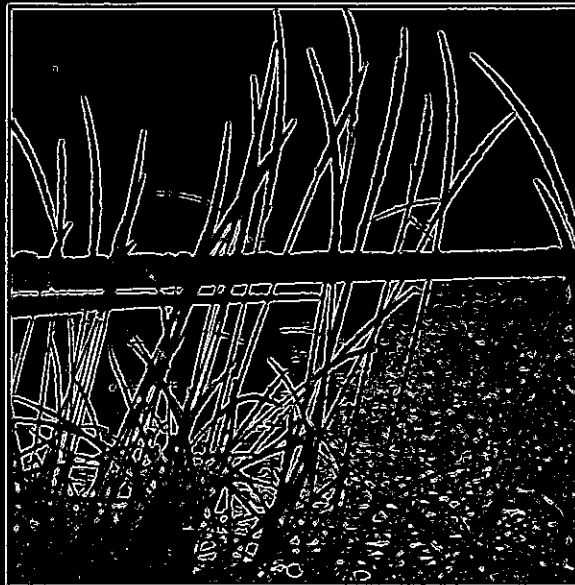




THE FEDERAL EFFORT  
TO DOCUMENT  
TRENDS IN COASTAL  
HABITAT LOSS

Washington, D.C.  
April 1991



NOAA National Oceanic and Atmospheric Administration  
Office of the Chief Scientist  
National Ocean Pollution Program Office

NATIONAL OCEAN POLLUTION PROGRAM OFFICE  
TECHNICAL MEMORANDUM SERIES

Comments on this Technical Memorandum or any questions about the mission and publications of the National Ocean Pollution Program Office should be directed to:

Director  
National Ocean Pollution Program Office  
1825 Connecticut Avenue, NW - Room 625  
Washington, DC 20235

Tel. (commercial): 202-606-4243  
FTS: 266-4243

NOAA TECHNICAL MEMORANDUM CS/NOPPO 91-1

**THE FEDERAL EFFORT TO DOCUMENT TRENDS IN  
COASTAL HABITAT LOSS**  
**A Report by the National Ocean Pollution Policy Board's  
Habitat Loss and Modification Working Group**

**DUPLICATE  
WITHDRAWN**

Sari J. Kiraly  
National Oceanic and Atmospheric Administration  
Office of the Chief Scientist  
National Ocean Pollution Program Office

Ford A Cross  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southeast Fisheries Science Center  
Beaufort Laboratory

John D. Buffington  
U.S. Fish and Wildlife Service  
Region 8, Research and Development

April 1991



**U.S. DEPARTMENT OF COMMERCE**  
Robert A. Mosbacher, Secretary

**National Oceanic and Atmospheric Administration**  
John A. Knauss, Administrator

**OFFICE OF THE CHIEF SCIENTIST**  
Sylvia A. Earle, Chief Scientist

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NOTE: An Appendix volume containing workshop presentation summaries is available upon request from the National Ocean Pollution Program Office.

## PREFACE

This report was prepared by the National Ocean Pollution Policy Board's Habitat Loss and Modification Working Group (Working Group), which is an interagency technical committee established by the National Ocean Pollution Policy Board pursuant to recommendations contained in the current National Marine Pollution Program Federal Plan for Ocean Pollution Research, Development, and Monitoring: Fiscal Years 1988-1992 (Federal Plan). The Working Group is jointly chaired by the National Oceanic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS) and the U.S. Department of the Interior's Fish and Wildlife Service (USFWS). The activities of the Working Group are coordinated through NOAA's National Ocean Pollution Program Office, which also directed preparation of the Federal Plan.

Understanding the effects of losing or modifying marine habitats as a result of human activities is one of six goals identified in the Federal Plan. The Working Group was charged with conducting projects which would address recommendations outlined in the Federal Plan for achieving this goal at the Federal level, and to arrive at products which would be useful for Federal agencies planning and conducting habitat programs. Three study areas were selected: coastal wetland mapping, coastal habitat loss, and coastal wetland mitigation. This report concerns coastal habitat loss.

The Working Group addressed the topic by assessing the Federal effort to document trends in coastal wetland loss, both from natural causes and from human-related activities. Two aspects of determining the extent of such losses were considered: status and trends analysis, and Federal permit documentation and compliance follow-up. In order to gather the necessary information, a workshop which included representatives from pertinent Federal agency programs was held in September 1990 at NOAA's NMFS Southeast Fisheries Science Center, Beaufort Laboratory, Beaufort, North Carolina. This report is based on a series of presentations by the Federal program representatives and on subsequent workshop discussions. The report presents an overview of what currently is being done by the Federal agencies, identifies deficiencies, and offers the Working Group's recommendations on what could be done to make the habitat-loss documentation process more comprehensive, efficient, and useful.

# THE FEDERAL EFFORT TO DOCUMENT TRENDS IN COASTAL HABITAT LOSS

Sari J. Kiraly  
National Oceanic and Atmospheric Administration  
Office of the Chief Scientist  
National Ocean Pollution Program Office

Ford A Cross  
National Oceanic and Atmospheric Administration  
National Marine Fisheries Service  
Southeast Fisheries Science Center  
Beaufort Laboratory

John D. Buffington  
U.S. Fish and Wildlife Service  
Region 8, Research and Development

**ABSTRACT.** Loss of coastal wetland habitat continues to occur and is cause for concern. The Habitat Loss and Modification Working Group (Working Group) examined the Federal effort to document this loss through status and trends analysis and by Federal permit documentation and compliance follow-up activities. For status and trends analysis, the Working Group concluded that: Federal efforts need to be accelerated; a tiered approach for wetland mapping and trends analysis, from a broad national scale to a local one, should be used; and a comprehensive, national digital status and trends data base is needed. For permit documentation, the Working Group found that there is no comprehensive national program to track coastal habitat loss in the United States through the permitting system. Therefore, a comprehensive national data base should be developed for documenting and tracking permit actions and permit-related activities. The potential exists for developing the U.S. Army Corps of Engineers (COE) Regulatory Analysis Management System (RAMS) toward meeting the need for a national data base.

## INTRODUCTION

Continued loss of the Nation's coastal wetlands has resulted in an increasing awareness and concern for these valuable habitats and the living resources they support. In order to assess the extent and rate of this loss, both from natural and human-related causes, it is critical that such losses be documented accurately and in a timely manner. Two aspects of habitat loss documentation are status and trends analysis, and documentation of Federal permit actions and permit compliance follow-up where modification or destruction of coastal wetlands is involved. It is important that this information comprise an up-to-date, comprehensive data base readily available to resource managers so that conscientious decisions involving potential loss of coastal wetlands may be made.

In this report, we summarize information presented to the National Ocean Pollution Policy Board's Habitat Loss and Modification Working Group (Working Group) on a series of Federal programs intended to document coastal wetland loss through status and trends analysis or by documenting Federal permit actions and related activities which affect wetlands. In addition, based on this information, we present the Working Group's conclusions as to the perceived status and effectiveness of the overall Federal effort, and provide recommendations on what could be done to improve the habitat-loss documentation process so that it is more efficient, comprehensive, and useful to resource managers.

