APPENDIX A:
STATE, FEDERAL, AND INTERSTATE AUTHORITIES AFFECTING COASTAL FISH HABITAT IN NORTH CAROLINA

Public Trust Doctrine - Implemented as part of North Carolina's constitution; applied in management of North Carolina's coastal lands, surface waters, and the resources in those waters. The doctrine states that "public trust lands, waters, and living resources in a State are held by the State in trust for the benefit of all the people, and establishes the right of the public to fully enjoy public trust lands, waters, and living resources for a wide variety of recognized public uses. The doctrine also sets limitations on the States, the public, and private owners, as well as establishing the responsibilities of the States when managing these public trust assets" (Coastal States Organization 1997).

North Carolina General Assembly - Enacts statutes affecting all of North Carolina. State laws and rules implementing those laws cannot overrule federal laws. However, state actions can be more restrictive than federal rules for environmental protection.

North Carolina Fisheries Reform Act of 1997 (FRA) - Includes a provision [G.S. 143B-279.8] for preparation of Coastal Habitat Protection Plans (CHPPs) by the N.C. Department of Environment and Natural Resources (DENR), with adoption and implementation by three regulatory commissions and their administrative agencies.

Magnuson-Stevens Fisheries Conservation and Management Act of 1976 - The basic law giving the federal government fisheries management authority in the ocean. The reauthorization law (in 1996) is known as the Sustainable Fisheries Act (SFA), which established the basis for federal designation of Essential Fish Habitat (EFH).

National Marine Fisheries Service (NMFS) - The agency in the National Oceanic and Atmospheric Administration (NOAA) charged with principal responsibilities for management of the Nation's fisheries and fish habitat in the oceans beyond individual states' jurisdictions. Federal fishery management plans must include provisions for the protection of Essential Fish Habitat (EFH) from negative impacts from federally funded activities.

Coastal Resources Commission (CRC) - One of three North Carolina regulatory commissions that must adopt CHPPs and implement their recommendations. The CRC enacts rules to manage development and land disturbing activities along estuarine and ocean shorelines, shoreline stabilization, alteration of submerged bottoms and coastal wetlands, and marina construction. The Division of Coastal Management (DCM), an agency of the N.C. Department of Environment and Natural Resources, implements CRC rules.

Environmental Management Commission (EMC) - One of North Carolina regulatory commissions that must adopt CHPPs and implement their recommendations. The EMC has wide-ranging authority over activities affecting water quality statewide. Rules adopted by the EMC govern point and nonpoint discharges, wastewater management, alteration of non-coastal wetlands, and stormwater management. Several different DENR agencies implement EMC rules, including the divisions of Water Quality (DWQ), Air Quality (DAQ), Water Resources (DWR), and Land Resources (DLR) of the N.C. Department of Environment and Natural Resources.

Marine Fisheries Commission (MFC) - One of three North Carolina regulatory commissions that must adopt CHPPs and implement their recommendations. The MFC manages commercial and recreational fishing practices in coastal waters through rules implemented by the Division of Marine Fisheries (DMF), an agency of the N.C. Department of Environment and Natural Resources.

Intercommission Review Committee (IRC) - A committee of two members from each of the three regulatory commissions (EMC, CRC, MFC), who reviewed the CHPP and developed the management recommendations.

Division of Marine Fisheries (DMF) - DENR agency that implements MFC rules affecting commercial and recreational fishing practices in coastal waters, including rules governing effects of fishing practices on fish habitats. The DMF also conducts extensive monitoring and research programs concerning fish stocks, landings statistics, licensing, and enforcement, and prepares and implements state fishery management plans.

Division of Water Quality (DWQ) - One of the DENR agencies that implements rules of the Environmental Management Commission to govern point and nonpoint discharges into surface waters, wastewater management, alteration of non-coastal wetlands, and stormwater management. The DWQ conducts an extensive statewide water quality monitoring program, manages permit programs for wetlands impacts and wastewater discharges, and prepares and implements basinwide management plans.

Division of Air Quality (DAQ) - One of the DENR agencies that implements rules of the Environmental Management Commission to govern discharges of particulates and gases into the atmosphere. The DAQ operates a statewide network to monitor air quality.

Division of Water Resources (DWR) - One of the DENR agencies that implements rules of Environmental Management Commission pertaining to use of water resources and water supply. The DWR manages state grant programs for water resource development projects, such as navigation and ocean beach nourishment.

Division of Land Resources (DLR) - The DLR administers rules adopted by Sedimentation Control Commission to control sediment transport from land development, as well as rules of the N.C. Mining Commission. The DLR administers the State's dam safety program, and also includes the N.C. Geological Survey and the N.C. Geodetic Survey.

Division of Coastal Management (DCM) - DENR agency that implements rules adopted by the CRC to manage development and land disturbing activities along estuarine and ocean shorelines, shoreline stabilization, alteration of submerged bottoms and coastal wetlands, and marina construction through permit programs. The DCM also sponsors and conducts research and analysis concerning coastal erosion and wetlands mapping.

Wildlife Resources Commission (WRC) - The state agency charged with management of inland fisheries, hunting, and management of wildlife, including birds and protected species. The WRC has authority over most anadromous fish spawning areas in coastal rivers and creeks. The WRC conducts fisheries research on a statewide basis.

APPENDIX B1:

Coastal Habitat Protection Plan
Public Meeting Data Analysis

A Report on the Input Received at Public Meetings
July – September 2003

Prepared by
Tancred Miller

North Carolina Department of Environment and Natural Resources
Division of Coastal Management

January 2004

INTRODUCTION

The North Carolina General Assembly enacted the Fisheries Reform Act in August 1997. One of its major provisions is a requirement that the North Carolina Department of Environment and Natural Resources (DENR) prepare Coastal Habitat Protection Plans (CHPPs). The stated CHPPs goal is to enhance the coastal fisheries associated with each habitat. The divisions of Marine Fisheries, Coastal Management, and Water Quality were given the major responsibilities for writing the plans. A unique feature of the law is that three state regulatory commissions (Coastal Resources, Environmental Management, and Marine Fisheries) must adopt the plans. Once adopted, the Commissions' actions are to be consistent with the plans. The Commissions are to adopt the initial plan by the end of December 2004.

In order to educate the public about the CHPP, DENR initiated a public outreach effort during the summer of 2003. This effort included a short video to introduce the public to the CHPP initiative, an informational brochure, a twelve-page newspaper tabloid, and a series of ten public meetings. The video was made available to Coastal Resources Advisory Council (CRAC) members and others for viewing at county commission meetings, town council meetings and other public gatherings. The video was also sent to local cable TV outlets, and given on request to interested groups. Over 200 copies of the video were distributed. A total of 250,000 copies of the newspaper tabloid, which described the six important fish habitats and threats to them, were distributed to coastal newspapers and to a limited statewide distribution through targeted mailings. DENR also held ten public meetings (see table below), gathering almost 1,000 written comments from over 500 participants.

Summary of Data for CHPP Public Meetings, July – September, 2003			
Location	Date	Attendance	Number of comments
Raleigh	July 23, 2003	38	70
Mooresville	July 24, 2003	30	61
Supply	July 29, 2003	38	82
Wilmington	July 30, 2003	78	173
Dixon	August 12, 2003	52	127
Beaufort	August 13, 2003	92	154
Manteo	August 19, 2003	64	87
Edenton	August 20, 2003	32	52
Washington	September 9, 2003	59	94
Bayboro	September 10, 2003	44	66
Totals		527	966

SUMMARY OF PERCEIVED THREATS TO COASTAL HABITAT

Meeting participants were asked to comment on the threats to coastal fisheries identified in the handout given to them (Attachment 1), and to include additional threats of which they were aware. Additional threats to coastal fisheries habitats identified during the public meetings included unsustainable development, inadequate enforcement of existing environmental laws and rules, and boating and fishing practices.

About one-third of the comments (324) dealt with development issues. Polluted stormwater runoff (45 comments), sewage discharges (41), and filling wetlands (35) were the major development threats cited by the public during the meetings.

It should be noted that 137 comments cited inadequate enforcement of existing rules, with 27 stating that penalties for violating environmental standards were either too low or should be increased. Some participants (21) also felt that enforcement staff levels at the regulatory agencies were inadequate to enforce existing rules and statutes.

Fishing and boating were also identified as threats to habitat (128 comments). Fifty-six comments cited boat wakes and other boating practices as major threats, while 27 comments identified specific fishing gear as a threat.

Specific development-related threats included 19 comments referencing land-use planning, and four comments identifying golf courses. Other threats identified at the meetings included: silviculture (11), aquaculture (9), air pollution (5), overfishing (4), and phosphate mining (1).

SUMMARY OF SUGGESTED ACTIONS

In addition to identifying threats to coastal fisheries, the meeting participants were asked for solutions to address the specific threats. Educating the public about the importance of coastal habitats and the threats they face was the most commonly cited suggestion.

More emphasis on enforcement of existing laws and rules was the second most popular “fix” that participants recommended. Eighty-six comments noted that critical habitats must be preserved or restored.

Other solutions offered numerous times by citizens attending the meetings included: increased funding to state agencies responsible for protecting habitats (29 comments); better cooperation among state and federal agencies (26); and more funding for land acquisition (14).

Hundreds of specific, individual actions were also suggested, ranging from establishing a citizens’ hotline, to better emissions standards for cars and boats, to restoring oyster reefs. An appendix to this report that includes the complete list of comments from the meetings is available at the Division of Marine Fisheries’ web site (http://www.ncfisheries.net/habitat/chpp1.htm) or on request (CHPPs@ncmail.net, or telephone 252-726-7021).

RESPONSE SUMMARY GROUPINGS

Comments were further grouped into the following nine categories in order to identify and portray trends in the nature of the comments submitted.

