97th Congress
2d Session

COMMITTEE PRINT

WETLAND MANAGEMENT

A REPORT

PREPARED BY THE

ENVIRONMENT AND NATURAL RESOURCES POLICY DIVISION

OF THE

CONGRESSIONAL RESEARCH SERVICE

OF THE

LIBRARY OF CONGRESS

FOR THE

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS

U.S. SENATE

JULY 1982

SERIAL NO. 97-11

Printed for the use of the
Committee on Environment and Public Works

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United States Senate
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WASHINGTON, D.C. 20510

July 1, 1982

Mr. Gilbert T. Gude
Director
Congressional Research Service
Library of Congress
Washington, D.C. 20540

Dear Mr. Gude:

Both the Congress and the Executive Branch are examining issues related to reauthorization of the Clean Water Act. Among the issues of interest are the Act's Section 404 dredge and fill permit program and, more broadly, management of the nation's wetland resources.

I would like to inquire whether the Congressional Research Service would be in a position to develop a wetlands management report--one designed to be of assistance to those of us engaged in the examination of these problems and programs. If so, it seems to me that such a report might well include:

(1) discussion of the nation's wetland resources, their functions and values, and impacts of typical activities on wetlands;

(2) review of current Federal programs (particularly Section 404 of the Clean Water Act), and also of State programs relating to wetlands; and

(3) review of past Congressional action with respect to wetlands legislation.

It would also be useful to the Committee if your analysts could summarize pro and con views on such topics as the scope or coverage of the Section 404 program, the roles and interaction of Federal agencies, roles of the Federal Government and the States in managing wetlands, and research activities aimed at studying and defining wetlands.

I understand that this proposal has been discussed with Claudia Copeland and Jeffrey Zinn of the Environment and Natural Resources Policy Division of CRS, who have expressed the view that public discussion would benefit from a coherent examination of these issues as well as their interest in pursuing this opportunity.

The Senate Committee on Environment and Public Works has scheduled hearings in late July on reauthorization of the Clean Water Act, so that your early response could be especially worthwhile.

Sincerely yours,

Robert T. Stafford
Chairman

RTS/BG

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

LETTER OF SUBMITTAL

July 6, 1982

Honorable Robert T. Stafford
Chairman
Committee on Environment and Public Works
U. S. Senate
Washington, D. C. 20510

Dear Mr. Chairman:

In response to your request, I am pleased to submit the report, Wetland Management.

The first chapter summarizes pro and con views on several issues that may arise during congressional debate about wetlands, including the scope and coverage of the Clean Water Act Section 404 program, the roles and interaction of Federal agencies in wetland management, roles of the Federal Government and the States in managing wetlands, and research activities aimed at defining and evaluating wetland resources. The remaining four chapters provide background information on these issues.

The report describes the status of our knowledge about wetlands -- the general characteristics of wetlands, functions that they perform, and effects of activities that alter wetlands. It also examines two alternative viewpoints on wetlands: those of scientists, who emphasize the functions and values of diverse wetland resources, and those of regulators, who focus on elements that are common to all wetlands. The report describes Federal wetland programs, particularly regulatory programs under Section 404 and related authorities, as well as other wetland acquisition and protection programs. It examines varied approaches to wetland management developed by State and local jurisdictions in recent years, discussing similarities and differences between some of these State programs and the Federal regulatory program. The report concludes with a review of Federal wetland legislation considered from the 93rd Congress (1973-1974) up to the 97th Congress.

The report was prepared by Dr. Jeffery A. Zinn and Claudia Copeland of the Environment and Natural Resources Policy Division. Mrs. Rosemary Panzenbeck and Mrs. Arlette Gillis of the Environment and Natural Resources Policy Division typed the manuscript.

We hope this report provides valuable information that will assist congressional examination of these issues.

Sincerely,

Gilbert Gude
Director

Congressional Research Service
The Library of Congress

Washington, D.C. 20540

WETLAND MANAGEMENT

Dr. Jeffrey A. Zinn
Specialist in Natural Resources Policy
and
Claudia Copeland
Analyst in Environmental Policy
Environment and Natural Resources Policy Division
July 2, 1982

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TABLES AND CHARTS

INTRODUCTION

Wetlands have been of high interest in Congress, as measured by the number of bills introduced in the recent past. This interest can be traced to growing conflict between two viewpoints about wetlands. The first viewpoint is that wetlands are of high value, if left unmodified, and typically perform numerous desirable services, from providing habitat to water purification and flood control. The second viewpoint is that many wetland areas could be better-used for other purposes, but alteration is hindered by inflexible management at the Federal level, sustained and augmented by judicial decisions. Some believe that the regulatory program unfairly limits personal property rights and usurps the traditional prerogatives of land use planning at the local level. Seen from this viewpoint, the potential values of natural wetlands are usually outweighed by benefits to be derived from alteration to support other uses.

Both viewpoints have been strengthened since the most recent protracted debate on wetlands that accompanied reauthorization of section 404 of the Clean Water Act in 1977, and have generated growing controversy. The first point of view has been reinforced by scientific research projects and publications about different functions of all types of wetlands; the second has been reinforced by agency and court decisions that continue to support a broad definition of wetland areas, and at the same time provide little latitude for direct or indirect modification once an area has been defined as a regulated wetland. As a result of the increased support for both of these two positions, a large number of wetland-related bills have been introduced, many having

provisions which address the definition of wetland areas to which the section 404 dredge and fill permit program should apply.

Congress is considering reathorizing the Clean Water Act in 1982. One of the most contentious issue areas is likely to be the section 404 permit program. Topics of debate will include geographic coverage under section 404, our present understanding of wetlands and their values, whether a Federal wetlands law is needed, whether the Clean Water Act or some other law is the appropriate vehicle, and possible changes in the present relationship among Federal, State, and local governments in the management of wetland areas.