## OVERVIEW OF THE FEDERAL EFFORT IN TRENDS ANALYSIS

### National Programs

Three major Federal programs which address coastal habitat loss trends analysis on a national scale are: the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory, the National Oceanic and Atmospheric Administration (NOAA) Coastal Ocean Program's CoastWatch-Change Analysis Program, and the Environmental Protection Agency (EPA) Environmental Monitoring and Assessment Program's Wetlands Resource component. The latter two programs, however, are not yet fully operational.

#### U.S. Fish and Wildlife Service

In 1982, the USFWS National Wetlands Inventory (NWI), a national wetland mapping program based on interpretation of black-and-white and color infrared aerial photographs, completed a study of the status and trends of wetlands for the conterminous United States. This study estimated total acreage and rate of change of the Nation's wetlands from the mid-1950's to the mid-1970's. In late 1990, this report was updated to reflect estimates of rates of gain or loss between the 1970's and 1980's. The study design consists of 3,629



UNITED STATES DEPARTMENT OF COMMERCE  
National Oceanic and Atmospheric Administration  
Office of the Chief Scientist  
Washington, D.C. 20230

OCT 23 1991

MEMORANDUM FOR: National Ocean Pollution Policy Board Members

FROM: Sari J. Kiraly *Sari J. Kiraly*  
National Ocean Pollution Program Office

SUBJECT: The Federal Effort to Document Trends in Coastal Habitat Loss

Enclosed is a copy of the Habitat Loss and Modification Working Group's second report, The Federal Effort to Document Trends in Coastal Habitat Loss. This report contains the Working Group's assessment of the overall Federal effort to document coastal habitat loss in terms of trends analysis and by tracking Federal permit actions and related activities which result in the loss or modification of coastal wetlands. It also presents the Working Group's recommendations for improving the Federal effort. The information which served as a basis for this report was obtained by the Working Group through a series of presentations given at a workshop held last fall at NOAA's NMFS Southeast Fisheries Science Center, Beaufort Laboratory, Beaufort, North Carolina.

This project was conducted in response to the Board's charge to the Working Group that it address critical issues related to coastal habitat loss and modification delineated in the Federal Plan for FY 1988-1992. The Working Group was also charged to develop products which would be helpful to the Federal agencies planning and conducting habitat programs. I hope the agencies will find the report useful in this regard.

If you have any questions or desire more information concerning this report, please call me at (202) 606-4243.

Enclosure





4-square-mile randomly selected plots distributed within strata formed by state boundaries, 35 physical subdivisions, the coastal zone, and the Great Lakes region. For the future, the NWI has been legislatively mandated to update this report on a 10-year cycle. In addition, the NWI intends to expand its monitoring of wetlands status and trends in 1991 by incrementally converting the effort to a continuous mode, intensifying work in priority areas, and seeking other Federal and state cooperation to produce regional and state-wide wetland trend studies.

Concurrent with its mapping activities, the NWI is coordinating with the U.S. Geological Survey (USGS) to include the NWI wetlands data base as one of the USGS national mapping base category thematic data sets. In applying geographic information system (GIS) technology to wetlands data, a national georeferenced digital wetlands data base could be constructed which would be updated easily and provide information in a variety of forms to suit user needs in conducting status and trends analysis.

#### National Oceanic and Atmospheric Administration

NOAA's Coastal Ocean Program (COP) recently established its CoastWatch-Change Analysis Program (C-CAP) to develop a comprehensive and nationally standardized information system for land cover and habitat change in the Nation's coastal zone. Under this program, satellite imagery, aerial photography and surface geographic data will be interpreted, classified, analyzed and integrated within a GIS. Habitat changes will be monitored on a cycle of 1 to 5 years, varying regionally according to the rate and magnitude of change in each region. The maps produced will be spatially registered digital images, allowing land cover change to be detected by a pixel by pixel (30- x 30- meter pixels) comparison of different time periods. Maps for a given time period will be synoptic so that direct comparisons can be made.

The C-CAP will build upon and complement ongoing mapping programs of other Federal and state agencies. Although some of the operational protocols for this program are still undergoing development, a change analysis prototype study for emergent coastal wetlands and adjacent uplands of the Chesapeake Bay region has been conducted by comparing 1984 satellite imagery with 1988/89 imagery. Also, in cooperation with EPA's Albemarle-Pamlico National Estuary Program, submerged aquatic vegetation within the bays of North Carolina is being mapped and is undergoing change analysis using aerial photographs. It is projected that, eventually, change analysis for all of the Nation's estuarine drainage areas will be conducted routinely, either directly under this program or cooperatively with other Federal and state programs. A description of this program can be found in the USFWS Biological Report 90(18), "Federal Coastal Wetland Mapping Programs."

### Environmental Protection Agency

EPA's Environmental Monitoring and Assessment Program's Wetlands Resource component (EMAP-Wetlands) currently is undergoing development. The intent of this program is to assess the long-term status and trends of wetland condition ("health" endpoints) and their extent by generating probability-based estimates of condition by wetland class, and with known confidence. The research plan calls for identifying suitable indicators for a national monitoring program, sampling resources on a regional scale; and evaluating the relationship between wetland condition and other resource condition and environmental characteristics that may influence wetland condition. Implementation of the program calls for pilot studies on the applicability of the indicators, regional demonstrations, and full operational implementation on the regional level. Once fully operational, each wetland site selected for study will be visited every 4 years.

EMAP-Wetlands will provide a major complement to the NWI data, and both programs will collaborate to produce reports describing the status and trends of wetland acreage and condition. In addition, EMAP-Wetlands will coordinate activities with other Federal agencies and also with local agencies. In 1991, the research plan will be completed, a pilot study in 40 Louisiana coastal marshes will be conducted in which selected indicators will be assessed in terms of ability to measure wetland "health", and statistical validity of sampling protocols tested. The Louisiana pilot project will be conducted cooperatively with NOAA's C-CAP. After the pilot study, field activities will be closely coordinated with EMAP's Near Coastal component.

### Regional Programs

In addition to the major national programs summarized above, there are several Federal programs conducted at the regional level. These include the USFWS National Wetlands Research Center's wetland trends studies, the USFWS-State of Pennsylvania cooperative wetlands monitoring, the USGS Coastal Geology Program's geologic processes studies, and the Chesapeake Bay Program (an interagency Federal and state cooperative effort).