1. Common themes
2. Top responses ranked statewide (regardless of meeting location)
3. Top responses ranked by meeting location
4. Institutional: staffing, funding, interagency cooperation, senior-level support
5. Regulatory: rules, policies, compliance and enforcement
6. Implementation: public outreach, public-private partnerships, continuous improvement
7. Recommendations by the Commissions' (Environmental Management Commission or EMC, Coastal Resources Commission or CRC, Marine Fisheries Commission or MFC) areas of jurisdiction
8. Recommendations outside the Commissions' *(EMC, CRC, MFC)* areas of jurisdiction: agriculture, silviculture, planning and zoning, U.S. Army Corps of Engineers, local government, school/education programs, U.S. military
9. Recommendations by habitat type

1. Common themes
This category lists the most frequent themes within each of the major issue areas.

Development – wastewater management, land use planning, wetlands protection, impervious cover, beach nourishment

Education and Research – school programs, homeowner education, decision maker education, natural and social science research to inform rulemaking

Enforcement – consistent enforcement of rules and penalties (e.g., curtail the influence of politics on variances from CRC rules); focus on existing rules rather than on creating new ones; increase enforcement staff and agency funding levels

Boating and Fishing – Require coastal recreational fishing licenses; ban or further limit the use of certain commercial fishing gear (e.g., trawl nets and dredges); further limit commercial fishing grounds (e.g., ban in estuarine waters); expand no wake zones; ban or further limit the use of personal watercraft (e.g., jet skis) especially in shallow waters; improve access to and reliability of sewage pumpout stations

Agriculture and Silviculture – subject agriculture and silviculture to Coastal Area Management Act (CAMA) rules; gradually eliminate hog farms from the coastal zone or require more stringent waste management; expand the oyster restoration program; apply forestry best management practices (BMPs)

Agency Cooperation – continue and expand existing cooperation among relevant agencies; streamline customer service

2. Response rankings statewide (regardless of meeting location)
This category ranks the three most common issue areas of concern on a statewide basis, with the number of times each was mentioned (in parentheses). For further details about the comments submitted on each issue, see the full list of comments in the Appendix.

#1:	Development controls	(324)
#2:	Enforcement and Compliance	(130)
#3:	Education and Research	(124)

The volume and pace of coastal development were cited in most meeting locations to be the biggest threats to coastal habitat, needing the most immediate and concerted attention. Actions to alleviate the effects of development were the most frequent recommendations. Within the development category, better handling of stormwater and wastewater was the most common concern, including sewage treatment, construction runoff, and discharge into public trust waters.

Enforcement of existing laws was the next most common area for desired action. The responses reflect a widespread opinion that existing laws are sufficient to improve habitat condition, but that they are not being enforced to their full extent.

Also notable for the frequency with which it was mentioned was boat operations, including a desire to establish more "No Wake Zones," to limit use of 2-stroke boat engines and personal watercraft (e.g., jet skis), and to better manage the disposal of marine sewage.

The Education and research theme was the third most common category for recommended action. Respondents concluded that much more education is required, targeting local decision-makers as well as the general public of all ages. Education topics would include the types of human activity that affect coastal habitat, the value in protecting habitat, and an explanation of how existing and proposed regulations work to protect the resource.

3. Top 3 responses by meeting location

This category lists the three most common issues of concern at each public meeting location. For further details about the comments submitted on each issue, see the full transcript of comments in the Appendix.

Site (# of attendees)	**Issue** (# of times mentioned)
Bayboro (44):	Development (23), Agriculture and Silviculture (11), Education and Research (8)
Beaufort (92):	Development (64), Enforcement (26), Boating and Fishing (25)
Edenton (32):	Education and Research (14), Enforcement (13), Development (9)
Dixon (52):	Development (44), Boating and Fishing (26), Enforcement (15)
Manteo (64):	Development (16), Education and Research (14), Enforcement (9)
Mooresville (30):	Boating and Fishing (19), Development (13), Enforcement (9)
Raleigh (38):	Development (28), Agriculture and Silviculture (11), Boating and Fishing (9)
Supply (38):	Development (35), Enforcement (15), Education and Research (11)
Washington (59):	Development (35), Education and Research (19), Agriculture and Silviculture/ Boating and Fishing (8)
Wilmington (78):	Development (57), Enforcement (27), Boating and Fishing (22)

4. Institutional: staffing, funding, interagency cooperation, and senior-level support

This category describes the main institutional needs that were identified.

Respondents that addressed the levels of enforcement staffing and resources were in agreement that the current levels are insufficient to ensure satisfactory compliance with existing laws, given the volume of activity on the coast. Respondents were supportive of increasing the staff and funding dedicated to enforcement and compliance.

Respondents acknowledged the cooperation taking place among the three Commissions and their staffs. Recommendations include extending the opportunity for early participation to other state agencies that will have some impact upon the success of the CHPP, and streamlining the customer response setup to deliver one-stop shopping for members of the public who want to get involved.

5. Regulatory: rules, policies, compliance and enforcement
This category describes the main suggestions concerning the Commissions' (EMC, CRC, MFC) legislative and regulatory programs.

There is the widespread belief that existing laws are not being fully enforced, and recognition among respondents that the lack of adequate staffing and resources is a major contributor to this shortcoming. Respondents were also concerned that certain laws were not being fairly and uniformly applied – the perception being that politically connected property owners received more favorable treatment on CRC variance requests and softer penalties for violating coastal rules. There was not a general feeling that existing laws are *in*adequate for coastal protection. Alternately, several respondents commented that there is not a good public understanding of what laws do exist and why.

6. Implementation: public outreach, public-private partnerships, continuous improvement
This category shows the main recommendations regarding CHPP implementation and quality control.

Education and research were repeatedly mentioned as central components for success of the CHPP. Recommendations included efforts to partner with primary and secondary schools to introduce environmental stewardship curricula, partnering with universities on research, and engaging in concerted educational outreach to private citizens and public sector employees.

7. Common recommendations by Commissions' (CRC, EMC, MFC) areas of jurisdiction
This category relates common recommendations that pertained specifically to any of the three Commissions' (CRC, EMC, MFC) jurisdictions, e.g., CAMA permitting, stormwater management, and fishing regulation.

CRC – Strengthen application of CRC rules, including tougher variance criteria for development in the buffer; phase out bulkheads – move towards living shorelines and riprap; strengthen disaster mitigation especially on the oceanfront by mandating greater setbacks and larger lots; reduce impervious cover by phasing in pervious materials; stop all beach nourishment; ensure more sewage pumpouts are available to boaters, and that they work; provide public education outreach; support more thorough and consistent enforcement of CRC rules; increase penalties for violations; ensure better interagency collaboration;

EMC – Complete Phase II Stormwater process; bring septic and sewer systems up to a higher standard; improve ability to handle/treat sewage overflows; end practices that send untreated stormwater to public waters (ocean, sound, rivers, etc.); provide public education outreach; fully enforce existing rules; increase penalties for violations; ensure better interagency collaboration;

MFC – Improve or restrict the use of non-selective commercial gear, particularly trawl nets and dredges; ban or further limit trawling and gill netting in estuarine waters; expand the oyster restoration program for water quality benefits; provide public education outreach; continue to develop more selective, less disturbing commercial gear; fully enforce existing rules; increase penalties for violations; ensure better

interagency collaboration.

8. Recommendations outside Commissions' (CRC, EMC, MFC) areas of jurisdiction: agriculture, silviculture, planning and zoning, U.S. Army Corps of Engineers, local government, school/education programs, U.S. military
This category lists common recommendations that fall outside of the three Commissions' (EMC, CRC, MFC) direct control.

Bring agriculture and forestry under CAMA jurisdiction; phase out hog farms and waste lagoons from the coastal zone; finalize and adopt the coastal recreational fishing license (CRFL); divert funds from beach nourishment to purchasing threatened properties; control the use of fertilizers; ban landfills in [drained] wetlands; require basin-wide land use planning that meshes with local plans and strict CAMA standards; establish more no wake zones; phase out 2-stroke boat engines in favor of 4-stroke engines; require inlet dredging only on low (ebb) tides; increase enforcement personnel and budget; prevent General Assembly from making last-minute changes to rules.

9. Common recommendations by habitat type
This category lists specific recommendations that were offered regarding the six habitat classes: Water Column, Shell Bottom, Submerged Aquatic Vegetation, Wetlands, Soft Bottoms, and Ocean Hard Bottom.

Water Column – plant oysters to filter out nutrients; allow dredging only on a falling (ebb) tide so that sediments flush oceanward; lessen the amount of pollutants, nutrients and sediments that come from point and nonpoint sources

Shell Bottom – increase the amount of effort dedicated to rebuilding and expanding oyster reefs; lessen the amount of pollutants, nutrients and sediments that come from various sources

Submerged Aquatic Vegetation (SAV) – ban equipment and practices such as jet skiing and trawling that damage SAV; lessen the amount of pollutants, nutrients and sediments that come from various sources

Wetlands – enforce "no net loss" rule; increase investment in wetland restoration; purchase lands for preservation; phase out bulkheads; lessen the amount of pollutants, nutrients and sediments that come from upland sources

Soft Bottoms – limit disturbing activities such as clam kicking and dredging; lessen the amount of pollutants, nutrients and sediments that come from various sources

Ocean Hard Bottom – ban or severely limit beach nourishment, which would lessen the need for dredging; modify or curtail the use of disturbing commercial fishing gear that directly and indirectly impacts the habitat; lessen the amount of nutrients and sediments that come from ocean outfalls and other inland sources

ATTACHMENT 1

List of threats to coastal fish habitats distributed for discussion at North Carolina Coastal Habitat Protection Plan public meetings, summer 2003.