Another impetus to Congressional consideration of wetlands issues is the proposals of the Presidential Task Force on Regulatory Reform to modify the section 404 program. The Task Force announced five initiatives on May 7, 1982 to streamline this program. These initiatives will be implemented through administrative, rather than legislative channels. They include: simplifying multilevel permit reviews, expanding use of general permits, increasing the role of states in the permit program, reducing conflicting and overlapping policies, and clarifying the scope of the permit program. Congress may want to consider these initiatives in a legislative context.

This report provides background information that should be helpful in this debate. The first chapter defines and briefly reviews issues of likely interest in Congress during the anticipated wetland debate in 1982, summarizing pro and con arguments for each issue. The second chapter examines the status of wetlands from a scientific viewpoint; it includes a review of the status of the Nation's wetland resources, current views on their functions and values, and impacts of typical activities on wetlands. The third chapter reviews the array of Federal programs that address wetlands, with particular attention to the development and status of the section 404 dredge and fill permit program. The fourth

chapter reviews State and local programs which have been developed to manage wetland resources. The fifth chapter takes a closer look at congressional interests in wetlands during the past five Congresses (since 1973), with emphasis on the legislative history of the section 404 program.

This report provides an overview of available information. Each chapter contains numerous references to more detailed analyses. This document is designed to help Congress focus on the policy questions; other sources should be consulted for additional information on specific wetland topics.

CHAPTER I: WETLAND ISSUES NOW FACING CONGRESS

INTRODUCTION

Congress may examine a number of issues while it is considering reauthorization of the Clean Water Act and other wetland legislative initiatives that have been introduced in the 97th Congress. Brief discussions of each issue are presented in Chapter I. They are cross-referenced to more detailed information and analysis in Chapters II through V. These issues fall into three categories: wetland science, wetland law, or Federal/State relations. Discussion of each issue includes a definition, followed by a brief presentation of contrasting points of view. Neither the issue statements nor the discussion represent conclusions or opinions of the Congressional Research Service. These points of view have been expressed by individuals involved in wetland management and wetland science.

Wetland management is primarily concerned with whether an area is a wetland; if it is then certain rules apply. Wetland science is concerned with variations among wetlands, and tends to include within its boundaries of study the broadest possible array of areas. These alternative perspectives are a main source of divergent views. The regulatory programs attempt to balance these views. Differences among State regulatory programs, and between these programs and the Federal program are expressions of how these divergent views are implemented.

The following issues are addressed in the remainder of Chapter I.

Wetland Science

1. Should Federal funding for wetland research be increased?

2. In conducting research activities, should emphasis be given to studying freshwater wetland resources?

3. Should future research activities be aimed at defining and evaluating the economic value of wetlands?

Wetland Law

1. Should the area covered under the present section 404 program be reduced?

2. Should some wetlands, by virtue of size, location, or other factors, be excluded from a national resource management program or be managed differently?

3. Should the statutory relationship between the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers under the Clean Water Act's section 404 program be revised to give the Corps a clear leadership role?

4. Should Congress clarify national goals for a wetland management program through some other legislative vehicle than a water pollution control law?

5. Should Federal law define the requirements for mitigation of adverse impacts on wetlands as habitats and restoration of altered wetlands, which currently are in the form of policy of the Fish and Wildlife Service (FWS)? Should those requirements be extended to other Federal agencies, as well?

6. Should the process of section 404 permit review be streamlined?

State/Federal Relations

1. Should States be given a stronger role in managing the nation's wetland resources?

2. Should section 404 be revised to authorize delegation of wetland management authority by States to local governments?

3. Should State wetland programs be required to conform to a uniform national definition of wetlands for regulatory purposes?

4. Should the national wetlands inventory be used as the basis for determining wetland boundaries under the regulatory program?

WETLAND SCIENCE

Issue 1

Should Federal funding for wetland research be increased? Many persons contend that wetlands management efforts would be improved if there were increased understanding of biological, chemical, and hydrological functions of various types of wetlands, understanding that could best be provided as a result of additional research activities. Other persons counter that we know enough about wetlands now to make sound management decisions and that additional research at this time is unlikely to provide a justifiable return, in terms of improved management capability.

Pro

Many persons support the concept of additional wetlands research as a means of improving wetlands management. In particular, these persons argue that additional research can help to determine how to minimize adverse effects of altering wetlands before pressures to convert these areas to other economic uses actually result in loss of valued resources. For example, before about 1970, most wetland research was concentrated in coastal areas. As the Federal and State coastal zone management programs developed during the 1970s, they have been able to take advantage of the products from wetland research projects to place management of wetland resources within a broader context of

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coastal resources management. Development of knowledge and understanding at a similar level is needed for other wetland areas, a need that is reinforced by the continued rapid conversion of wetland areas.

Proceedings of recent symposia show that gains in knowledge are being made on all wetlands. Traditionally-valued functions, especially habitat for waterfowl, have a strong research heritage. But knowledge about other functions where the value could be very high, such as in waste assimilation and flood control, are limited. A modest investment in research on these topics now may save substantial Federal expenditures in public works projects in the future. (See discussion of wetland values, pages 51-54.) Scientists have developed a basic understanding of the roles wetlands can play in providing these valuable services, and a limited amount of site-specific data (see pages 44-51). More information that compares different types, sizes, locations, and conditions of wetlands is now needed.

Knowledge about other functions was gained through research. There may be additional important functions to be discovered--those discoveries would not be possible without research funds. The benefits of research are sometimes disappointing. Even when results do not demonstrate a hypothesis, the knowledge gained is useful in focusing further lines of inquiry. Wetland research has provided substantial advances in knowledge in the past 10 to 15 years--future benefits from continued research seem apparent.