### U.S. Fish and Wildlife Service

The USFWS National Wetlands Research Center, in conjunction with the NWI, has used computer-assisted methodologies and techniques to quantify coastal wetland loss for several areas along the Gulf of Mexico coast and for south San Francisco Bay. Future projects are planned for selected portions of the Mid-Atlantic coast and South Atlantic Bight. The Center works closely with the states and other Federal agencies involved, and provides them with the project data bases it develops. Products include change measurements and tabular summaries accompanied by materials that geographically display habitat changes. In some cases, causes of loss are incorporated into

the data base. Ongoing studies include updates (late 1980's) of wetland maps and digitized data bases for the entire coastal zone of Louisiana, and Galveston and Mobile Bays. Lastly, the Center, in conjunction with EPA's EMAP, NOAA's COP, and the five Gulf states, has initiated a study to map submerged aquatic vegetation from an area north of Tampa Bay to the Mexican border.

The USFWS NWI has provided the State of Pennsylvania with detailed information on the status and trends of wetlands within its coastal zone. In addition, NWI helped the State develop a monitoring program to identify wetland changes. This effort included the development of a comprehensive georeferenced wetland map data base, based on high-resolution color infrared photographs comparing different time periods. Particularly noteworthy is that this information, when compared with permit records, was used to detect unauthorized wetland activities.

#### U.S. Geological Survey

The USGS Coastal Geology Program is conducting field research along the Louisiana delta plain in order to gain an improved understanding of the geological processes responsible for coastal erosion and deterioration of wetlands. Two studies are underway in cooperation with the State of Louisiana. One study is examining the role of coastal barrier islands in protecting bays, estuaries, and wetlands from ocean waves, storm surges, and salt-water intrusion by mapping and interpreting physical changes that have taken place over the past several thousand years. The other study is investigating critical physical coastal processes such as storm events, sediment dispersal, subsidence, and sea-level rise and the relationship of these processes to marsh deterioration. In addition, a coastal erosion study for southern Lake Michigan is underway. One of the primary goals of the program is to generate information that can be used to predict future erosion and wetland loss on a national scale. In order to maximize utilization, the data are entered into a GIS network.

#### Chesapeake Bay Program

The Chesapeake Bay Program intends to implement a comprehensive inventory, mapping, and monitoring plan using various methodologies. Key activities will include: an intensive wetlands mapping program on a 10-year cycle, a monitoring program within selected regions to quantify functions and values and document changes occurring over time within these systems, a statistically valid status and trends analysis on a 5-year cycle, a monitoring program for invasive or exotic species, and a regional data base of permitted activities. The Implementation Plan for this program has been completed, and protocols are currently undergoing development.

## OVERVIEW OF THE FEDERAL EFFORT IN PERMIT DOCUMENTATION

The U.S. Army Corps of Engineers (COE), under authority of the Clean Water Act (Federal Water Pollution Control Act, as Amended, Pub.L. 92-500) and the Rivers and Harbors Act of 1899 (30 Stat. 1151) regulates wetland alteration activities. Permits for projects which affect wetlands are issued under Section 404 of the former act, and under Section 10 of the latter. At the Federal level, permit applications are reviewed by the resource agencies prior to permit issuance in order to determine potential impacts on jurisdictional resources and to provide the COE with recommendations designed to minimize those impacts. The COE is under no legal obligation to accept and implement those recommendations. Agencies which presented information on their Section 404 and Section 10 permit review programs to the Working Group include the COE, NOAA's NMFS, and the USFWS.

### U.S. Army Corps of Engineers

The COE Section 404 wetlands regulatory program reviews approximately 75,000 permit applications each year. Based primarily on a proposed project's compliance with Section 404(b)(1) Guidelines, which are environmental criteria, the COE District Engineers decide to issue, modify, or deny a permit. In order to track the multitude of permit actions, in 1986 the COE Baltimore District developed a computer system, the Regulatory Analysis and Management System (RAMS). This is a user-friendly, flexible, fully integrated, multi-user system which tracks regulatory activities from pre-application actions, or the beginning of enforcement actions, to final decisions, or resolutions of enforcement actions. At this time, RAMS is utilized essentially as a permit logging system.

Currently, there are over 2,000 possible data fields in RAMS, although only about 350 are used, with 275 of these common to all COE Districts. Of the 38 COE regulatory offices nationwide, 9 use RAMS, while several others are considering its use. In addition, RAMS is available to all Federal agencies that wish to access the data. Efforts are underway to enhance existing linkages between RAMS and the COE GIS, the Geographic Resource Analysis Support System (GRASS). When RAMS is fully linked to GRASS, the information could be capable of providing a management tool for assessing trends and cumulative impacts on the Nation's wetlands. With appropriate data entries, RAMS could serve as a national wetlands tracking system for the COE regulatory program.

### National Oceanic and Atmospheric Administration

As part of its Habitat Conservation Program, NOAA's NMFS conducts extensive permit review activities under authority of the Clean Water Act and the Fish and Wildlife Coordination Act (Pub.L. 85-624). NMFS provides recommendations to the COE that are designed to minimize project impacts on marine, estuarine, and anadromous fishery resources. Approximately 30 percent of NMFS Habitat Conservation

Program workload consists of permit-related activities. As a means of measuring the efficiency and effectiveness of this effort, NMFS has conducted assessments which include numbers and types of permit actions reviewed, acreage affected, and the outcome of NMFS recommendations to the COE. The results have been published in NMFS annual and biennial reports and in "Marine Fisheries Review." In addition to monitoring the effectiveness of its permit review program, these assessments can be used in determining potential cumulative loss of coastal habitat and for suggesting measures needed to avoid or minimize harm to fisheries resources.

Although all five NMFS Regional Offices have contributed fundamental information to this effort, the Southeast Region, which reviews over one-half of all notices received by NMFS, conducts additional, intensive analyses annually. Detailed information is compiled for every step of the permit process, including issuance of the notice of the proposed action, specifications and conditions for the project once the permit is issued, and the degree to which NMFS recommendations are applied in issuing the permit.

#### U.S. Fish and Wildlife Service

The USFWS reviews COE permit applications and submits recommendations to the COE under authority of the Clean Water Act and the Fish and Wildlife Coordination Act. In 1984, the USFWS began a Mitigation Evaluation Project designed to make follow-up evaluations a routine part of field office operations in order to improve future recommendations and assist in the development of policy and operational decisions. A computer data base for follow-up studies was established. Although field offices have conducted selected follow-up studies since 1984, budget and personnel constraints have prevented the USFWS from meeting its goal of establishing these evaluations as a routine part of its field operations.

### CONCLUSIONS AND RECOMMENDATIONS

#### Trends Analysis

Although a substantial amount of trends analysis work is presently underway or being initiated by the Federal agencies, the following recommendations identify areas where the Federal effort can be improved to make the information more timely and useful.