Coastal Habitat Protection Plans (CHPPs) – Public Meeting

Coastal Fisheries Habitats

Water column – The water in a river, sound or ocean and its physical, chemical and biological properties
Shell bottom – Intertidal and subtidal bottoms made up to shells or living oysters, clams or other shellfish
Submerged aquatic vegetation – Underwater beds of rooted plants, called sea grass, or macro algae
Wetlands – Areas that are inundated enough to support plants normally adapted to saturated soils
Soft bottoms – Sand and mud bottoms with no vegetation
Ocean hard bottoms – Exposed areas of rock or hard sediment in the ocean

THREATS TO COASTAL FISH HABITATS
AGRICULTURE/AQUACULTURE RELATED
Excessive Sedimentation and Turbidity
Excess Nutrients
Harmful Bacteria (animal operations)
Invasive Species
Filling and Draining Wetlands
Stormwater Runoff
WATER CONTROL
Alteration of the Natural Flow of Water (dams, water withdrawal, channelization)
DEVELOPMENT RELATED
Toxins
Excessive Sedimentation and Turbidity
Roads/Highways (including culverts, bridges)
Harmful Bacteria
Stormwater Runoff
Wastewater Discharges
Filling and Draining Wetlands
Beach Nourishment
Shoreline Stabilization (bulkheads, rip rap)
BOATING AND FISHING RELATED
Fishing Gear
Marinas and Docks
Ports
Boat Operations (Wakes, Prop Damage, Boat Anchors)
Dredging
MINING RELATED
Sand and Gravel
Oil and Gas Exploration

APPENDIX B2:

Coastal Habitat Protection Plan
Public Meeting Data Analysis

A Report on the Input Received at Public Meetings
July – August 2004

Prepared by

North Carolina Department of Environment and Natural Resources
Division of Coastal Management

August 2004

I. Introduction

The North Carolina General Assembly enacted the Fisheries Reform Act in August 1997. One of its major provisions is a requirement that the North Carolina Department of Environment and Natural Resources (DENR) prepare Coastal Habitat Protection Plans (CHPPs). The stated CHPPs goal is to enhance the coastal fisheries associated with each habitat. The divisions of Marine Fisheries, Coastal Management, and Water Quality were given the major responsibilities for writing the plans. A unique feature of the law is that three state regulatory commissions (Coastal Resources, Environmental Management, and Marine Fisheries) must adopt the plans. Once adopted, the Commissions' actions are to be consistent with the plans. The Commissions are to adopt the initial plan by the end of December 2004. An Intercommission Review Committee (IRC), comprised of two members of each of the commissions, oversaw the development of the plan and was responsible for drafting recommendations.

During the summer of 2003, the Department conducted a major effort to educate and solicit public input for development of the Coastal Habitat Protection Plan. The focus of the 2003 public meetings was to explain the CHPP to the public, describe the state's coastal habitats and the threats to them, and to get the public's input about perceived threats and possible solutions. The Department held a series of ten public meetings, and distributed over 200 copies of an introductory video, 15,000 informational brochures, and 250,000 copies of a newspaper tabloid. Over 500 citizens attended the public meetings, almost 1,000 written comments were received, and the CHPP was widely discussed in local and regional news media. A primary message conveyed at these meetings was that public comment would be incorporated into the draft CHPP. The Department also made it clear that there would be another series of public meetings in the summer of 2004 to give citizens an opportunity to see how their comments have been incorporated into the plan and allow them to comment on forthcoming recommendations.

The Department held a second round of public meetings in the summer of 2004 — ten meetings geared towards the general public, as well as five additional meetings to solicit comments from targeted stakeholder groups that seemed to be under-represented at the 2003 meetings, including realtors, homebuilders, local governments, and agriculture and forestry interests. The 2004 public meetings focused on soliciting public response to the recommendations drafted by the IRC and whether or not the recommendations would be effective in meeting the goals of the CHPP. These meetings attracted over 500 people, who submitted 276 completed questionnaires (see Attachment 1) and over 700 written comments. As in 2003, the Department assured the meetings' attendees that comments would be incorporated in the CHPP and the accompanying draft recommendations. The CHPP has undergone revisions reflecting the comments received during this second round of public input (see Attachment 2) and the targeted interest group meetings (see Attachment 3), as have the recommendations.

The meeting dates and locations, the attendance at each meeting, and the number of completed comment questionnaires returned are shown in Table 1. A summary of the five meetings held in July and August for targeted stakeholder groups is shown in Table 2. One additional meeting is to be scheduled in September for a targeted stakeholder group in the northern coastal area.

Table 1. Locations and other data for the Coastal Habitat Protection Plan public meetings, Summer 2004

Location	Date	Attendance	# of Questionnaires Completed
Manteo	July 13	45	30
Edenton	July 14	27	22
Jacksonville	July 19	30	19
Beaufort	July 21	47	43
New Bern	July 22	36	29
Bolivia	July 27	28	17
Wilmington	July 28	100	50
Washington	July 29	60	32
Mooresville	August 3	7	5
Raleigh	August 4	50	29
Totals		**430**	**276**

Table 2. Locations and other data for the Coastal Habitat Protection Plan stakeholder meetings, Summer 2004

Location	Date	Attendance	Stakeholder Group
Wilmington	July 8	18	Business Alliance for a Sound Economy
New Bern	July 29	32	N.C. Coastal Communities Coalition
New Bern	August 2	9	N.C. Fisheries Association
Raleigh	August 5	4	N.C. Forestry Association
Raleigh	August 5	16	N.C. Soil & Water Conservation Comm. Technical Review Committee
Total		**79**	

II. Summary of Written Responses

Attendees at the 2004 public meetings received a form that included the CHPP draft recommendations and columns to fill in to (1) indicate if the draft recommendations would likely help achieve the plan's goals, and (2) rank their top three overall recommendations, as well as to provide additional comments. Participants provided about 700 individual written comments at the meetings, in addition to their evaluation of the efficacy of the recommendations and their priorities.

About 64% of the attendees turned in a response form. Overall, 90% of respondents indicated that the draft recommendations would contribute to reaching the CHPP goals, ranging from a low of 81% for recommendations **4E2 - Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through rule making, including: more stringent impervious surface limits** to a high of 99% for recommendation **1A - Enhance enforcement of, and compliance with, Coastal Resources Commission (CRC), Environmental Management Commission (EMC), and Marine Fisheries Commission (MFC) rules and permit conditions**. Thus, even the recommendations that generated the greatest opposition were supported by at least 80% of those persons who provided written comments.

The following recommendations were ranked as the three most important overall for success of the CHPP (indicated as the highest priority by the most respondents):

> *1(A) Enhance enforcement of, and compliance with, Coastal Resources Commission (CRC), Environmental Management Commission (EMC), and Marine Fisheries Commission (MFC) rules and permit conditions (99% support).*
>
> *1(C) Enhance and expand educational outreach on the value of fish habitat, threats from human activities, effects of non-native species, and the reasons for management measures (93% support).*
>
> *4(A)(1) Reduce point source pollution from human sewage by increasing inspections of sewage treatment facilities, collection infrastructure, and land disposal sites (93% support).*

Respondents also indicated which of the recommendations they felt would contribute the least towards success of the CHPP. The following three recommendations received the least support:

> *4(E)(2) Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through rule making, including more stringent impervious surface limits (81% support).*
>
> *4(E)(3) Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through rule making, including expansion of Areas of Environmental Concern (AECs) upstream and landward (82% support).*
>
> *4(D)(3) Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through voluntary actions, Best Management Practices (BMPs), and incentives, including documentation and monitoring of small but cumulative impacts to wetlands and streams resulting from un-permitted/un-mitigated activities (82% support).*

III. Comments on Individual Goals

Goal 1: Improve Effectiveness of Existing Rules & Programs Protecting Coastal Fish Habitats

An average of 237 respondents (95%) felt that these recommendations would help achieve Goal 1 (Table 3). Recommendation **1A - Enhance enforcement of, and compliance with, Coastal Resources Commission (CRC), Environmental Management Commission (EMC), and Marine Fisheries Commission (MFC) rules and permit conditions** was perceived as the most effective, with 99% of respondents agreeing that it was beneficial. Recommendation **1D - Coordinate rulemaking and enforcement among regulatory commissions and agencies** was ranked as the least effective under this goal, with 8% of respondents challenging its usefulness.

Table 3. Summary of comments on Goal 1 recommendations

Recommendation	Recommendations helpful?		Overall Rankings (# of votes)		
	Yes	No	1	2	3
1A	237 (99%)	2	61	24	14
1B	240 (96%)	11	21	23	32
1C	239 (93%)	19	29	26	24
1D	233 (92%)	20	21	21	23

Meeting attendees expressed strong support (39% of Goal 1 written comments) for enhanced education efforts (20%) and better enforcement of existing rules (19%). Many respondents believe that understanding the regulations will improve compliance and make enforcement seem fairer since the rules would be more widely known. The third most common written comment called for improved coordination among permitting and regulatory agencies (13% of Goal 1 comments).

Goal 1 comments also revealed skepticism (6% of comments) about the feasibility of fulfilling this goal. Respondents questioned whether there is sufficient political will to fully enforce existing rules, and whether programs and enforcement will be adequately funded.

Goal 2: Identify, Designate and Protect Strategic Habitat Areas (SHAs)

An average of 212 respondents (93%) felt that these recommendations would help achieve Goal 2 (Table 4). Recommendation **2A1 - Gather information to identify Strategic Habitat Areas by: coordinating, completing, and maintaining habitat mapping (including seagrass, shell bottom, and other bottom types) using the most appropriate technology** was perceived as the most effective, with 98% of respondents agreeing that it was beneficial. Recommendation **2B - Identify and designate Strategic Habitat Areas using ecologically based criteria** was ranked as the least effective under this goal, with 11% of respondents challenging its usefulness.

Table 4. Summary of comments on Goal 2 recommendations

Recommendation	Recommendations helpful?		Overall Rankings (# of votes)		
	Yes	No	1	2	3
2A1	227 (95%)	12	18	7	5
2A2	225 (95%)	12	4	6	9
2A3	219 (91%)	21	6	3	3
2B	227 (89%)	27	9	23	18
2C	232 (91%)	23	13	18	18
2D	230 (92%)	21	21	20	19

Written comments on this goal showed little consensus. The most frequent comment was whether this goal was necessary and feasible (11% of Goal 2 comments) while 9% of the comments supported increased funding for land conservation.

Other comments on this goal advised DENR to proceed with implementation instead of conducting further studies, that individual property rights should be preserved, public trust access should be maintained, and that new Strategic Habitat Areas (SHAs) should be coordinated with existing programs and designations. Respondents also indicated that any new SHA should be afforded strict protection, including a ban on trawling.