Con

In response, other persons argue that we already know enough about wetlands in general to make reasonable management decisions. Increased knowledge would improve that capability, but the cost-effectiveness of substantial new research programs does not seem appropriate, especially in this time of budget

constraints. The payoff for increments of additional research is never certain, and in the case of wetlands research, even if such a program reached its goals, the payoff would be modest, these persons contend. Research results have helped solve practical problems occassionally, but often they just lead to further research and answers to obscure questions of interest to the scientific community alone.

One possible result of additional research data would be a growing justification for wetland acquisition. Increased knowledge and growing efforts to protect areas, typically by acquisition, seem reinforcing, whether the topic is wetlands or farmland or beaches. Additional acquisition, which might be stimulated by additional research on a large scale, is not needed, nor does it appear that the Nation can afford it at this time. In a few cases, wetland acquisition may be appropriate, but in most circumstances, other forms of protection, even those that allow some modification, are more appropriate. Wetlands already receive substantial recognition for their special values, which have been identified in completed research programs.

Issue 2

In conducting research activities, should emphasis be given to studying freshwater wetland resources? Some persons take the position that freshwater wetlands are more diverse, yet our knowledge of these resource systems is more limited than is knowledge of coastal wetlands. Hence, special research attention should be paid to scientific studies of freshwater areas. Others respond that the functions and values of most freshwater wetlands are reasonably well understood today, so that there is little reason to emphasize research on one wetlands type over another.

Pro

Proponents of additional research on freshwater systems point out that before about 1970, most wetland research was concentrated on coastal areas. As Federal and State coastal zone management programs developed, those programs have been able to take advantage of the products from such research projects to place management of wetlands resources within a broader context of coastal resources.

In contrast, our knowledge and understanding of non-coastal wetland areas is considerably less, although it is these areas that are under the greatest pressure for conversion. State and regional surveys have repeatedly shown that losses in many freshwater areas have been high and accelerated from past levels in recent years. (See discussion of wetlands inventory, pages 65-66.) But relatively little is known about freshwater wetlands. They are more diverse than coastal wetlands. Consequently, research results from one wetland type generally are not transferable to draw conclusions about nearby wetlands of another type. Only with increased and focused research can these functions and their values in the diverse array of freshwater wetlands be understood. Freshwater wetlands need to be studied just as coastal wetlands have; a result of such studies should be recognition of high values, where appropriate, and difficult degrees of protection under different circumstances.

Some of the largest conflicts over wetlands management decisions seem to occur where research information is limited. Agencies charged with protecting these resources will tend to be more skeptical of proposed changes if data are lacking. Research results can provide a base for informed dialogue between opposing points of view, especially when a strong protection program is competing with a major development proposal.

Research is especially needed in areas where wetlands are scarce, where they can perform particularly important functions, or where a large portion of the wetland resource has already been lost. In a period of scarce research funds, it is probably more important to increase work on fresh water wetlands that are disappearing rapidly. One goal of research should be to gain enough knowledge so that the functional value of all types of wetlands can be compared. This capability would greatly enhance the decision-makers' capacity to reach sound conclusions.

Con

Other persons counter that the functions and values of most freshwater wetlands are already generally understood. Additional research would refine our knowledge, but not at a level commensurate with dollars spent. Without special incentives, freshwater wetlands research has increased greatly in the past few years. Knowledge about freshwater wetlands is growing rapidly. Scientific research has already produced a number of significant results. There appears to be sufficient information on most of these areas to allow managers to make informed decisions. Additional information may be of interest to scientists, but it is less clear that it would provide incremental benefits to managers.

If any special priority is to be given, perhaps it should go to research on special wetlands in a natural condition. These areas include small wetlands, edge zones of wetlands, heavily modified wetlands, and created wetlands. These types of areas appear to have different values from large, unmodified wetlands. We need to learn more about these values, and whether valuable natural resources are being lost when additional modification occurs.

Issue 3

Should future research activities be aimed at defining and evaluating the economic value of wetlands? Some persons contend that wetland management might be assisted by improved capability to translate the multiple functions of wetlands into economic values which might then be utilized in management decisions. Others take the position that, in dealing with resources as varied as wetlands, it probably is not feasible and may not be desirable to emphasize economic values above scientific considerations.

Pro

Some persons assert that the best decisions for society about resources are typically made in economic terms. Economic terms should serve as a common baseline for comparing alternatives, they say. While scientific investigation of wetlands has been extensive, relatively little attention has been given to improving valuation capabilities. Even for those wetlands where a great deal of scientific research data are available, translation into economic terms has usually not occurred. (See discussion on problems of valuation, pages 52-53.) The figures available today are fragmentary. Economists disagree on the best approach. Efforts to improve these capabilities will pay considerable dividends in wetland managment in the future.

Before decisions can be made using economic terms, certain improvements on present capabilities are required. They are:

1) A need for more analysis on how best to translate functions into values;

2) An ability to compare different types of wetlands, and to incorporate values based on the relative scarcity of a particular wetland; and

3) Tools to determine how proposed alterations in a portion of a wetland area will affect values in other portions of that area.

Con

Other persons oppose increased emphasis on the role of economics in wetland management. Wetland management has been based on a consideration of scientific facts within a political process. They assert that there are a number of cases in which scientific knowledge has been translated into economic terms does not appear to have affected the decision process. That process may be less effective if it is too imprecise. Further, economic considerations may be used in decisions where other considerations should be more important.

These persons argue that economic terms offer no particular advantage over scientific terms. In fact, using the economic structure may lead an analyst to conclude that values can be more precisely compared than, in fact, is possible. The problems associated with trying to attach economic measures to natural resouce values have been discussed in a number of forums. Efforts to use these measures frequently result in disagreements over procedure, rather than resolution of the actual issue in question. This difficulty of using economic measures has occurred in a number of topics in the past, most notably water resource development projects.

