation and restoration are currently preventing net loss of wetlands. Improvements in wetland restoration address some important CHPP recommendations. Continued priority needs include updating wetland and shoreline maps, improving mapping and tracking system for wetland loss by wetland types, and modifying shoreline stabilization techniques to maintain shallow nursery habitat and enhance riparian buffers. Emerging needs include developing CRC and DENR policies regarding sea level rise adaptations and revising land use planning guidelines, as well as considering alternative types of restoration/mitigation.

Soft bottom habitat is a key foraging habitat for juvenile and adult fish and invertebrates, and aids in storing and cycling of sediment, nutrients, and toxins between the bottom and water column. Shallow unvegetated bottom is particularly productive and, by providing refuge from predators, is an important nursery area. Species dependent on soft bottom include clams, crabs, flounder, and rays, although almost all fish will forage on microalgae, infauna, or epifauna on the soft bottom. Soft bottom habitat is dynamic and resilient to change, although it can be degraded by toxins, hypoxia, or dredging. There is minimal monitoring of sediment quality (i.e., contamination, nutrient enrichment). Since the 2005 CHPP, there has been a large increase in requests for federally authorized and locally funded beach nourishment projects. Large scale projects have been conducted or are underway at Bogue Banks, and Brunswick County beaches, and are in late planning stages for portions of Dare County and most of Topsail Island. Accomplishments of the 2005 CHPP that may benefit soft bottom include implementation of CRC sediment criteria rules, modification to CRC dock rules to protect PNAs, DCM development of a Beach and Inlet Management Plan, and research on the effect of hypoxia on fish productivity. Emerging priority needs include updating existing bathymetric maps, preventing hardened structures on ocean shorelines, and implementing regional sand management strategies of the 2009 Ocean Policy Report.

Low to high relief **hard bottom** in nearshore ocean waters adds to the diversity of North Carolina's waters. The hard bottom areas serve as secondary nursery areas for estuarine dependent reef fish such as black sea bass and gag. Little new information is available for this habitat. SEAMAP-SA has conducted some mapping, but it is limited in information on fish use or habitat description or quality. The largest threat to hard bottom is large scale beach nourishment projects where hard bottom occurs immediately offshore of the nourished beach or near borrow areas. Continuing priority needs include establishing baseline data on the extent and quality of ocean hard bottom & fish use, monitoring water quality trends in bottom waters of the coastal ocean, and monitoring the effect of beach nourishment projects on nearshore hard bottom.

Ecosystem management is an approach to maintaining or restoring the composition, structure, function, and delivery of ecosystem services that focuses on multiple interdependent species and/or habitats rather than single species or habitats. The 2010 CHPP, while looking at each habitat individually also examines the interrelationship among habitats. Almost all threats mentioned in the CHPP affected more than one habitat and all habitats are affected by more than one threat. The largest threat to coastal fish habitats is the cumulative impact of multiple threats. Similarly, no single habitat is the most ecologically important. Multiple habitats are needed to maintain the functions of the entire system. Areas having high quality, structurally complex and diverse habitats are known to support ecosystem stability and resilience and should be high priorities for protection and conservation. To accomplish this, the CHPP recommended identification of Strategic Habitat Areas, which are habitat complexes of exceptional habitat quality or that are particularly at risk due to imminent threat, rarity, or vulnerability. The MFC approved a process in 2006, the first assessment (Region 1 - Albemarle Sound area) was completed in 2008, and the second assessment for Region 2 (Pamlico Sound and the Pamlico and Neuse rivers) began in April 2010.

The 2010 CHPP identifies numerous management needs, some accomplished, others with progress, without progress, or newly identified. The CHPP staff and CSC reviewed these management needs to determine if the existing goals and recommendations established in the 2005 CHPP adequately addressed all the specific management needs. The results suggested some necessary revision of the goals/recommendation language. New recommendations are in bold italic font below. The goals and recommendations listed below will serve as the new guiding framework for CHPP implementation over the next five years.

GOAL 1. IMPROVE EFFECTIVENESS OF EXISTING RULES AND PROGRAMS PROTECTING COASTAL FISH HABITATS

1. Continue to enhance enforcement of, and compliance with, Coastal Resources Commission (CRC), Environmental Management Commission (EMC), Marine Fisheries Commission (MFC), and ***Wildlife Resources Commission (WRC)*** rules and permit conditions.
2. Coordinate and enhance water quality, physical habitat, and fisheries resource monitoring (including data management) from headwaters to the nearshore ocean.
3. Enhance and expand educational outreach on the value of fish habitat, threats from land-use and human activities, ***climate change***, and reasons for management measures.
4. Coordinate rulemaking and data collection for enforcement among regulatory commissions and agencies.
5. ***Develop and enhance assessment and management tools for addressing cumulative impacts.***
6. ***Enhance control of invasive species with existing programs.***

GOAL 2. IDENTIFY, DESIGNATE, AND PROTECT STRATEGIC HABITAT AREAS

1. Support Strategic Habitat Area assessments by:
    a. Coordinating, completing, and maintaining baseline habitat mapping (including seagrass, shell bottom, shoreline, and other bottom types) using the most appropriate technology.
    b. Selective monitoring of the status of those habitats, and
    c. Assessing fish-habitat linkages and effects of land use and human activities on those habitats
2. Identify, designate, and protect Strategic Habitat Areas.