Goal 3: Enhance Habitat and Protect it from Physical Impacts

An average of 200 respondents (91%) felt that these recommendations would help achieve Goal 3 (Table 5). Recommendation **3A - Greatly expand habitat restoration, including: 1. creation of subtidal oyster reef no-take sanctuaries and 2. re-establishment of riparian wetlands and stream hydrology** was perceived as the most effective with 93% of respondents agreeing that it was beneficial. Recommendation **3B - Prepare and implement a coast wide beach and inlet management plan that requires ecologically based guidelines for minimization of impacts to fish habitat, while addressing socio-economic concerns** was ranked as the least effective under this goal, with 15% of respondents challenging its usefulness.

Table 5. Summary of comments on Goal 3 recommendations

Recommendation	Recommendations helpful?		Overall Rankings (# of votes)		
	Yes	No	1	2	3
3A1	220 (93%)	16	4	9	4
3A2	209 (90%)	24	10	6	4
3B	202 (85%)	37	22	15	16
3C	228 (92%)	20	19	23	22
3D	218 (90%)	24	11	24	16
3E1	219 (93%)	17	0	5	5
3E2	194 (87%)	30	3	3	8

Other comments received for Goal 3 covered feasibility, trawling, estuarine buffers and beach nourishment. Some respondents believed that this goal might be unnecessary, and questioned whether it is feasible to implement (16% of Goal 3 comments). An equal number of comments called for bans on trawling and mechanical shellfish harvest for inshore waters (16% of Goal 3 comments).

Increased limits on coastal development was supported by 14% of the comments, including tighter restrictions within buffers and setbacks, and 9% of the comments supported more attention to the positive and negative effects of beach nourishment. There was little consensus in other comments on this goal.

Goal 4: Enhance and Protect Water Quality

An average of 195 respondents (89%) felt that these recommendations would help achieve Goal 4. Recommendation **4G4 - Reduce non-point source pollution from concentrated animal operations by the following actions: use improved siting criteria to protect fish habitat** was perceived as the most effective, with 98% of respondents agreeing that it would be beneficial. Recommendation **4E2 - Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through rule making, including: 2. more stringent impervious surface limits** was ranked as the least effective, with 19% of respondents challenging its usefulness.

Table 6. Summary of comments on Goal 4 recommendations

Recommendation	Recommendations helpful?		Overall Rankings (# of votes)		
	Yes	No	1	2	3
4A1	239 (93%)	17	23	16	5
4A2	232 (93%)	17	9	7	9
4B	221 (90%)	24	8	9	6
4C	215 (92%)	18	12	12	15
4D1	224 (94%)	15	8	13	11
4D2	223 (91%)	21	6	4	6
4D3	191 (82%)	43	4	6	3
4D4	214 (89%)	26	8	7	7
4D5	215 (90%)	23	1	4	1
4D6	203 (88%)	28	4	4	6
4E1	199 (83%)	42	14	6	5
4E2	191 (81%)	45	5	6	6
4E3	195 (82%)	44	4	5	4
4E4	195 (83%)	40	2	5	5
4F	194 (85%)	33	1	2	5
4G1	230 (90%)	25	16	18	11
4G2	216 (88%)	30	7	4	14
4G3	209 (85%)	37	13	10	11
4G4	217 (98%)	5	5	6	4

The most frequent comment on this goal was a need to reduce pollution from farming and development (11%). Other frequent comments included:

- Strengthen stormwater regulations and enforcement (8%)
- Encourage new pollution control technologies (7%)
- Increase public education efforts (7%)
- No need for more regulations; enforce existing rules (7%)
- Provide incentives for low-impact development and voluntary compliance with existing regulations (6%)
- Strengthen enforcement of buffer rules — fewer variances (5%)

IV. Summary

The public provided more than 700 written comments to the North Carolina Department of Environment and Natural Resources on the draft recommendations of the North Carolina Coastal Habitat Protection Plan at 10 meetings in the eastern and central parts of the state during July and August 2004. Overall, more than 90% of the comments indicated support for the recommendations. Even those recommendations generating the most opposition were still supported by 80% of the meetings' attendees.

Recommendations that would not require new rules garnered the greatest support, including those dealing with improved enforcement, education, and coordination. Programs to restore oyster beds and riparian wetlands and stream flow were also strongly supported.

While recommendations for stricter impervious surface limits, extending AECs inland, and conducting cumulative impact assessments received the most direct opposition, each of these recommendations was still supported by over 80% of respondents.

V. Response to Public and Interest Group Meetings

In response to the comments received at the 2004 public meetings and the targeted interest group meetings, numerous changes have been made to the text of the CHPP and the recommendations in particular. Some of the highlights are indicated below.

One major text change has been in the sections discussing the threats from forestry activities. The CHPP cites forestry as a major threat to water quality. Data from the most recent 303 (d) listing requirement of the Clean Water Act show that it is an order of magnitude less than agriculture and development. The text in the CHPP has been changed to reflect this.

There was much confusion about how increased impervious surface limits would be applied and a lot of apprehension about the effects on property owners. It was also noted that the recommendations did not acknowledge the use of engineered systems to minimize the effects on water quality due to increased impervious surface coverage. The recommendation has been changed to incorporate the use of engineered systems and recognize that increased limits on impervious surfaces may not be feasible in all situations.

Written comments indicated some confusion over the buffers currently in place and what the CHPP recommendation (larger buffers) were calling for – larger than what? While the recommendation still does not state a specific width, it was changed to call for the increased use of effective buffers.

Several comments recommended stakeholder involvement in the implementation of specific recommendations as well as economic analyses. Since stakeholder groups and economic concerns are relative to many of the recommendations, the IRC chose to address them in the text of the document as a preface to the recommendations. "*Implementation of any of the recommendations below through specific rules or policies may involve further discussion with stakeholders and, in some cases, the balancing of competing ecological and economic values.*"

In response to meetings with local governments, a new recommendation added "Enhance coordination with, and financial/technical support for, local government actions to better manage stormwater and wastewater." This recommendation is an attempt to recognize the efforts currently undertaken by local governments to manage stormwater and protect water quality.

Several changes were made to recommendations dealing with non-point source pollution. "Improve land-based strategies <u>throughout the river basins</u> to reduce non-point pollution and minimize cumulative losses to wetlands and streams through voluntary actions, assistance, Best Management Practices (BMPs) and

incentives, including…" The IRC wanted to make it clear that these recommendations, as does the CHPP itself, applies to the entire river basins and not just the coastal counties.

Attachment 1. CHPP Public Meeting Comment Form (Summer 2004)

SUMMARY OF CHPP RECOMMENDATIONS	Will the recommendations help reach the goal?		Rank top three among all recommendations
	YES	*NO*	
Goal 1: Improve Effectiveness of Existing Rules & Programs Protecting Coastal Fish Habitats			
A. Enhance enforcement of, and compliance with, Coastal Resources Commission (CRC), Environmental Management Commission (EMC), and Marine Fisheries Commission (MFC) rules and permit conditions.			
B. Coordinate and enhance water quality, physical habitat, and fisheries resource monitoring (including data management) from headwaters to the nearshore ocean.			
C. Enhance and expand educational outreach on the value of fish habitat, threats from human activities, effects of non-native species, and the reasons for management measures.			
D. Coordinate rulemaking and enforcement among regulatory commissions and agencies.			
Comments or suggested recommendations:			
Goal 2: Identify, Designate & Protect Strategic Habitat Areas (SHAs)			
A. Gather information to identify Strategic Habitat Areas by:			
1. coordinating, completing, and maintaining habitat mapping (including seagrass, shell bottom, and other bottom types) using the most appropriate technology,			
2. monitoring the status of those habitats, and			
3. assessing effects of land use and human activities on those habitats.			
B. Identify and designate Strategic Habitat Areas using ecologically based criteria.			
C. Analyze existing rules and enact measures needed to protect Strategic Habitat Areas.			
D. Improve programs for conservation (including voluntary actions) and acquisition of areas supporting SHAs.			
Comments or suggested recommendations:			

SUMMARY OF CHPP RECOMMENDATIONS	Will the recommendations help reach the goal?		Rank top three among all recommendations
	YES	*NO*	
Goal 3: Enhance Habitat and Protect it from Physical Impacts			
A. Greatly expand habitat restoration, including:			
1. creation of subtidal oyster reef no-take sanctuaries and			
2. re-establishment of riparian wetlands and stream hydrology.			
B. Prepare and implement a coast wide beach and inlet management plan that requires ecologically based guidelines for minimization of impacts to fish habitat, while addressing socio-economic concerns.			
C. Protect Submerged Aquatic Vegetation (SAV), shell bottom, and hard bottom areas from fishing gear effects through improved enforcement, establishment of protective buffers around habitats, and further restriction of mechanical shellfish harvesting.			
D. Protect fish habitat by revising estuarine and public trust shoreline stabilization rules using best available information, considering estuarine erosion rates, and the development and promotion of incentives for use of alternatives to vertical shoreline stabilization measures.			
E. Protect and enhance habitat for anadromous fishes by:			
1. incorporating the water quality and quantity needs of fish in surface water use planning and rule making and			
2. eliminating obstructions to fish movements, such as dams, locks and road fills.			
Comments or suggested recommendations:			

Attachment 1 (continued)

SUMMARY OF CHPP RECOMMENDATIONS	Will the recommendations help reach the goal?		Rank top three among all recommendations
	YES	*NO*	
Goal 4: Enhance and Protect Water Quality			
Point Source			
A. Reduce point source pollution from human sewage by:			
1. increasing inspections of sewage treatment facilities, collection infrastructure, and land disposal sites and			
2. providing incentives for upgrading all types of wastewater treatment systems.			
B. Adopt or modify rules or statutes to prohibit ocean wastewater discharges.			
C. Prohibit new or expanded stormwater outfalls to coastal beaches and to coastal shellfishing waters (EMC surface water classifications SA and SB), and continue to phase-out existing outfalls by implementing alternative stormwater management strategies.			
Nonpoint Source			
D. Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through voluntary actions, Best Management Practices (BMPs), and incentives, including:			
1. improved methods to reduce sediment pollution from construction sites, agriculture, and forestry,			
2. increased on-site infiltration of stormwater,			
3. documentation and monitoring of small but cumulative impacts to wetlands and streams resulting from un-permitted/un-mitigated activities,			
4. incentives for low-impact development,			
5. enhanced inspections of onsite wastewater treatment facilities, and			
6. increased water re-use and recycling.			