Finally, economic measures can only be developed based on scientific knowledge. Without the necessary base of knowledge, it will be impossible to develop supportable values. Before developing an economic analysis capability for most wetlands, considerably more scientific information is needed on each wetland type, on comparing functions, and on functional relationships among different wetlands.

WETLANDS LAW

Issue 1

Should the area covered under the present section 404 program be reduced? Legal interpretations of the Clean Water Act (FWPCA) have extended jurisdiction to waters of the United States (see Chapter V), and the Corps has consequently expanded the geographic scope of its regulatory program (see Chapter III). The desirability of applying dredge and fill permit requirements to such an extensive area, beyond the traditional navigable waters and adjacent wetlands, is in question. Proponents of narrowing the scope of section 404 argue that the current program is overly intrusive in private land use decisions, while opponents respond that valuable wetlands would be left unprotected by such a change.

Pro

Proponents of narrowing the scope of section 404 argue that the present jurisdiction is too extensive. The resulting regulatory program is an undue intrusion into traditional economic activities, including farming and harvesting of timber, and into local land use planning. If these local and private activities are restricted, the land owner is denied use of his land. The section 404 program has become a form of Federal land use control in some areas, rather than a water pollution control measure, as envisioned when enacted in 1972. In addition, this provision, as applied, does not except wetlands that may have a reduced value because they are small or have been created incidental to other activities. The result is a lack of regulatory flexibility which has caused numerous project delays and alterations that can be measured in economic costs that outweigh the apparent values of the wetlands that are protected.

Limiting the scope of the program to waters considered to be traditionally navigable, or capable of being made navigable (i.e., Phase I waters under the

current program), could have a number of administrative benefits, these persons contend, since the miles of waters regulated would be reduced by a small percentage, while the number of wetland acres regulated would be reduced by a large percentage (see pages 83-85). Such curtailment of the program would reduce the Corps' permit processing task and would enable Corps personnel to concentrate on permitting activities directly relating to navigation. In turn, this would benefit persons interested in navigation who may have suffered permit processing delays in the past as a result of the broad scope of the program. Four bills have been introduced in the 97th Congress to reduce Federal wetlands jurisdiction.

Con

Persons who oppose reducing the scope of section 404 argue that all wetland areas have a high value. The functions that combine to make up that value are becoming better understood every year. But at the same time, the Nation's wetland areas have been disappearing at a rapid rate (see pages 65-68). As more is learned about the unique functions and capabilities of wetlands, the need to protect this disappearing resource becomes more apparent. One means of protecting wetlands is protecting water quality in adjacent waterways. Protecting water quality, especially around small wetlands, may mean some special management practices on adjacent buffer areas. A policy that permits reduction of overall wetland resources would appear to be inconsistent with newly recognized facts regarding the valued services provided by wetlands in their natural condition and the rapid disappearence of such existing wetland resources, these persons contend.

Supporters of the current section 404 program hold the view that the Corps' regulatory program is an important mechanism for protecting the integrity and use of the entire aquatic ecosystem, including wetlands. This

program may be the only means of protecting the entire aquatic ecosystem, including wetlands. Moreover, it may be the only means of protecting some particular types of wetlands, such as the pocosins in North Carolina (several hundred thousand acres of freshwater wetlands concentrated in that State). At the same time, there are other wetlands, particularly bottomland hardwoods of the Lower Mississippi Valley, that are not protected under any program. Thus, it could be argued that the geographic scope of the Corps program should be enlarged, so as to encompass resources not presently protected.

Moreover, if the current program were restricted to so-called Phase I waters--those considered to be navigable in the traditional sense--it is likely that there would be reduced protection of water quality and of wetlands in the other areas no longer included, except in those few States with strong management programs.

Furthermore, it is uncertain whether major administrative savings would be achieved by narrowing the scope of the current Federal program to Phase I waters. The Corps of Engineers has reported that the majority of projects which actually experience lengthy permitting delays are, in fact, located in Phase I waters. Thus, it is unlikely that removal of Phase II and III waters from the Federal program would provide relief or time savings to large, controversial projects.

Issue 2

Should some wetlands, by virtue of size, location, or other factors, be excluded from a national resource management program or be managed differently? Some persons argue that certain wetlands (including very small wetlands, artificially created wetlands, and heavily modified wetlands) should be recognized as different from all others and should be given special treatment under

the regulatory program. Recognition might take the form of modified review procedures or complete exemption from regulatory review. Others respond that the varied functions performed by wetlands, regardless of size or location, require that they all should be afforded the protection of a uniform regulatory process intended to determine the environmental impact of any material removal or disposal project, before the project can be permitted.

Pro

Some persons contend that there should be a mechanism to exempt or modify permitting requirements for certain wetland areas of the United States. They argue that such wetlands, including substantially-altered wetlands and those created ancillary to other activities, are not critical to maintenance and enchancement of water quality in navigable waters--waters which were the original focus of the section 404 program. Further, the value of many of these areas to perform wetland functions is minimal because they are less likely to provide multiple functions such as flood control, groundwater recharge, and food chain productivity. Most State wetland programs recognize some differences by only applying to wetlands larger than a certain size and by recognizing that wetlands of differing characteristics require different levels of protection (see pages 104-105). It is inappropriate to require the same Federal review and permitting procedures for wetlands adjacent to navigable waterways and for other wetlands of limited value as well. The administrative costs of carrying out permit review for certain wetland areas are not commensurate with benefits these areas may provide. The costs are particularly burdensome to small landowners.