GOAL 3. ENHANCE HABITAT AND PROTECT IT FROM PHYSICAL IMPACTS

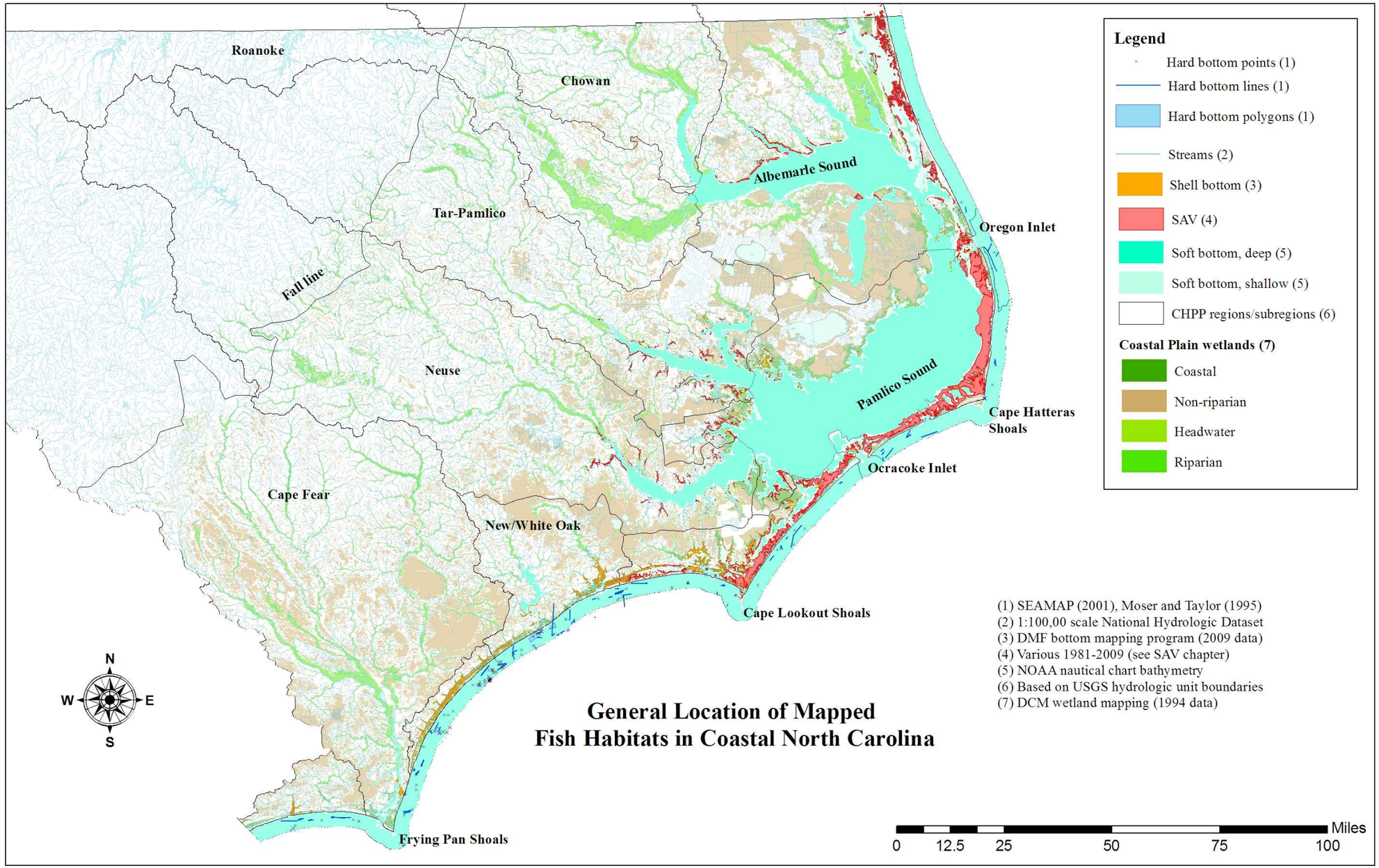
1. Expand habitat restoration in accordance with ecosystem restoration plans, including:
    a. Creation of subtidal oyster reef no-take sanctuaries.
    b. Re-establishment of riparian wetlands and stream hydrology.