Attachment 1 (continued)

SUMMARY OF CHPP RECOMMENDATIONS	Will the recommendations help reach the goal?		Rank top three among all recommendations
	YES	*NO*	
Goal 4: Enhance and Protect Water Quality (continued)			
E. Improve land-based strategies to reduce non-point pollution and minimize cumulative losses to wetlands and streams through rule making, including:			
1. larger vegetated buffers,			
2. more stringent impervious surface limits,			
3. expansion of Areas of Environmental Concern (AECs) upstream and landward, and			
4. establishment of setbacks along estuarine and public trust shorelines.			
F. Develop and implement a comprehensive coastal marina and dock management plan and policy to prevent closures of shellfish harvest waters and minimize cumulative impacts on fish habitat			
G. Reduce non-point source pollution from concentrated animal operations by the following actions			
1. continue the moratorium on new/expanded swine operations until alternative waste treatment technology is implemented,			
2. use a greater percentage of agricultural conservation funds to phase-out concentrated animal operations in sensitive areas and relocate operations from sensitive areas,			
3. mandate the phase-out of waste lagoons by a specific deadline, and			
4. use improved siting criteria to protect fish habitat.			
Comments or suggested recommendations:			

Attachment 1 (continued)

Attachment 2. Major changes to CHPP Public Draft 7-01-04

EXECUTIVE SUMMARY

- Large, foldout map of habitat types

WATER COLUMN CHAPTER

- Chapter 2, Section 2.4, Hydrologic modification/Dredging (navigation channels and boat basins)
- Chapter 2, Section 2.4, Water quality degradation/Land cover and water quality
- Chapter 2, Section 2.4, Water quality degradation/Nutrients/Sources of nutrient enrichment
- Chapter 2, Section 2.4, Water quality degradation/Sediments/Status of turbidity/sedimentation
- Chapter 2, Section 2.4, Water quality degradation/Fecal coliform bacterial contamination in estuarine waters
- Chapter 2, Section 2.4, Water quality degradation/Fecal coliform bacterial contamination in ocean waters
- Chapter 2, Section 2.4, Water quality degradation/Toxic chemicals/Sources of toxic chemical pollution
- Chapter 2, Section 2.4, Existing management measures/Stormwater management program
- Chapter 2, Section 2.5, Water column summary
- Chapter 3, Section 3.2, Fish utilization/Nursery

SHELL BOTTOM CHAPTER

- Chapter 3, Section 3.3, Status of associated fishery stocks
- Chapter 3, Section 3.4, Water quality degradation/Toxic chemicals

SAV CHAPTER

- Chapter 4, Section 4.4, Physical threats/Channel dredging

SOFT BOTTOM CHAPTER

- Chapter 6, Section 6.2, Ecological role and function/Community structure/marine
- Chapter 6, Section 6.3, Status and trends/Designated areas
- Chapter 6, Section 6.4, Physical threats/Dredging
- Chapter 6, Section 6.4, Physical threats/Shoreline stabilization/Soft stabilization

RECOMMENDATIONS <whole chapter>

Attachment 3. Comments from Interest Groups – 8/10/04 Memorandum from Mike Street to IRC

Memo To: IRC
From: Mike Street
Subject: Possible additional CHPP recommendation changes
Date: 10 August 2004

Based on comments received at public meetings, interest group meetings, e-mail, and written statements since the meeting with Pres Pate, Charles Jones, and Steve Wall on 4 August 2004, some additional possible changes to CHPP recommendations are provided below.

- Specifically include stakeholder process in SHA (Goal 2), beach nourishment (Goal 3), and marina planning (Goal 4).
- Because the legislative moratorium applies only to large-scale swine operations, change a) under Goal 4 (large-scale animal operations) back to "swine."
- Comments from David Williams (Div. Soil & Water Conservation), supported by Jim Cummings (Assistant Commissioner, Dept. of Agriculture and Consumer Affairs), also address concerns in the non-point source pollution and large-scale animal operations recommendations.
    - For voluntary NPS actions:
        - a) "Increased incentives and technical assistance for and promotion of" …
        - b) Delete reference to "agriculture conservation funds" and insert "Continue and expand voluntary efforts" to …
        - Add a new g) "Increased incentives for establishing riparian buffers and restoring prior converted wetlands."
    - For large-scale animal operations:
        - Replace c) lagoon phase-out with "Develop and provide incentives and infrastructure to implement effective alternative uses for animal derived-nutrients as described in the Soil and Water Conservation Commission's State Plan for Managing Animal Manures and Animal-Derived Nutrients Produced in North Carolina (http://www.enr.state.nc.us/DSWC/pages/state%20nutrient%20plan.pdf) and be consistent with the process for implementing environmentally superior technologies between the N.C. Attorney General and Smithfield Foods, Premium Standard Foods, and Frontline Farmers."

This last comment is extremely long and complex, potentially replacing the simple concept of eliminating swine waste lagoon/spray field systems. But there is information, and the A-G agreement is in place. I have taken a quick look at the referenced S&WC report, and I lack the background to judge it. So we really need advice here.

Please contact me if you have any questions.

cc: Bill Ross, Robin Smith, Dempsey Benton, Dan Oakley, Steve Wall
Pres Pate, Charles Jones, Alan Klimek
CHPP Development Team

APPENDIX C:
INTERCOMMISSION REVIEW COMMITTEE AND
COASTAL HABITAT PROTECTION PLAN DEVELOPMENT TEAM

Intercommission Review Committee (Two members each from MFC, EMC, CRC)

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Appendix D: Land cover descriptions (Source: DWQ Basinwide Plans)

Natural Resources Inventory land cover type	Land cover descriptions
Cultivated cropland	Harvestable crops including row crops, small-grain and hay crops, nursery and orchard crops, and other specialty crops.
Uncultivated cropland	Summer fallow or other cropland not planted.
Pastureland	Includes land that has a vegetative cover of grasses, legumes and/or forbs, regardless of whether or not it is being grazed by livestock.
Forest land	Land at least 10% stocked by single-stemmed trees of any size which will be at least 4 meters at maturity, and land bearing evidence of natural regeneration of tree cover. The minimum area for classification of forestland is 1 acre, and the area must be at least 1,000 feet wide.
Urban and built-up	Includes airports, playgrounds with permanent structures, cemeteries, public administration sites, commercial sites, railroad yards, construction sites, residences, golf courses, sanitary landfills, industrial sites, sewage treatment plants, institutional sites, water control structure spillways and parking lots. Including highways, railroads and other transportation facilities if surrounded by other urban and built-up areas. Tracts of less than 10 acres that are completely surrounded by urban and built-up lands.
Other	Rural transportation: Consists of all highways, roads, railroads and associated right-of-ways outside urban and built-up areas; private roads to farmsteads; logging roads; and other private roads (but not field lanes).
	Small water areas: Waterbodies less than 40 acres; streams less than 0.5 miles wide.
	Minor land: Lands that do not fall into one of the other categories.

Appendix E: Land Cover by Management Unit shown as acreage (1000s) and percentage of total by river basin.
(Sources: National Resource Inventory, unpub. data. See Appendix F for map representation of USGS hydrologic units.)

USGS hydrologic unit (CHPP MU)	Year	Land cover types						Total
		Cultivated crop	Un-cultivated crop	Pasture	Forest	Urban/ built-up	Other land cover[1]	
Albemarle (95% of Albemarle MU and 5% of Chowan MU)	1982	493.2	0	3.9	668.7	36.9	198.3	1401.0
	1987	498.9	1	5.4	552.9	50.2	292.4	1400.8
	1992	443.5	0.1	7.8	487.3	58.8	402.0	1399.5
	1997	437.1	0.1	6.7	491.7	68.7	395.0	1399.3
% of total land cover	1997	31.2	0.0	0.5	35.1	4.9	28.2	100.0
% Change	1982-97	-11.4	na	71.8	-26.5	86.2	99.2	-0.1
Bogue-Core Sounds (100% of Bogue-Core MU, 30% of Pamlico MU, and 50% of New-White Oak MU)	1982	54.3	0	1.7	159.6	25.2	201.6	442.4
	1987	56.8	0	1.7	156.3	32.6	195.1	442.5
	1992	50.4	0	1.7	146.9	46.6	197.1	442.7
	1997	45.5	5	1.7	144.4	51	195.1	442.7
% of total land cover	1997	10.3	1.1	0.4	32.6	11.5	44.1	100.0
% Change	1982-97	-16.2	na	0.0	-9.5	102.4	-3.2	0.1
(Cape Fear)	1982	1177	44.6	297	3531.7	370	351.5	5771.8
	1987	1138.4	40.8	304.8	3461.1	435.6	382.1	5762.8
	1992	1077.5	69	277.4	3395.7	517.2	423.3	5760.1
	1997	947.1	143.4	301.1	3312.2	627.6	426.9	5758.3
% of total land cover	1997	16.4	2.5	5.2	57.5	10.9	7.4	100.0
% Change	1982-97	-19.5	221.5	1.4	-6.2	69.6	21.5	-0.2
Chowan, Meherrin, Nottaway (95% of Chowan MU)	1982	265.4	0	10.5	448.4	14	32.9	771.2
	1987	265.3	0	10.6	445.9	17.3	32.2	771.3
	1992	262.5	1.5	9	446.2	20	32.1	771.3
	1997	263.3	1.5	8	444	22.7	31.4	770.9
% of total land cover	1997	34.2	0.2	1.0	57.6	2.9	4.1	100.0
% Change	1982-97	-0.8	na	-23.8	-1.0	62.1	-4.6	0.0