These persons point out that it may be possible to eliminate the time-consuming permit review procedures of section 404 for small or artifically created wetlands, as well as for others that have already been heavily modified by man's

activities in the past. One means of at least modifying the requirements might be to adopt the Corps' abbreviated permit procedures for minor projects coming only under section 10 of the Rivers and Harbors Act. Such activities can be authorized through Letters of Permission, after coordination with appropriate Federal and State agencies, but without a public hearing or administrative referral process. Extension of that section 10 process to projects in lesser wetland areas could achieve administrative and time savings but without adversely affecting the wetland environment.

Con

Opponents of modifying the regulatory process for certain types of wetlands contend that water quality is not the only function that comes under the umbrella of the Corps' public interest review. Other valued functions should continue to be equally protected by the Corps' regulatory program. Many small wetland areas and artifically created wetlands are more fragile and may have greater value than coastal wetlands. Such areas actually should be afforded greater protection, rather than less, which would likely be the case under a modified management arrangement. For example, isolated inland wetlands are more easily disturbed and permanently altered by direct and indirect changes, perhaps because of their small size and because of their separation from larger hydrologic/hydraulic systems. But these small wetlands are highly valued for waterfowl habitat. They are the principal areas of interest in the wetland acquisition programs of the Interior and Agriculture Departments, evidence of the high value of such areas (see pages 96-98).

Artifically created wetlands often have similar high value. For example, dredged material has created several thousand man-made islands, many of which are being managed for wildlife habitat. The Corps has reported that a large

number of these artificial islands, located along the Intracoastal Waterway System, shelter endangered species or provide critical habitat (see pages 60-61).

Likewise, areas such as bogs and swamps that may appear to have little tangible value, often are associated with officially listed rare and endangered species.

Finally, the functions performed by wetlands are diverse and dependent on many characteristics other than size alone (including location and condition) (see pages 35-38). It is not possible to accurately generalize about wetlands, on the basis of only one or two factors, or to conclude that some have less value.

Issue 3

Should the statutory relationship between EPA and the Corps of Engineers under the section 404 program be revised to give the Corps the clear leadership role? Because of a 1979 Attorney General's opinion, EPA currently defines the jurisdictional reach of the section 404 program, although the Corps has principal regulatory responsibilities. Some persons see this distinction as confusing and inappropriate in view of original congressional intent and long-standing administrative practice concerning the role of the Corps. Other persons support the current process of shared responsibilites and consultation and would oppose altering this relationship.

Pro

Under the current program there exist overlapping responsibilities and confu sion about which Federal agencies are involved in examining a section 404 permit application, especially when trying to untangle the complex interagency review processes called for in the Act (see pages 88-95). According to some

persons, the result can be delayed permit issuance, particularly in cases of complex applications--delays which may be costly to the applicant. Attorney General Civiletti's 1979 advisory opinion stating that EPA, not the Corps, should have the final say in determining the jurisdictional limits of the program, has focused attention on this issue. It raises the question not only of which agency has full regulatory authority but also of who has authority to bring enforcement actions over activities occurring in navigable waters, including the discharge and disposal of dredged material. Under the Reagan Administration, the Justice Department has not taken steps to reverse the Civiletti opinion. One reason that the Corps was given major responsibilities under section 404 in 1972 was pressure from the dredging industry and others to keep EPA out of matters concerning dredging and filling (see page 78).

Con

Other persons argue that the current Corps-EPA relationship should remain unchanged. They contend that there should be little or no confusion regarding responsibility under section 404, which is set out in the statutory provision itself, and thus no need for legislative clarification. The Attorney General's 1979 advisory opinion spelled out the Corps-EPA relationship that is already in the law, these persons say. In particular, EPA develops environmental guidelines for the Corps' use in reviewing permit requests (section 404(b)), and the agency may deny or restrict specific sites for dredged material disposal, based on determination of adverse environmental effect (sec. 404(c)). Each of these EPA activities is to be accomplished in conjunction or consultation with the Corps of Engineers. Because section 404 is, in fact, part of a water quality law, EPA's limited activities concerning water quality protection are entirely appropriate. EPA is not authorized, for example, to determine the Corps' regulatory jurisdiction under section 10 of the Rivers and

Harbors Act, a related statute and program concerned with activity occurring in waters that are navigable under the traditional definition. However, if certain administrative confusion does exist between EPA and the Corps of Engineers, it could be handled without legislative change.

Issue 4

Should Congress clarify national goals for a wetland management program through some other legislative vehicle than a water pollution control law? Some persons contend that, if a comprehensive wetland management program is desired, Congress should enact such a program directly, rather than continuing to take an indirect approach principally through section 404 of the Clean Water Act. Others respond that the current water quality approach is, in fact, comprehensive enough as a national approach to managing wetlands.

Pro

Many persons believe that the established water quality approach to wetland management has a number of disadvantages, including the following, which could be remedied by explicit wetland legislation.

1) Responsibility for wetland protection has been placed with an agency (the Corps) that has not traditionally been concerned with environmental protection and has only slowly developed the expertise to deal with complex issues of wetland science. In fact, the primary responsibilities of the Corps are water resource development and navigation (see page 77-79). The Corps has become overly-burdened by being made responsible for the additional water quality considerations inherent in section 404. It would be more sensible to locate all wetland management responsibilities in a single agency that has environmental protection activities as one of its major missions, and that can interrelate water quality enhancement with other environmental goals.

2) Vast acreages of freshwater wetlands, particularly bottomland hardwoods and prairie potholes, are excluded from effective regulatory protection under the current program (see page 39). These wetlands represent a significant nonrenewable resource which should be protected by a national program, as should all wetland areas identified in the national wetlands inventory.