**A national, georeferenced digital data base for the status and trends of the Nation's coastal wetlands is needed.** Coastal wetland trends analysis information generated at the Federal level needs to be gathered and incorporated into one coastal zone data base which would serve as a readily available, uniform source of information, and which could be updated easily as new information becomes available. Such a data base would facilitate direct comparisons of data sets and allow problem areas to be more readily identified, and management steps taken in a timely manner. In addition, a digital data base

offers flexibility in producing information either as maps or in statistical form, and in various combinations and levels of complexity, to suit a wider range of user needs. Quality control review of the data, which is an important element, would also be easier to accomplish with a centralized system. Because this information could be a valuable tool to coastal resource scientists and managers at all levels, from national to local, this data base needs to be developed using the best maps and other information currently available. The USFWS NWI has initiated such an effort in cooperation with the USGS, whereby digital data from NWI maps will be incorporated as one of the USGS national mapping base thematic data sets. This effort should be expanded to include information generated by other programs, such as NOAA's C-CAP and the USFWS National Wetlands Research Center regional wetland studies, and updated as needed. Another recent development is the Office of Management and Budget revised Circular No. A-16, "Coordination of Surveying, Mapping, and Related Spatial Data." Circular No. A-16 calls for the eventual development of a national digital spatial information resource, with the involvement of Federal, state and local governments, and the private sector. An interagency subcommittee led by the USFWS will promote and ensure development, accuracy, sharing, dissemination, and use of the wetland-related spatial data.

**Status and trends analysis for the Nation's coastal wetlands needs to be conducted on a frequent (1- to 5-year) basis, as appropriate, particularly for critical habitat areas, so that losses can be detected in a timely manner and management action taken.** Such timely documentation should be conducted on the national level and on the regional or local level, depending on information needs. This trends analysis should be conducted at the smallest scale practicable to assess small, but cumulative, changes. Frequent updates could identify problem areas early and serve to improve projections from predictive models on the effects of future wetland losses. Both NOAA's C-CAP and EPA's EMAP-Wetlands initiatives intend to monitor wetland changes on a relatively frequent (1- to 5-year for C-CAP; 4-year for EMAP) basis in order to document wetland status in a timely manner. In addition, the Chesapeake Bay Program intends to perform status and trends analysis on a 5-year cycle. Such efforts, both on the national and regional levels, are needed in order to gain a comprehensive understanding of our Nation's wetlands.

**A tiered approach for conducting wetland mapping and trends analysis, from a broad national scale to a local one, is needed, and the methodology selected accordingly.** Detail of resolution and frequency of effort should depend on the goals of the project and the information needed. On a national or regional scale, trends analysis based on a stratified random sample approach or on pixel-by-pixel comparisons of satellite imagery for different time periods may be appropriate. These are the approaches used by the USFWS NWI and NOAA's C-CAP. These methods, however, do not detect small-scale

losses. Therefore, more intensive efforts which produce comprehensive, detailed information (e.g., using aerial photography and detailed computer data bases), although they may not be practicable on a nationwide basis, are needed to detect small-scale problems or to make localized decisions. This approach has been taken by the USFWS, for example, at the National Wetlands Research Center, and in cooperation with the State of Pennsylvania. In order to provide a comprehensive analysis of coastal wetland loss nationally, while at the same time identifying "hot spots" of rapid decline, a combination of approaches and methodologies is needed. Strategies for accomplishing this goal should be further developed so that coastal wetland loss can be detected at all levels and adequately documented.

#### Permit Documentation

The Federal agencies presently do not appear to be coordinating efforts toward resolving the issue of permit documentation and follow-up compliance monitoring. To assist the agencies in identifying areas which need to be addressed, and areas where cooperative opportunities could be explored in order to improve the overall Federal effort, the following recommendations are offered.

**A clear definition of the "coastal zone" is needed and should be applied consistently in documenting permit actions.** The COE, in particular, needs to know what the resource agencies which review wetland permit applications consider to be the inland limits of the coastal zone so that information can be documented and cataloged properly. The workshop concluded that perhaps the estuarine drainage area to the head-of-tide would be a suitable standard boundary. Related to this is the need for a common upland classification system. However, as other Federal groups (e.g., NOAA's C-CAP workshops) are currently addressing upland classification, the Working Group has no specific recommendations on the topic at this time other than to note that a definition is needed.

**A standardized national system, including a central data base, for documenting and tracking habitat loss related to permit actions, including compliance follow-up documentation after issuance of the permit, is needed.** Presently, there is no single, comprehensive data base for documenting Federal permit actions which all the agencies can utilize for their information needs. In addition, there is virtually no consistent follow-up within any of the Federal agencies, either in the field or through permittee reporting requirements, to verify compliance with permit conditions and specifications or to detect illegal activities. Consequently, impacts on living marine resources, including cumulative impacts and the outcome of wetland mitigation projects, cannot be determined. The NMFS has compiled data on the permit actions it has reviewed. Although its Southeast Region has performed particularly extensive analyses in this regard, the data portrays only one region of the

United States in detail, and reflects the efforts of only one Federal agency. Also, the lack of compliance follow-up remains a problem.

Especially critical is the question of acreage loss permitted compared to what was actually lost due to the project. Examination of COE permit application records compared to field checks have shown inconsistencies, with acreage reported as being affected by the permit frequently not the actual amount lost. Some estimates of non-reported losses are as high as 30 percent. Additionally, it is not unusual to have inconsistencies between the permit application and the actual habitat affected in terms of species composition. These discrepancies in record-keeping vary regionally. The problems described here are basically a reflection of the overload of permit applications needing review and processing, and the lack of resources for these activities and for permit compliance follow-up, both on the part of the COE and the resource agencies.