   c. ***Restoration of SAV habitat and shallow soft bottom nurseries.***
   d. ***Developing compensatory mitigation process to restore lost fish habitat functions.***
2. ***Sustain healthy barrier island systems by maintaining and enhancing ecologically sound policies for ocean and inlet shorelines*** and implement a comprehensive beach and inlet management plan that provides ecologically based guidelines to protect fish habitat and address socio-economic concerns.
3. Protect habitat from fishing gear effects through improved enforcement, establishment of protective buffers around habitats, modified rules, and further restriction of fishing gears, where necessary.
4. Protect estuarine and public trust shorelines and shallow water habitats by revising shoreline stabilization rules to include consideration of erosion rates and ***prefer*** alternatives to vertical shoreline stabilization measures ***that maintain shallow nursery habitat***.
5. Protect and enhance habitat for migratory fishes by:
   a. Incorporating the water quality and quantity needs of fish in water use planning and rule making.
   b. Eliminating or modifying obstructions to fish movements, such as dams and culverts, to improve fish passage.
6. ***Ensure that energy development and infrastructure is designed and sited in a manner that minimizes negative impacts to fish habitat, avoids new obstructions to fish passage, and where possible provides positive impacts.***
7. ***Protect important fish habitat functions from damage associated with activities such as dredging and filling.***
8. ***Develop coordinated policies including management adaptations and guidelines to increase resiliency of fish habitat to climate change and sea level rise***.

GOAL 4. ENHANCE AND PROTECT WATER QUALITY

1. Reduce point source pollution discharge by:
   a. Increasing inspections of discharge treatment facilities, collection infrastructure, and disposal sites.
   b. Providing incentives for upgrading all types of discharge treatment systems.
   c. ***Develop standards and treatment facilities that minimize the threat of endocrine disrupting chemicals on aquatic life.***
2. Adopt or modify rules or statutes to prohibit ocean wastewater discharges.
3. Prevent additional shellfish and swimming closures through targeted water quality restoration and prohibit new or expanded stormwater outfalls to coastal beaches and to coastal shellfishing waters (EMC surface water classifications SA and SB) except during times of emergency (as defined by the Division of Water Quality's Stormwater Flooding Relief Discharge Policy) when public safety and health are threatened, and continue to phase-out existing outfalls by implementing alternative stormwater management strategies.
4. Enhance coordination with, and financial/technical support for, local government actions to better manage stormwater and wastewater.
5. Improve strategies throughout the river basins to reduce non-point pollution and minimize cumulative losses of fish habitats through voluntary actions, assistance, and incentives, including:
   a. Improved methods to reduce pollution from construction sites, agriculture, and forestry.
   b. Increased on-site infiltration of stormwater.
   c. Documentation and monitoring of small but cumulative impacts to fish habitats from approved, un-mitigated activities.
   d. Encouraging and providing incentives for low impact development.
   e. Increased inspections of onsite wastewater treatment facilities.
   f. Increased water re-use and recycling.

6. Improve strategies throughout the river basins to reduce non-point pollution and minimize cumulative losses of fish habitats through rule making, including:
    a. Increased use of effective vegetated buffers.
    b. Implementing and assessing coastal stormwater rules and modify if justified.
    c. ***Modified water quality standards that are adequate to support SAV habitat.***
7. Reduce non-point source pollution from large-scale animal operations by the following actions:
    a. Support early implementation of environmentally superior alternatives to the current lagoon and spray field systems as identified under the Smithfield Agreement and continue the moratorium on new/expanded swine operations until alternative waste treatment technology is implemented.
    b. Seek additional funding to phase-out large-scale animal operations in sensitive areas and relocate operations from sensitive areas, where necessary.
    c. Use improved siting criteria to protect fish habitat.
8. ***Maintain adequate water quality conducive to the support of present and future aquaculture***.


Roanoke
Chowan
Albemarle Sound
Tar-Pamlico
Oregon Inlet
Fall line
Neuse
Pamlico Sound
Cape Hatteras Shoals
Ocracoke Inlet
Cape Fear
New/White Oak
Cape Lookout Shoals
Frying Pan Shoals
N
W
E
S
Legend
Hard bottom points (1)
Hard bottom lines (1)
Hard bottom polygons (1)
Streams (2)
Shell bottom (3)
SAV (4)
Soft bottom, deep (5)
Soft bottom, shallow (5)
CHPP regions/subregions (6)
Coastal Plain wetlands (7)
Coastal
Non-riparian
Headwater
Riparian
(1) SEAMAP (2001), Moser and Taylor (1995)
(2) 1:100,00 scale National Hydrologic Dataset
(3) DMF bottom mapping program (2009 data)
(4) Various 1981-2009 (see SAV chapter)
(5) NOAA nautical chart bathymetry
(6) Based on USGS hydrologic unit boundaries
(7) DCM wetland mapping (1994 data)
General Location of Mapped
Fish Habitats in Coastal North Carolina
Miles
0
12.5
25
50
75
100

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