3) Current debate--particularly about the section 404 program--tends to concentrate on the question of which of the Nation's waterways are navigable and which waterways, therefore, should be subject to some Federal regulatory jurisdiction. Unfortunately, this focus does not set clear policy for wetland areas of the United States because navigable streams and wetlands are not always associated with one another. Consequently, the current approach fails to present national goals for a wetland management program. While wetland protection may be an indirect beneficiary of this approach, a more direct focus could involve some newer management tools including the critical area concept and special area management planning.

4) The water quality functions performed by wetlands are among the highest values of such areas. However, the section 404 regulatory program is an inefficient tool for recognizing other functions and values (see pages 77, 82). For example, under a pollution control program, it is difficult to consider the value of wetlands for migratory and waterfowl habitat, values that have been recognized in separate Federal land acquisition and conservation programs. A more comprehensive approach would allow a weighing of all functional changes when considering effects of proposed alterations.

Con

In response, other persons contend that the current water quality approach provides ample protection for wetlands and need not be revised. In fact, this approach ensures thorough consideration of activities most likely to alter or

destroy such areas, namely draining, filling, and dredging of lands adjacent to the Nation's waterways (see pages 54-59). To enact and implement a new approach, perhaps with different emphasis, would risk disruption of programs that have been reasonably successful in identifying and protecting valuable wetland areas (see pages 88-93 for summary of permit program). Implementation of a new program also would require identification of which wetlands would be included, definition of agency responsibility, and decisions on other program details that could disrupt ongoing efforts. Furthermore, the alternative to the current approach preferred by some persons--Federal land use planning and management--has so far proven to be unacceptable to many groups and individuals. Interest in Federal land use legislation peaked in the early 1970s, and at the present time it seems unlikely that Congress and the general public would endorse moves in that direction.

Despite the Corps' traditional focus on water resources and navigation, these persons point out that since 1977 the Corps has increasingly accepted responsibility for additional areas of interest, including the environment (see pages 78-88). The composition of the Corps' staff has changed, and more recent hirings include personnel having ecological science background. These experts now form a large portion of Corps of Engineers staff involved in permit processing evaluation. That fact, coupled with high levels of involvement by EPA, the Fish and Wildlife Service, and the National Marine Fisheries Service, help to assure consideration of environmental protection issues during review of section 404 permit applications.

Issue 5

Should Federal law define the requirements for mitigation of adverse impacts on wetlands as habitats and restoration of altered wetlands, which currently are in the form of policy of the Fish and Wildlife Service, and extend

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those requirements to other Federal agencies, as well? Some persons contend that giving statutory basis to this policy would promote interagency consistency and elevate the stature of the mitigation concept when agencies review a dredge or fill permit application. Other persons respond that the policy could be adopted administratively by other Federal agencies, without any need for statutory change, and could thus be applied flexibly, depending on a specific situation.

Pro

In January 1981 the Fish and Wildlife Service adopted a mitigation policy for making recommendations on proposed actions that may adversely affect habitat (see page 54). The policy has two principles: (1) either avoidance of the activity or compensation for the impact should be recommended in the case of highly valued habitat resources; and (2) the degree of mitigation requested should correspond to the value and scarcity of the habitat at risk. Proponents argue that giving statutory basis to the current Fish and Wildlife Service policy could overcome a number of current limitations. First, the policy applies only to the Service; other agencies having major wetland review responsibilities, such as the Corps, EPA, and the National Marine Fisheries Service, do not have similar requirements. The value of this policy in enhancing the Nation's dwindling wetland resources has already been demonstrated in several cases. However, this limitation of the policy to a single agency tends to be uneven within the Federal community, sometimes leading to interagency conflict.

Second, giving the policy statutory basis could also succeed in broadening its current focus, which is now mitigating losses of fish and wildlife habitat. Other possible impacts on proposed actions, on public health or heritage values,

for example, are not specifically included. Moreover, the policy does not provide for consideration of other functions in wetland areas, such as flood control, groundwater recharge, or nutrient productivity, which may be as highly valued but may also be incompatible with wildlife habitat in some cases (see page 50). Involving other agencies and their programmatic coverage in wetlands could enlarge application of the mitigation program to include these additional functions.

Third, the definition of mitigation incorporated in the policy statement was derived from Council on Environmental Quality regulations for implementing the National Environmental Policy Act. Lacking a statutory basis, the definition of such an important concept is likely to be subject to considerable debate and challenge. This has been true, for example, of the term "wetlands," which has had various judicial and regulatory interpretations, but no statutory definition.

Finally, Congress has had no formal role in formulating the Fish and Wildlife Service mitigation policy. Considering the importance of the issues involved--making recommendations that may alter landowners' and developers' plans and affect land values--there is major interest in the policy, which should be reviewed by Congress and, if judged appropriate, authorized in law.

Con

Other persons take the position that it would be unwise to define in law the roles of wetland mitigation and restoration. Doing so could prove to be overly restrictive in view of the variability of wetland types and their functions.

First, an administrative policy offers greater flexibility, both for developers (project applicants) and Federal agencies. With flexibility, the agency can respond more easily to case-by-case differences, which frequently

arise in plans that may affect wetlands, and to any changing national views about the need to protect wetland areas. Explicit legislative language might be so rigid as to hinder the agency from considering situations that are exceptions.

Second, although the Fish and Wildlife Service is the only agency that so far has adopted an explicit mitigation policy, others could do so, in order to mitigate damage to other wetlands functions besides habitat. Indeed, Presidential Executive Order 11990 does require each Federal agency to minimize damage or loss of wetlands, and to protect or enhance their beneficial values (see pages 98-99).

Finally, these persons point out there is considerable public and scientific dispute about the relative functions of different wetlands types. The congressional forum may be inappropriate for resolving complex disputes about mitigating damages. While Congress might give Federal agencies general policy guidance on mitigation and restoration, the administrative agencies should continue to develop many more specific policies or rules, within their areas of expertise.