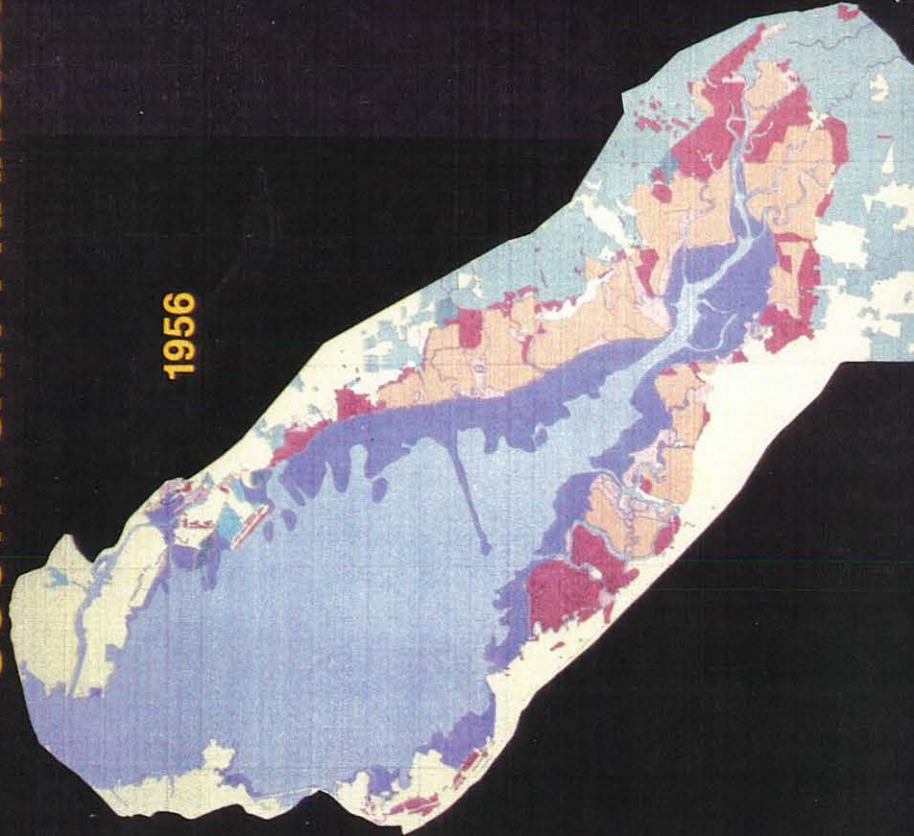
Opportunities for developing the COE's Regulatory Analysis Management System (RAMS) to a point where it could serve as a national data base, perhaps in coordination with other Federal agencies, should be explored. Upon invitation by the COE, an informal ad hoc technical committee should be convened by the National Ocean Pollution Policy Board to explore opportunities for making RAMS a comprehensive data base which would be useful not only to the COE but also to the resource agencies. RAMS is a multi-task data base and word processing computer system. Presently used for logging permits, it has the capacity for expansion. RAMS is used on a limited basis and by only a small number of the COE Districts. In addition, since the COE does not routinely track its permits for compliance, this follow-up information is generally lacking. However, the potential capabilities for RAMS are extensive, as it provides over 2,000 possible data fields and could be linked with the COE's GIS, the Geographic Resource Analysis Support System (GRASS), whereby it could be used as a tool for assessing cumulative impacts and trends in wetlands loss. The COE has indicated that not only is RAMS presently available to other Federal agencies who may wish to access the data but also that the COE would be willing to coordinate with other agencies to incorporate additional entries to meet their information needs. Such opportunities should be explored in an effort to develop a comprehensive data base for tracking permit actions and the related impacts on coastal wetlands and the living marine resources these wetlands support.



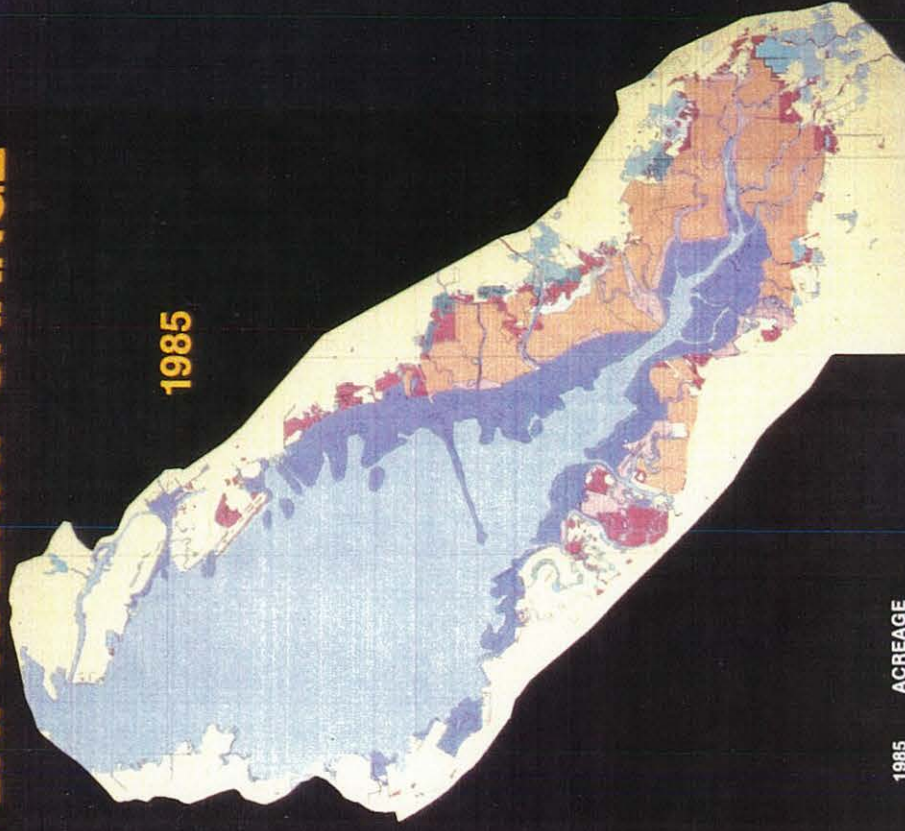
# PLATES

The following plates illustrate coastal wetland change for the following regions: South San Francisco Bay, California; Coastal Louisiana; Galveston Bay, Texas; and Hillsboro Bay, Florida. (Plates provided by the U.S. Fish and Wildlife Service, National Wetlands Research Center, 1010 Gause Boulevard, Slidell, LA 70458.)

# SOUTH SAN FRANCISCO BAY HABITAT CHANGE



1956



1985

	1956 ACREAGE	1985 ACREAGE	ACREAGE CHANGE
<b>DEEPWATER HABITATS</b>			
■ ESTUARINE SUBTIDAL	94,855	93,220	- 1,635
■ LAKES, PONDS, AND RIVERS	1,217	2,262	+ 1,046
<b>WETLANDS</b>			
■ ESTUARINE INTERTIDAL, NON-VEGETATED, NOT DIKED	30,992	30,379	- 613
■ ESTUARINE EMERGENT, NOT DIKED	9,884	8,600	- 1,284
■ ESTUARINE EMERGENT, DIKED, AND NON-ESTUARINE WETLANDS	19,242	8,902	- 10,340
■ FARMED WETLANDS	1,013	1,317	+ 304
■ PALUSTRINE WOODY VEGETATION	66	171	+ 105
■ SALT PONDS	26,764	27,497	+ 733
<b>UPLANDS</b>			
■ URBAN	56,885	100,225	+ 43,340
■ UPLAND AGRICULTURE	37,153	4,706	- 32,447
■ UPLAND RANGE	1,517	2,122	+ 605

- DEEPWATER HABITATS
- ESTUARINE SUBTIDAL
- LAKES, PONDS, AND RIVERS
- WETLANDS
- ESTUARINE INTERTIDAL, NON-VEGETATED, NOT DIKED
- ESTUARINE EMERGENT, NOT DIKED
- ESTUARINE EMERGENT, DIKED, AND NON-ESTUARINE WETLANDS
- FARMED WETLANDS
- PALUSTRINE WOODY VEGETATION
- SALT PONDS
- UPLANDS
- URBAN
- UPLAND AGRICULTURE
- UPLAND RANGE