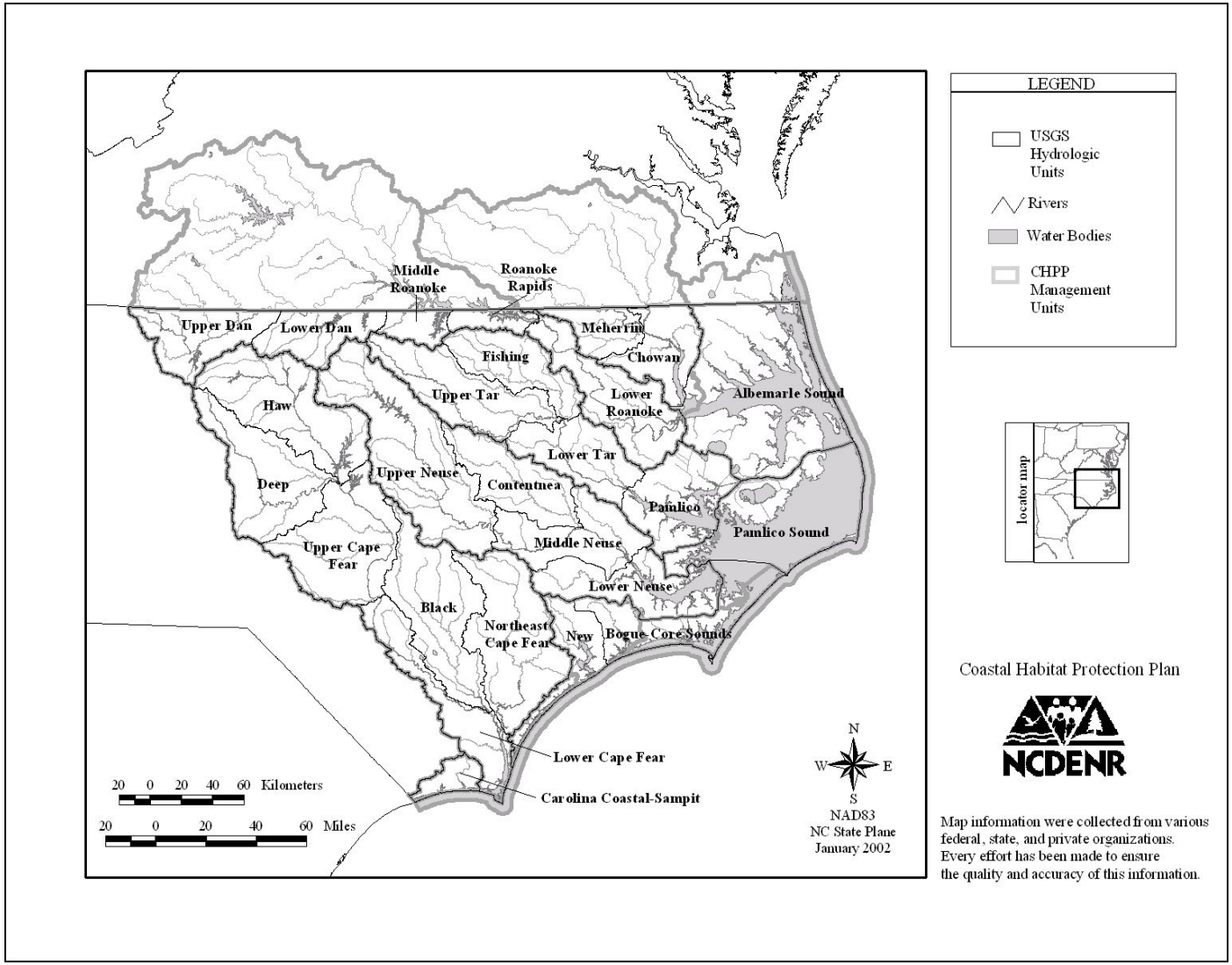
[1] Includes minor land uses, rural transportation, federal lands, and Conservation Reserve Program lands (See Appendix D for explanation)

USGS hydrologic unit (CHPP MU)	Year	Land cover types						Total
		Cultivated crop	Un-cultivated crop	Pasture	Forest	Urban/ built-up	Other land cover[1]	
(Neuse)	1982	1054.4	13.1	116.7	1769.4	254.1	235.3	3443.0
	1987	1028.3	32.3	105.3	1697.2	326.3	249.1	3438.5
	1992	985.4	35.1	108.5	1669.4	391.1	247.8	3437.3
	1997	874.7	53.9	136.2	1641.5	481	247.3	3434.6
% of total land cover	1997	25.5	1.6	4.0	47.8	14.0	7.2	100.0
% Change	1982-97	-17.0	311.5	16.7	-7.2	89.3	5.1	-0.2
New (50% of New-White Oak MU and 40% of Southern Estuaries MU)	1982	12.7	0	0	221.7	28.9	58.7	322.0
	1987	12.7	0	0	217	33.6	58.7	322.0
	1992	12.4	0	0.1	214.5	35.9	59.0	321.9
	1997	12.4	0	4.2	207.4	38.6	59.2	321.8
% of total land cover	1997	3.9	0.0	1.3	64.4	12.0	18.4	100.0
% Change	1982-97	-2.4	na	na	-6.5	33.6	0.9	-0.1
Pamlico Sound (70% of Pamlico MU)	1982	77	0	0	142.6	5.5	137.0	362.1
	1987	59.1	0	0	124.5	9.5	169.0	362.1
	1992	55.8	0	0	120	11	175.3	362.1
	1997	55	0	0	118.1	13.1	175.9	362.1
% of total land cover	1997	15.2	0.0	0.0	32.6	3.6	48.6	100.0
% Change	1982-97	-28.6	na	na	-17.2	138.2	28.4	0.0
(Roanoke)	1982	478.7	24.8	111.8	1377.4	54.9	98.3	2145.9
	1987	437.3	16.2	118.3	1396.6	76.5	100.3	2145.2
	1992	399.1	38.1	102.1	1380.9	105.5	119.9	2145.6
	1997	381	47	87.8	1370.1	129.6	129.0	2144.5
% of total land cover	1997	17.8	2.2	4.1	63.9	6.0	6.0	100.0
% Change	1982-97	-20.4	89.5	-21.5	-0.5	136.1	31.2	-0.1

[1] Includes minor land uses, rural transportation, federal lands, and Conservation Reserve Program lands (See Appendix D for explanation)

USGS hydrologic unit (CHPP MU)	Year	Land cover types						Total
		Cultivated crop	Un-cultivated crop	Pasture	Forest	Urban/ built-up	Other land cover[1]	
Carolina Coastal-Sampit (50% of Southern Estuaries MU)	1982	17.9	0.8	2.5	120.3	13.7	8.9	164.1
	1987	11	0	5.4	110.1	27.8	9.7	164.0
	1992	10.9	0	5.4	109.3	27.9	10.5	164.0
	1997	10.1	0	5.3	105.9	32.1	10.5	163.9
% of total land cover	1997	6.2	0.0	3.2	64.6	19.6	6.4	100.0
% Change	1982-97	-43.6	-100.0	112.0	-12.0	134.3	18.0	-0.1
Fishing, Lower Tar, Pamlico (100% of Tar-Pamlico MU)	1982	846.2	5.8	94.9	1422.5	90.8	163.9	2624.1
	1987	823.9	2.7	87.1	1427.4	114.7	167.3	2623.1
	1992	782.3	19	81.8	1412.3	139.9	187.4	2622.7
	1997	714.5	27.7	118.9	1390	170	198.7	2619.8
% of total land cover	1997	27.3	1.1	4.5	53.1	6.5	7.6	100.0
% Change	1982-97	-15.6	377.6	25.3	-2.3	87.2	21.2	-0.2
TOTAL AREA	1982	4476.8	89.1	639	9862.3	894	1486.4	17447.6
	1987	4331.7	93	638.6	9589	1124.1	1655.9	17432.3
	1992	4079.8	162.8	593.8	9382.5	1353.9	1854.4	17427.2
	1997	3740.7	278.6	669.9	9225.3	1634.4	1869.0	17417.9
% of total land cover	1997	21.5	1.6	3.8	53.0	9.4	10.7	100.0
% Change	1982-97	-16.4	212.7	4.8	-6.5	82.8	25.7	-0.2

[1] Includes minor land uses, rural transportation, federal lands, and Conservation Reserve Program lands (See Appendix D for explanation)



Appendix F: Map of U.S. Geological Survey (USGS) hydrologic units and CHPP management units.

Appendix G: State protected species. [Source: N.C. Natural Heritage Program (2001)]

Associated Habitat	Taxonomic group	Endangered	Endangered-Special Concern	Threatened	Threatened-Special Concern	Special Concern	Candidate	Candidate-Special Concern	Significantly rare
Aquatic	Amphibian	.	.	.	.	1	.	.	.
	Crustacean	.	.	.	.	.	.	.	2
	Fish	5	.	1	.	13	.	.	1
	Insect	.	.	.	.	.	.	.	26
	Mammal	1	.	.	.	.	.	.	.
	Mollusk	4	.	9	.	5	.	.	5
	Moss	.	.	.	.	.	1	.	.
	Reptile	3	.	2	.	2	.	.	.
	Vascular Plant	1	.	3	.	.	6	.	11
	Subtotals	14	0	15	0	21	7	0	45
Wetland	Amphibian	.	.	1	.	4	.	.	3
	Bird	3	.	2	.	6	.	.	17
	Crustacean	.	.	.	.	.	.	.	2
	Insect	.	.	.	.	.	.	.	25
	Lichen	.	.	.	.	.	.	.	1
	Liverwort	.	.	.	.	.	1	.	4
	Mammal	.	.	1	.	3	.	.	2
	Mollusk	.	.	1	.	.	.	.	.
	Moss	.	.	.	.	.	1	.	2
	Reptile	.	.	2	.	2	.	.	5
	Vascular Plant	18	1	11	2	.	56	1	69
	Subtotals	21	1	18	2	15	58	1	130
Totals		35	1	33	2	36	65	1	175