Issue 6

Should the process of section 404 permit review be streamlined? Several Federal agencies are involved in reviewing and consulting on permit applications. Frequently the result is duplication, poor interagency coordination, confusion, and delays. Some persons--particularly thoae who find themselvea "victims" of the review process--argue that administrative and legislative changes should be made to speed up the process. Opponents respond that, as currently operating, the review process is necessary to ensure environmental protection and to balance public interest considerations.

Pro

Several steps could be taken to streamline section 404 permitting. These efforts would be beneficial to small landowners who frequently cannot afford delay, as well as to larger developers who bear large costs when regulatory delays occur. The regional and national permit programs have already been helpful, and other actions could be initiated (see pages 91-92 for discussion of regional and national permits).

1) Formalize interagency coordination. The Corps could be required to enter into formal agreements with other Federal agencies to coordinate permit review and specific activities such as site inspection. A number of Corps districts have individual arrangements of this type now with some Federal agencies and with some States, as well. If extended to all districts, it would be possible to avoid duplication of efforts and achieve time savings. In specific areas where States or other Federal agencies have a comprehensive program in place, the Corps could delegate its authority, subject to a recapture provision, so that wetlands considerations are integrated into planning by the lead agency in the area (see North Carolina example, page 110).

2) Impose time limits on permit issuance. Section 404 could be amended to provide that a permit would issue automatically within 90 days after a complete application is filed, unless the Corps denies a permit within that time or determines that the proposal's magnitude requires an environmental impact statement. Such a time limitation would not only reduce an applicant's delay and uncertainty, but would also provide incentive to other Federal agencies to examine a permit request promptly. Ninety days is an appropriate limit for two reasons: first, section 404 now provides that Federal agencies should attempt to make permit decisions within 90 days, to the maximum extent practicable; and second, the Corps reports that 70 percent of all applications are, in fact,

processed within 75 days. Computerizing applications and developing programs to combine State and Federal applications are further reducing time requirements, and greater efficiencies are anticipated in the future.

3) Modify the authority of other Federal agencies to refer a disputed application to higher level officials. Under this authority, EPA or the Fish and Wildlife Service can object to the District Engineer's decision and request that the permit be elevated to higher levels in the Department of the Army (see pages 90-91, 95) Some persons contend that the referral authority tends to hold some applicants hostage: in order to avoid delays that would result from referral, an applicant may simply alter his project plan and thus satisfy the reluctant agency. Moreover, it has been argued that the referral authority results in greater consideration actually being given to environmental matters, thus unbalancing the Corps' consideration of issues within its public interest review. Finally, it may no longer be necessay to provide explicitly for referral by environmental agencies, since during the last several years, the Corps staff has been augmented with personnel fully capable of representing such interests.

Con

Opponents of streamlining say that, while it may be desirable to obtain better interagency cooperation, it would not necessarily be better to artificially limit the time for the permit review process. The current system of permit review, involving several agencies having different missions (water quality, fish and wildlife, impacts on marine species), serves to insure a balancing of the public interest. In many cases, the thoroughness of review would be reduced if a precise time limit were imposed on permit review, and it is possible that adverse effects of a project might not be fully aired. The

same problems could result if the referral authority of other Federal environmental agencies were eliminated or modified. Increasing State involvement in the permit program, national permits and other initiatives are already reducing permit processing time. If these changes provide the same levels of protection while reducing permit processing time, their value will be proven in actual experience, rather than rest on an arbitrary legislative mandate.

It also is questionable how much delay actually results from interagency review procedures. The Fish and Wildlife Service estimates that most permit applications are processed efficiently and that the average review time for a permit is brief. In addition, the Corps has reported that projects that do experience lengthy delays prior to construction frequently are waiting for more than just a section 404 permit. Many, in fact, are held up by various State and local permit decisions rather than Federal approvals.

FEDERAL/STATE RELATIONS

Issue 1

Should States be given a stonger role in managing the Nation's wetland resources, for example, by encouraging transfer of program responsibility that is now partially authorized in section 404 of the Clean Water Act or, if necessary, by developing new incentives for the States to assume these responsibilities? Many persons contend that programs for wetland protection and management are best carried out primarily by the States, which have greater familiarity with conditions within their jurisdictions. Other persons respond that wetland protection is better served by a section 404 program that is national in character, in order to ensure consistent application of resource management principles.

Pro

Proponents of transfering wetland regulatory responsibilities to the States favor reduced Federal control over land use decisions that traditionally have been the responsibility of State and local government. With program transfer, they assert, such decisionmaking could be done by officials who are likely to be most familiar with local needs and unique situations. A reduced Federal role would eliminate problems that may exist now of the Federal government second-guessing the States in areas of their decisionmaking and expertise. It would also be consistent with the New Federalism concept, which seeks to shift such program responsibilities away from the Federal level.

Certain savings are likely to be achieved as well, according to these persons. First, program transfer would eliminate problems of Federal and State duplication of paperwork during review of permit applications. Problems of duplication and even contradiction are most likely to occur in the case of States that have strong wetland protection programs authorized by their own statutes (see page 108-109, 114-116). Second, project applicants could expect benefits as a result of dealing primarily with State government rather than both Federal and State (see pages 115-116 for comments on this problem). These benefits would be in the form of reduced time delay for permit issuance and of basic administrative cost savings. Such a program would still recognize a national interest and Federal involvement for the few very large projects proposed every year that are truly of national significance.

Con

Other persons argue that the Federal regulatory role is necessary in order to ensure consistent national application of resource management principles. Many of the resources protected under the Federal program have interstate value, such as migratory fish and wildlife, which would not necessarily be as well

protected under State-based programs (see pages 45-51 for discussion of wetland functions). The Federal regulatory role may well serve to make existing State and local programs more effective and more consistant. At the same time, the decentralized offices of the Corps' 38 District Engineers provide flexibility to recognize specific State and regional needs.