SAN FRANCISCO BAY REGION

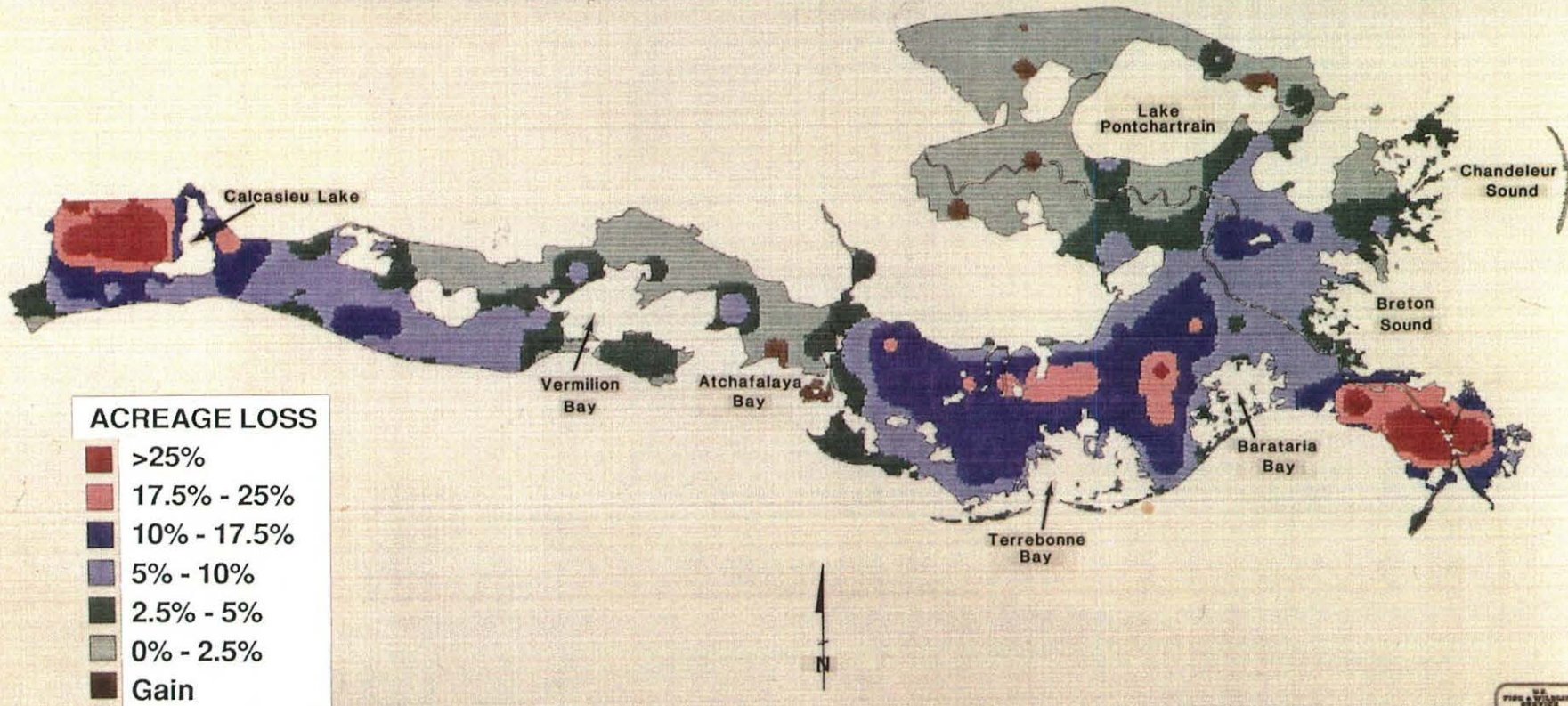


0 1 2 3  
MILES



NATIONAL WETLANDS RESEARCH CENTER  
U.S. FISH AND WILDLIFE SERVICE  
SLIDELL, LOUISIANA

# LAND LOSS IN THE LOUISIANA COASTAL ZONE (1955/56-1978)



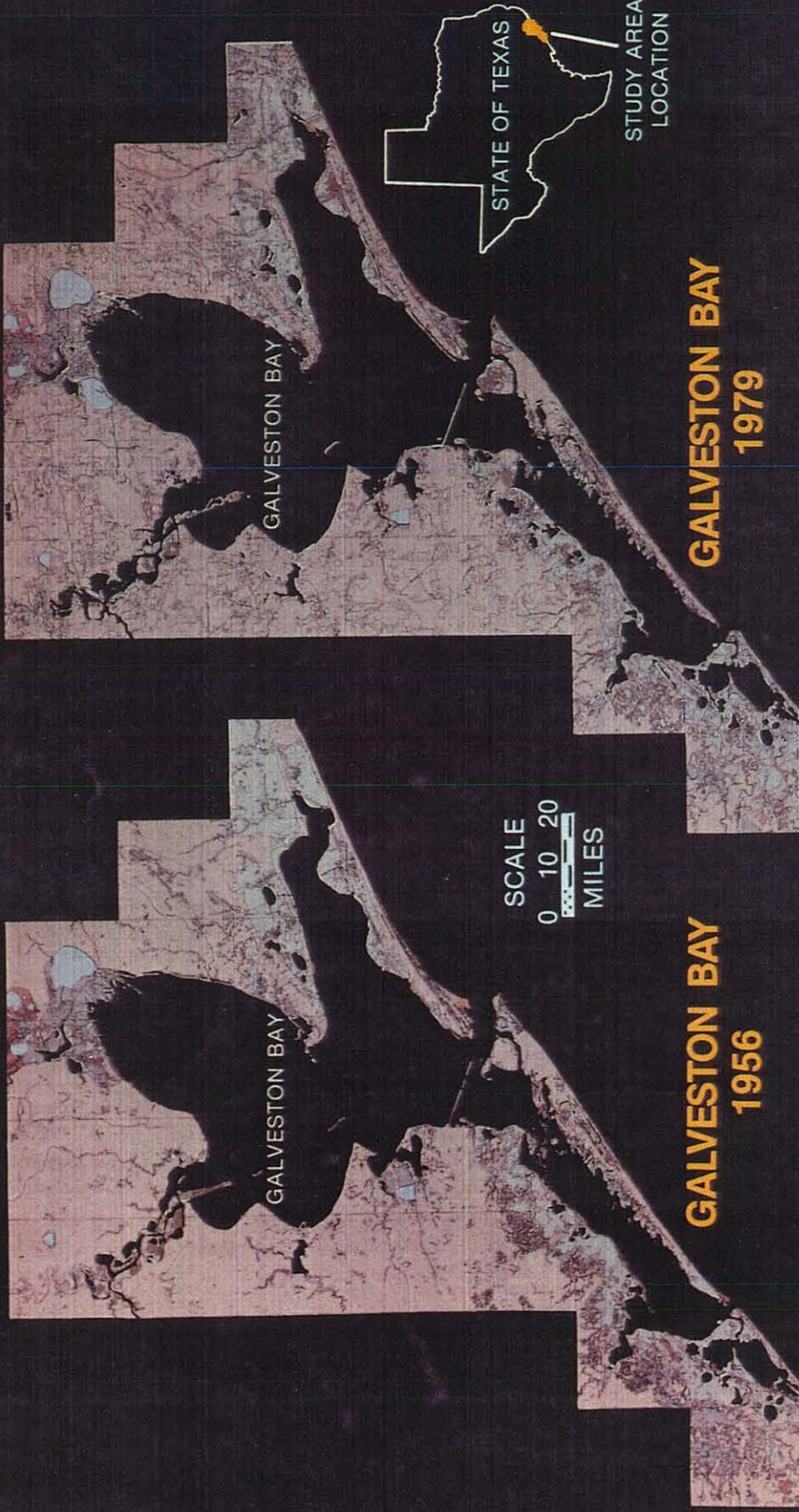
The area illustrated above represents the Louisiana Coastal Zone as defined in State and Local Resources Management Act 361 of 1978, amended 1979 and 1980.