Appendix H: *Part 1 (Acronyms)*

Acronym	Meaning
A	One of the three primary surface water classifications established by the EMC
AAAS	American Association for the Advancement of Science
ACOE	United States Army Corps of Engineers (see "COE" and "USACOE" below)
ADCP	Acoustic Doppler Current Profiling
AEC	Area of Environmental Concern
AFS	American Fisheries Society
AIWW	Atlantic Intracoastal Waterway (see "ICW" below)
APES	Albemarle-Pamlico Estuarine Study
APNEP	Albemarle-Pamlico National Estuary Program
ASMFC	Atlantic States Marine Fisheries Commission
B	One of the three primary surface water classifications established by the EMC
BACIPS	Before-After-Control-Impact Paired Series
BEACH	Beaches Environmental Assessment and Coastal Health Act of 2000
BMPs	Best Management Practices
BOD	Biological Oxygen Demand
BRACO	Blue Ribbon Advisory Council on Oysters
C	One of the three primary surface water classifications established by the EMC
CAAE	Center for Applied Aquatic Ecology at North Carolina State University
CAMA	Coastal Area Management Act
CBF	Chesapeake Bay Foundation
CCA	Copper, chromium, and arsenic
C-CAP	Coastal Change Analysis Program
CCPCA	Central Coastal Plain Capacity Use Area
cfs	Cubic feet per second
CFZ	Coastal frontal zone
CGIA	Center for Geographic Information and Analysis
CHAs	Critical Habitat Areas
CHPP	Coastal Habitat Protection Plan
CHS	Commission for Health Services
C-MAN	Coastal-Marine Automated Network
CMSR	Center for Marine Science Research at the University of North Carolina - Wilmington

Acronym	Meaning
COBRA	Coastal Barrier Resources Act
COE	United States Army Corps of Engineers (see "ACOE" above and "USACOE" below)
COMP	Coastal Ocean Monitoring Program
CORMP	Coastal Ocean Research and Monitoring Program
CPUE	Catch per unit effort
CRAC	Coastal Resources Advisory Council
CRC	Coastal Resources Commission
CREP	Conservation Reserve Enhancement Program
CREWS	Coastal Region Evaluation of Wetland Significance
CWMTF	Clean Water Management Trust Fund
DAQ	Division of Air Quality
DCM	Division of Coastal Management
DDD	1,1-dichloro-2,2-bis(p-chlorophenyl)ethane
DDE	1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDT	Dichlorodiphenyltrichloroethane
DEH	Division of Environmental Health
DEH - SS	Division of Environmental Health - Shellfish Sanitation
DEHNR	Department of Environment, Health and Natural Resources
DEM	Division of Environmental Management
DENR	Department of Environment and Natural Resources
Dermo	*Perkinus marinus*
DFR	Division of Forest Resources
DLR	Division of Land Resources
DMF	Division of Marine Fisheries
DNA	Deoxyribonucleic acid
DO	Dissolved oxygen
DOT	Department of Transportation
DSWC	Division of Soil and Water Conservation
DWQ	Division of Water Quality
EA	Environmental Assessment
ECU	East Carolina University
EEP	Ecosystem Enhancement Program
EEZ	Exclusive Economic Zone
EFH	Essential Fish Habitat

Acronym	Meaning
EIS	Environmental Impact Statement
EMAP	Environmental Monitoring and Assessment Program
EMC	Environmental Management Commission
EO	Executive Order
EPA	United States Environmental Protection Agency (see "USEPA" below)
FC	Fecal coliform bacteria
FLDEP	Florida Department of Environmental Protection
FMP	Fishery Management Plan
FONSI	Findings of No Significant Impact
FPGs	Forestry Practice Guidelines
FRA	Fisheries Reform Act
FWS	United States Fish & Wildlife Service (see “USFWS” below)
FWS	Future Water Supply
FY	Fiscal year
GIS	Geographic Information System
GS	General Statute
HAPC	Habitat Area(s) of Particular Concern
HB	House Bill
HQW	High Quality Waters (EMC supplemental water quality classification)
HU	Hydrologic unit
ICW	Atlantic Intracoastal Waterway (see "AIWW" above)
IRC	Intercommission Review Committee
JAI	Juvenile abundance index
LC50	Lethal concentration 50%
MAFMC	Mid-Atlantic Fishery Management Council
MARMAP	Marine Resources Monitoring, Assessment, and Prediction Program
MFC	Marine Fisheries Commission
mgd	Million gallons per day
MHW	Mean high water
MLW	Mean low water
MMS	Minerals Management Service
MODMON	Neuse River Estuary Modeling and Monitoring project
MPA	Marine Protected Area
MS4s	Municipal separate storm sewer systems

Acronym	Meaning
MSC	Moratorium Steering Committee
MSX	*Haplosporidium nelsoni*
MU	Management Unit
NAWQA	National Water Quality Assessment
NCAC	North Carolina Administrative Code
NCDEHNR	North Carolina Department of Environment, Health and Natural Resources
NCDOT	North Carolina Department of Transportation
NCGS	North Carolina General Statute
NCSU	North Carolina State University
NCWRP	North Carolina Wetlands Restoration Program
NHP	Natural Heritage Program
NM	Nautical mile
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NOS	National Ocean Service
NPDES	National Pollution Discharge Elimination System
NRC	National Research Council
NRCS	Natural Resources Conservation Service
NRI	National Resource Inventory
NSW	Nutrient Sensitive Waters (EMC supplemental water quality classification)
NTA	No Trawl Areas
NTU	Nephelometric turbidity unit
NWI	National Wetland Inventory
NWR	National Wildlife Refuge
OECA	Office of Enforcement and Compliance Assurance
ODMDS	Ocean Dredge Material Disposal Site
ORM	Organic rich mud
ORW	Outstanding Resource Waters (EMC supplemental water quality classification)
PAHs	Polycyclic aromatic hydrocarbons
PCBs	Polychlorinated biphenyls
PNA	Primary Nursery Area
ppm	Parts per million
ppt	Parts per thousand
PWS	Public Water Supply

Acronym	Meaning
RCGL	Recreational Commercial Gear License
RO	Reverse osmosis
SA	One of the three primary surface water classifications for coastal waters established by the EMC
SAB	South Atlantic Bight
SABRE	South Atlantic Bight Recruitment Experiment
SAFMC	South Atlantic Fishery Management Council
SAV	Submerged aquatic vegetation
SB	One of the three primary surface water classifications for coastal waters established by the EMC
SB	Senate Bill
SBFMP	Striped Bass Fishery Management Plan
SC	One of the three primary surface water classifications for coastal waters established by the EMC
SCC	Sedimentation Control Commission
SCGL	Standard Commercial Gear License
SCDHEC	South Carolina Department of Health and Environmental Control
SCMRD	South Carolina Marine Resources Division
SEAMAP	Southeast Area Monitoring and Assessment Program
SEAMAP-SA	Southeast Area Monitoring and Assessment Program - South Atlantic
SECC	Sedimentation and Erosion Control Commission
SEPA	State Environmental Policy Act
SFA	Sustainable Fisheries Act
SHA	Strategic Habitat Area
SL	Session Law
SMZ	Federal Artificial Reef Special Management Zone
SMZ	Streamside Management Zone
SNA	Secondary Nursery Area
SNHA	Significant Natural Heritage Area
SOC	Schedule of Compliance
SOD	Sediment Oxygen Demand
SSMAs	Shellfish/Seed Management Areas
SSR	Stock Status Report
STORET	Storage and Retrieval System
SW	Swamp waters (EMC supplemental water quality classification)
TBT	Tributyltin
TL	Total length

Acronym	Meaning
TMDL	Total Maximum Daily Load
TR	Trout waters (EMC supplemental water quality classification)
TRC	Total residual chlorine
TSS	Total suspended solids
UM	Ulcerative mycosis
UNC	University of North Carolina
UNC-IMS	University of North Carolina - Institute of Marine Science
UNC-W	University of North Carolina - Wilmington
USACOE	United States Army Corps of Engineers (see "ACOE" and "COE" above)
USC	United States Code
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency (see "EPA" above)
USFWS	United States Fish & Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet light
VIMS	Virginia Institute of Marine Science
WRC	Wildlife Resources Commission
WRP	Wetland Restoration Program
WS	Water Supply (EMC supplemental water quality classification)

Appendix H: *Part 2 (Definitions)*

Term	Description
Accretion/accrete	Natural process by which marshes build in elevation with rising water level.
Adsorption	Chemical attachment to a particle.
Aerenchyma	Specialized thin-walled cells with large air spaces between them to provide buoyancy and support in an aquatic environment.
Anadromous	Fish species that migrate from the ocean to fresh water streams, lakes, and wetlands to spawn .
Anaerobic/reducing	Condition of the water column without oxygen.
Anoxia	Absence of oxygen.
Anthropogenic	Human-like or caused by humans.
Baseflow	Sustained low flow of a stream which is often due to groundwater inflow to the stream channel.
Benthic	Associated with the bottom under a water body.
Benthic-pelagic coupling	The influence of the benthic community and sediments on the water column, and, in turn, the influence of the water column on the benthic community and sediments, through integrated events and processes such as resuspension, nutrient cycling, settlement, and absorption .
Biomass	Weight of living material, usually expressed as a dry weight, in all or part of an organism, population, or community. Commonly presented as weight per unit area, a biomass density.
Biotic interactions	The physical interactions among organisms (i.e., predation, spawning, competition).
Buffer	A vegetated transitional zone between upland areas and aquatic habitats, which functions as a filter of surface water runoff.
Catadromous	Fish species that migrate from fresh waters through to spawning areas in the ocean.
Catch per unit effort	Amount of fish (numbers or weight) caught by a standard amount of fishing, such as pounds per trip.
Compensatory mitigation	The restoration, creation, enhancement, or, in exceptional cases, preservation of wetlands and/or other aquatic resources for the purpose of compensating for unavoidable impacts from human activities.
Critical habitat area	Habitat areas that are vital for spawning, early growth and development, and/or the entire life cycle of marine and estuarine fish species (MFC rule 15A NCAC 3I .0101 (20) defines critical habitat areas generally, along with specific definitions for submerged aquatic vegetation, shellfish beds, anadromous fish spawning areas, and anadromous fish nursery areas).
Demersal	Fish species that live primarily on or near the bottom.
Denitrification	Biochemical reduction , primarily by microorganisms, of nitrogen from nitrate (NO_3^-) eventually to molecular nitrogen (N_2).
Desiccation	Removal of water from organic material.
Detritivores	An organism that feeds on freshly dead or partially decomposed organic matter.
Detritus	Fragments of plant material occurring in the water during the process of decomposition by bacteria and fungi.
Drowned river system	An estuary that originated as a river basin flooded by rising sea level.
Embayment	A bay or bay-like waterbody.
Emergent vegetation	Non-woody wetland vegetation rooted in shallow water having leaves protruding above the water.