10 0 10 20 30 40 MILES  
10 0 10 20 30 40 50 KILOMETERS

NATIONAL WETLANDS RESEARCH CENTER  
U.S. FISH AND WILDLIFE SERVICE  
SLIDELL, LOUISIANA



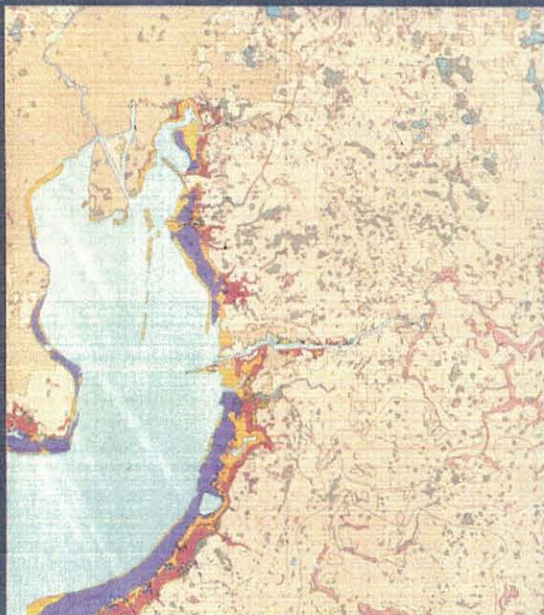
# WETLAND CHANGES IN THE GALVESTON BAY, TEXAS, REGION (1956-1979)



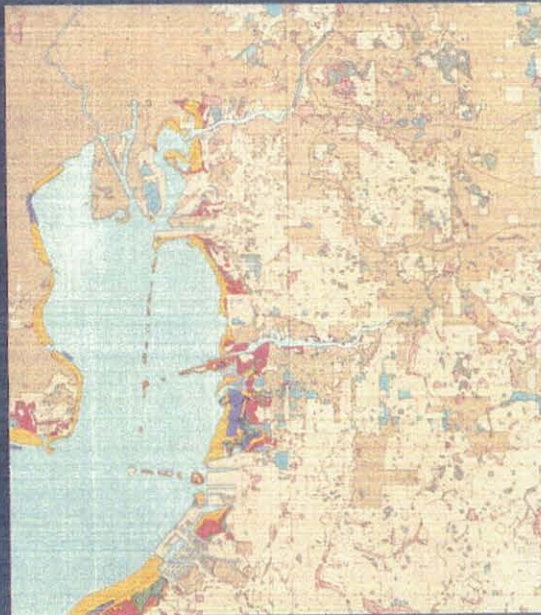
SYMBOL	HABITAT TYPE	ACREAGE		PERCENT CHANGE
		1956	1979	
	FRESH MARSH	47851	32250	-32.6
	SALT MARSH	117603	105730	-10.1
	FORESTED WETLANDS	5466	7896	+44.5
	FRESH WATER PONDS AND LAKES	11475	19395	+69.0
	UPLAND	491728	489913	-0.4
	BEACH BAR	2697	1521	-43.6
	MUD AND SAND FLATS	16461	13748	-16.5

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 SLIDELL, LOUISIANA

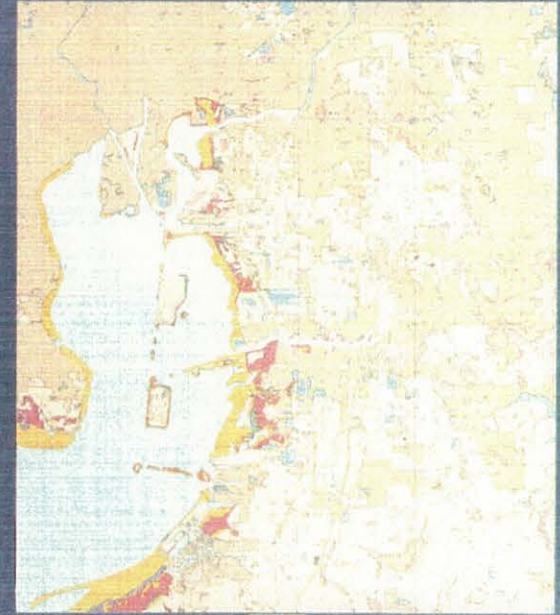
## WETLAND CHANGES IN HILLSBOROUGH BAY, FLORIDA (1948-1982)



1948

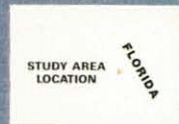


1972



1982

HABITAT TYPE	1948 ACREAGE	1972 ACREAGE	1982 ACREAGE	1948-1982 CHANGE	PERCENT CHANGE
SALT MARSH	583	614	348	-235	-40.3
FRESH MARSH	5,990	3,573	2,564	-3,426	-57.2
FORESTED WETLANDS	3,796	4,624	3,745	-51	-1.3
ESTUARINE VASCULAR AQUATICS	4,381	566	170	-4,211	-96.1
OTHER AQUATICS	0	163	278	+278	-
MANGROVES	2,301	1,758	2,044	-257	-11.2
ESTUARINE OPEN WATER	32,425	33,503	32,060	-365	-1.1
FRESH OPEN WATER	961	2,968	3,839	+2,878	+299.5
BEACHES, BARS, & FLATS	4,207	3,748	4,682	+475	+11.3
SPOIL (NON-UPLAND)	0	290	264	+264	-
UPLAND-URBAN/DEVELOPED	22,495	57,302	64,188	+41,693	+185.3
UPLAND-OTHER	91,336	59,368	54,295	-37,041	-40.6



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SLIDELL, LOUISIANA



**APPENDIX A: WORKSHOP TOPICS AND  
PRESENTERS**

**HABITAT LOSS AND MODIFICATION WORKING GROUP**  
**WORKSHOP ON THE FEDERAL EFFORT TO DOCUMENT TRENDS IN COASTAL**  
**HABITAT LOSS**

Beaufort Laboratory  
National Marine Fisheries Service  
National Oceanic and Atmospheric Administration  
Beaufort, North Carolina

September 5-6, 1990

**PRESENTATIONS**

**Trends Analysis**

**U.S. Fish and Wildlife Service**

**Monitoring Coastal Wetland Acreage Changes**

Mr. Thomas Dahl  
National Wetlands Inventory  
9720 Executive Center Drive, Suite 101  
St. Petersburg, FL 33702

**Progress Toward a National Digital Data Base of Coastal Wetlands**

Dr. Bill O. Wilen  
National Wetlands Inventory  
400 ARLSQ  
18th and C Streets, NW  
Washington, DC 20240

**Selected Wetland Trend Studies for the Gulf and Pacific Coasts**

Dr. James B. Johnston  
National Wetlands Research Center  
1010 Gause Boulevard  
Slidell, LA 70448

**Monitoring Wetland Trends in Pennsylvania's Coastal Zone**

Dr. Ralph Tiner  
National Wetlands Inventory  
1 Gateway Center, Suite 700  
Newton Corner, MA 02158

**Chesapeake Bay Wetlands Policy: A Commitment for Wetlands Trends Assessment**

Mr. Steve Funderburk  
Chesapeake Bay Estuary Program  
180 Admiral Cochrane Drive, Suite 535  
Annapolis, MD 21401

**National Oceanic and Atmospheric Administration**

**Coastal Habitat Change in the Chesapeake Bay**

Dr. Jerome Dobson  
Oak Ridge National Laboratory  
P.O. Box 2008  
Oak Ridge, TN 37831

**U.S. Geological Survey**

**Geologic Methods for Assessing Coastal and Wetlands Change**

Dr. S. Jeffress Williams  
National Coastal Geology Program  
914 National Center  
Reston, VA 22090

**U.S. Environmental Protection Agency**

**The Wetlands Component of the U.S. Environmental Protection Agency's Environmental Monitoring and Assessment Program**

Mr. Steve Cordle  
Office of Environmental Processes and Effects Research  
West Tower, Room 609  
401 M Street, SW  
Washington, DC 20460

**Permit Documentation**

**U.S. Army Corps of Engineers**

**Tracking Wetlands: The Section 404 Regulatory Program**

Mr. E. Zell Steever  
Office of the Chief of Engineers, CECW-OR  
20 Massachusetts Avenue, NW  
Washington, DC 20314



National Oceanic and Atmospheric Administration

Testing the Effectiveness of Interaction with the Corps of Engineers Regulatory Program

Mr. John R. Hall  
National Marine Fisheries Service  
Office of Protected Resources  
1335 East West Highway, Room 8240  
Silver Spring, MD 20901

The National Marine Fisheries Service Habitat Conservation Efforts Related to Federal Regulatory Programs in the Southeastern United States

Mr. Andreas Mager, Jr.  
National Marine Fisheries Service  
Southeast Regional Office  
9450 Koger Boulevard  
St. Petersburg, FL 33702

U.S. Fish and Wildlife Service

Follow-up Evaluation Efforts of the U.S. Fish and Wildlife Service:  
Section 10 and 404 Permits

Dr. Warren T. Olds, Jr.  
Region 4  
75 Spring Street, SW, Suite 1276  
Atlanta, GA 30303

**APPENDIX B: HABITAT LOSS AND  
MODIFICATION WORKING GROUP**

**HABITAT LOSS AND MODIFICATION WORKING GROUP**

**CO-CHAIRS:**

Dr. John D. Buffington  
Regional Director for Research and Development  
U.S. Fish and Wildlife Service  
U.S. Department of the Interior  
18th and C Streets, NW, Room 3245  
Washington, DC 20240  
202/208-6394 (FAX: 202/208-4674)

Dr. Ford A Cross  
Laboratory Director  
Beaufort Laboratory, Southeast Fisheries Science Center  
National Marine Fisheries Service  
National Oceanic and Atmospheric Administration  
Beaufort, North Carolina 28516-9722  
919/728-8724 (FAX: 919/728-8784)

**COORDINATOR:**

Ms. Sari J. Kiraly  
Ecologist  
National Ocean Pollution Program Office, CS/OP  
National Oceanic and Atmospheric Administration  
Universal Building, Room 625  
1825 Connecticut Avenue, NW  
Washington, DC 20235  
202/606-4243 (FAX: 202/387-8945)

Mr. Frank Baxter  
Chief, Office of External Coordination  
National Mapping Division  
U.S. Geological Survey  
590 National Center  
Reston, VA 22097  
703/648-5112 (FAX: 703/648-5585)

Mr. John W. Bellinger  
Environmental Planner  
Office of Environmental Policy, CECW-RE  
U.S. Army Corps of Engineers  
20 Massachusetts Avenue, NW  
Washington, DC 20314-1000  
202/272-0130 (FAX: 202/272-1163)

Dr. Virginia Carter  
Biologist  
Water Resources Division  
U.S. Geological Survey  
430 National Center  
Reston, VA 22092  
703/648-5897 (FAX: 703/648-5274)

Mr. Don Field  
Marine Resource Specialist  
Ocean Assessments Division  
National Ocean Service, N/OMA31  
National Oceanic and Atmospheric Administration  
6001 Executive Boulevard, Room 305  
Rockville, MD 20852  
301/443-0453 (FAX: 301/984-9356)

Dr. Robert Middleton  
Marine Biologist  
Branch of Environmental Operations  
Minerals Management Service  
U.S. Department of the Interior  
Mail Stop 644  
381 Elden Street  
Herndon, VA 22070  
703/787-1737 (FAX: 703/787-1010)

Ms. Dorene Robb  
Environmental Protection Specialist  
Office of Wetlands Protection  
U.S. Environmental Protection Agency  
A-104F  
401 M Street, SW  
Washington, DC 20460  
202/245-3906 (FAX: 202/475-8000)

Mr. Michael Slimak, Deputy Director  
Office of Environmental Processes and  
Effects Research  
and  
Mr. Steve Cordle, Team Leader  
Office of Environmental Processes and  
Effects Research  
U.S. Environmental Protection Agency  
RD-682  
West Tower, Room 609  
401 M Street, SW  
Washington, DC 20460  
202/382-5950 (FAX: 202/382-6370)

Dr. John Sutherland  
Ecological Specialist  
Office of Oceanic Research Programs  
National Sea Grant College Program  
Oceanic and Atmospheric Research  
National Oceanic and Atmospheric Administration  
1335 East West Highway, Room 5226  
Silver Spring, MD 20910  
301/427-2435 (FAX: 301/427-2799)

Dr. Billy M. Teels  
National Biologist  
Soil Conservation Service  
U.S. Department of Agriculture  
South Agriculture Building, Room 6144  
P.O. Box 2890  
Washington, DC 20013  
202/447-5991 (FAX: 202/447-2646)

Dr. Bill Wilen  
Fish and Wildlife Biologist  
National Wetlands Inventory  
U.S. Fish and Wildlife Service  
400-ARLSQ  
U.S. Department of the Interior  
18th and C Street, NW  
Washington, DC 20240  
703/358-2201 (FAX: 703/358-2232)