Term	Description
Energy regimes	Refers to the timing and magnitude of wave impact on and near a shoreline.
Epibenthic	Living on the surface of the bottom.
Epibiota	Organisms living on a relatively stationary surface.
Estuarine and ocean waters	All the waters of the Atlantic Ocean within the seaward boundary of North Carolina and all the bays, sounds, rivers, and tributaries thereto seaward of the dividing line between coastal fishing waters and inland fishing waters.
Estuary	A dynamic coastal water body in which fresh water from rivers and creeks mixes with ocean waters.
Euphotic zone	Portion of the water column in which light penetrates sufficiently to allow photosynthesis.
Eutrophication	Process of enrichment of a water body with excessive nutrients to the extent that abnormal algae blooms occur and community structure changes.
Evapotranspiration	The combination of water transpired from vegetation and evaporated from the soil and plant surfaces.
Extirpation	To destroy totally; extermination.
Functional equivalence	Refers to different characteristics that provide the same function in a system.
Hard bottom habitat	Exposed areas of rock or consolidated sediments, distinguished from surrounding unconsolidated sediments, which may or may not be characterized by a thin veneer of live or dead biota, generally located in the ocean rather than in the estuarine system.
Herbivory	Consuming living plants or their parts.
Heterogeneity	The variety of qualities found in an environment (habitat patches) or a population (genotypic variation).
Hydric soils	A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part.
Hydrodynamic conditions	How the water is moving or circulating through a body of water.
Hydrogeomorphology	The characteristics of aquifers transmitting groundwater.
Hypoxia	Condition in which the level of dissolved oxygen in the water column is below that necessary to fully support normal biological functions, resulting in stress for the natural community.
Ichthyoplankton	Fish eggs and larvae that drift with the currents near the water's surface.
Impoundment	Water body created or modified by a barrier or dam which purposefully or unintentionally obstructs the outflow of water. This could include man-made dams and beaver dams.
Interbasin transfers	Artificial movement of water from one river basin to another, generally through pipelines or canals.
Inundation	Covering with water.
Isobath	Lines on a map or graph connecting points with the same water depth.
Light attenuation	The reduction of radiant energy (light) with depth, by both scattering and absorption mechanisms.
Light availability	The amount of light present at a given depth.
Macroalgae	Large algae visible to the naked eye, such as sea lettuce and kelp.

Term	Description
Macrofauna	The larger animals such as adult crabs and fish.
Macrophyte	Plant large enough to be visible to the naked eye.
Marine systems	Open ocean waters overlying the continental shelf and its associated high-energy coastline where salinities exceed 30 ppt.
Meiofauna	Microscopic animals that live in the upper layers of sediment.
Meroplankton	Organisms that spend only part of their life cycle in the plankton.
Mesohaline	Moderate salinity waters (5-18 ppt).
Nekton	Free-swimming organisms that live in the water column.
Oligohaline	Low salinity waters (0.5-5 ppt).
Peat blocks	Old marsh beds on which the vegetation has died, leaving a mass of decomposed roots. Along eroding shorelines, they are created when the banks cave in.
Pelagic	Fish species that live primarily up in the water column.
Phytobenthic	Refers to microscopic plants that live on the bottom.
Phytoplankton	Microscopic plants that float in the water column.
Plankton	Small organisms that live in the water column, generally near the surface, including eggs, larvae, and adults; they may float with the currents, or have some control over their movements.
Polyhaline	High salinity waters (18-30 ppt).
Porewater	Water found among the air spaces in soil.
Primary production	The accumulation of energy and nutrients by green plants and other life forms that do not consume other life forms to survive (autotrophs).
Propagules	A plant seed or spore.
Public trust waters	All navigable waters within state jurisdiction and the lands thereunder, below the mean high water line or mean water level.
Recruitment	Number of fish hatched or born in any year that survive to reproductive size; also, the number of individuals that reach a harvestable size, a particular size or age, or a size captured by a particular fishing gear.
Rhizomes	Underground plant stem that can give rise to a new plant above the surface.
Riparian wetlands	Wetlands that are connected to coastal water bodies by surface water of sufficient depth to allow fish utilization.
Sciaenids	Family of fishes that includes the drums and croakers
Secondary production	The accumulation of energy and nutrients by organisms consuming green plants or other autotrophs.
Sedimentation	Soil that is washed into coastal waters by runoff waters. The source of sedimentation could be land-disturbing human activities or natural events.
Sessile	Stationary or non-moving.
Siltation	Process of filling a water body with sediments.
Silviculture	The branch of forestry dealing with the development and care of forests.
Sinks	Habitats where certain organisms have a higher mortality rates and production rate (i.e., areas that are heavily fished or otherwise dangerous).

Term	Description
Slough	A stagnant, backwater area associated a swamp.
Strategic Habitat Areas (SHAs)	Specific locations of individual fish habitats or systems of fish habitats that have been identified to provide exceptional habitat functions or that are particularly at risk due to imminent threats, vulnerability, or rarity.
Submersion regime	The frequency and depth of flooding over a given bottom area.
Subsidence	Natural degradation of marsh wetlands to open waters.
Substrate	A submerged surface, usually associated with the bottom.
Surface incident light	The amount of light hitting a surface.
Temporal abundance	The variation in abundance of a given organism through time.
Tidal amplitude	Vertical distance between the high and low points of lunar tides.
Total suspended solids	A measure of suspended particles (i.e., sediment, phytoplankton) in the water column.
Trophic position	An organisms position on the food chain (top predator vs. plant eater).
Trunk estuaries	Coast-perpendicular, drowned river estuaries.
Turbidity	Reduced water clarity caused by sediment or other particulates suspended in the water column.
Unconsolidated substrate	Substrate with at least 25% cover of particles smaller than stones, and vegetative cover less than 30% (Cowardin et al. 1979).
Vegetated swales	Very wide ditches with sloping banks constructed to gradually convey storm water to surface waters.
Water clarity	A measure of the depth to which light penetrates the water column .
Wetlands	Areas that are inundated or saturated by an accumulation of surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.
Wind fetch	Distance over which the wind has blown uninterrupted by land, over water.
Zoogeographical	Related to the geographic distribution of animals.

Appendix I: Common and scientific names of selected fish and invertebrates cited in this document

Common name	***Scientific name***	**Common name**	***Scientific name***
Alewife	*Alosa pseudoharengus*	Greater amberjack	*Seriola dumerili*
American eel	*Anguilla rostrata*	Gulf flounder	*Paralichthys albigutta*
American shad	*Alosa sapidissima*	Hard clam	*Mercenaria* spp.
Atlantic croaker	*Micropogonias undulatus*	Hermit crab	*Pagurus bernhardus*
Atlantic menhaden	*Brevoortia tyrannus*	Hickory shad	*Alosa mediocris*
Atlantic spadefish	*Chaetodipterus faber*	Horseshoe crab	*Limulus polyphemus*
Atlantic stingray	*Dasyatis sabina*	Inland silverside	*Menidia beryllina*
Atlantic sturgeon	*Acipenser oxyrhynchus*	Inshore lizardfish	*Synodus foetens*
Banded killifish	*Fundulus diaphanus*	King mackerel	*Scomberomorus cavalla*
Bay anchovy	*Anchoa mitchilli*	Kingfish	*Menticirrhus* spp.
Bay scallop	*Argopecten irradians*	Mantis shrimp	*Squilla empusa*
Bay whiff	*Citharichthys spilopterus*	Moon snail	*Polinices duplicatus*
Black drum	*Pogonias cromis*	Mummichog	*Fundulus heteroclitus*
Black sea bass	*Centropristis striata*	Naked goby	*Gobiosoma bosc*
Blackcheek tonguefish	*Symphurus plaqiusa*	Oyster	*Crassostrea virginica*
Blue crab	*Callinectes sapidus*	Oyster toadfish	*Opsanus tau*
Blueback herring	*Alosa aestivalis*	Pinfish	*Lagodon rhomboides*
Bluefish	*Pomatomus saltatrix*	Pink shrimp	*Penaeus duorarum*
Brown shrimp	*Penaeus aztecus*	Planehead filefish	*Stephanolepis hispidus*
Cobia	*Rachycentron canadum*	Red drum	*Sciaenops ocellatus*
Cownose ray	*Rhinoptera bonasus*	Rough silverside	*Membras martinica*
Florida pompano	*Trachinotus carolinus*	Round scad	*Decapterus macarellus*
Fringed flounder	*Etropus crossotus*	Sand perch	*Diplectrum formosum*
Gag	*Mycteroperca microlepis*	Scup	*Stenotomus chrysops*
Grass shrimp	*Palaemonetes* spp.	Sheepshead	*Archosargus probatocephalus*
Sheepshead minnow	*Cyprinidon variegatus*	Stone crab	*Menippe mercenaria*
Shortnose sturgeon	*Acipenser brevirostrum*	Striped anchovy	*Anchoa hepsetus*
Silver perch	*Bairdiella chrysoura*	Striped bass	*Morone saxatilis*
Skilletfish	*Gobiesox strumosus*	Striped mullet	*Mugil cephalus*
Smooth dogfish	*Mustelus canis*	Summer flounder	*Paralichthys dentatus*
Southern flounder	*Paralichthys lethostigma*	Tautog	*Tautoga onitis*
Southern kingfish	*Menticirrhus americanus*	Tomtate	*Haemulon aurolineatum*
Spanish mackerel	*Scomberomorus maculatus*	Weakfish	*Cynoscion regalis*
Spiny dogfish	*Squalus acanthias*	Whelks	*Busycon* spp.
Spot	*Leiostomus xanthurus*	White grunt	*Haemulon plumieri*
Spottail pinfish	*Diplidus holbrooki*	White shrimp	*Penaeus setiferus*
Spotted seatrout	*Cynoscion nebulosus*	Whitebone porgy	*Calamus leucosteus*