Another concern of some of these persons is that greater State assumption of regulatory responsibility in these areas could result in reduced water quality and wetland protection, as well as uneven regulatory patterns among the States. For example, States with coastal wetlands have, in many cases, operated strong wetland programs (see Chapter IV), and it is likely that these States would continue their efforts. However, in the absence of a visible Federal leadership role and without adequate Federal funding support other States may be unwilling to assume added or new responsibilities, and they might conduct only a minimal program.

Finally, it is uncertain whether major time savings will be achieved in project review, particularly for large development projects, some of which have experienced lengthy permit delays. The Corps has reported that the few large projects which account for the preponderance of economic activity (commercial and industrial developments) regulated under its program would continue to fall under the National Environmental Policy Act. In addition, according to the Corps' analyses, it is frequently State and local activities, such as review and issuance of water quality certificates, that are the greatest cause of project delay.

Issue 2

Should section 404 be revised to authorize delegation of wetland management authority by States to local governments? Since States may already assume responsibility for a portion of the section 404 program, some persons contend

that is would be desirable to encourage delegation of this State authority to local governments, as well, because of strong local interest in and knowledge of wetlands within their jurisdictions. Other persons respond, however, that problems of conflicting interest, inconsistency, and administrative difficulties, would be greater under locally-managed wetland programs.

Pro

In the 1977 Clean Water Act amendments, Congress authorized delegation of section 404 authority to qualified States but provided no mechanism for delegation of the national program to local governments. However, some persons contend that there are several reasons why it may now be appropriate to do so.

Several States have wetland programs that rely on local government for implementation. In these States, such as Connecticut, the State cannot participate in the Federal program because it has delegated management responsibilities for freshwater wetlands to local government. Yet the State/local partnership, at least in Connecticut, is working well, according to a State official.

Lessons from the Federal coastal zone management program may also be instructive, according to this viewpoint. Several States with approved coastal plans are implementing them by requiring local jurisdictions to develop detailed plans that are then approved by the State. These plans become the vehicle for implementing the more general State plan. When local jurisdictions refuse to take on these responsibilities, the State steps in, but most local jurisdictions apparently prefer the option of operating their own programs. Local programs can allow for State review and involvement when the issue is of more than local concern.

The best program can occur when local officials, who know local conditions, have a strong role. States should retain an ability to intercede in a local program, just as the Federal government now can intercede in an approved State

program under certain circumstances. Based on experience with coastal zone management and other Federal programs, it may be most efficient to delegate authority to States and let them determine how that delegated authority will be allocated among the State and local levels.

Con

Other persons cite reasons why delegation to local government should not occur. Local government represents local interests. But most wetlands, even small ones, are of greater than local value. These persons contend that one result of local management would be that State and even national interests may not be properly represented. Political influences are strong at the local level, and States would have to retain a major capacity to deal with local governments and project proposals. One result might be considerable duplication between State and local efforts, just as Federal and State efforts are often duplicative, yet inconsistent, at present (see Chapter IV).

The coastal zone management experience offers some negative examples, where communities have been unwilling to participate. The result is a checkered pattern of State administration and local administration, as some communities take the initiative while others neglect this responsibility, requiring States to impose controls. Reasons to oppose this approach can be summarized as follows: local governments are subject to political influence, local governments lack technical capability, and there may be institutional or other barriers perventing the Federal government from dealing directly with local governments. Experience with other Federal resource management programs in which local governments have major rolea generally indicatea that this approach ia no panacea.

Issue 3

Should State wetland programs be required to conform to a single national definition of wetlands for regulatory purposes? Some persons contend that, because current State wetland programs utilize different definitions, all of which are at variance with the Federal definition of wetlands, it would be administratively more efficient if all were to adopt a single, consistent definition. Other persons respond that to force consistency among all programs, by imposing a single definition, would hinder the flexibility of States.

Pro

The present regulatory situation where States define wetlands using different parameters leads to inconsistencies and inequities, some persons assert. These definitions may be fine for individual State programs, but they will cause confusion for applicants if States assume responsibilities in the Federal program. It is easy to imagine an applicant's confusion when the State indicates it operates two programs (a Federal and a State wetland program) with different geographic boundaries on the same topic. Problems with the present approach derive from some States that are only managing wetlands larger than a defined size, and from soil, vegetation, and water coverage being used differently to define regulated areas in various States.

A single definition would reinforce uniform national wetland management goals. States could identify additional management goals, and additional wetland areas for purposes of attaining those goals, but the Federal-State program should provide a nationally-consistent baseline for wetlands management. This consistency may help permit applicants to be better aware of the requirements of this program. It would also improve the image of the Federal and State programs as consistent and coordinated efforts.

Con

Other persons respond that the present system works acceptably. States have defined wetlands and management goals for purposes that are different from the Federal water quality goal. Some States that have initiated a wetland program would now like to gain increased responsibilities through a stronger role in the Federal program. So long as the administering State agency can properly maintain the separated identities of these two programs, there is no reason to force consistency. The benefits to applicants would be negligible so long as the State agency can clearly indicate how, geographically and procedurally, the two programs operate, and how they overlap and differ.

The Federal program should not alter the flexibility of States to administer more, the same, or less wetlands or wetland parameters than the Federal program. The Federal government should try to encourage States to participate more actively in the Federal program; a requirement to adopt a uniform definition of key terms would be a strong disincentive. The present Federal program should remain in place in States that choose not to assume responsibilities.

Issue 4

Should the national wetlands inventory be used as the basis for determining wetland boundaries under the regulatory program? Some persons contend that the current national assessment is designed to identify all of the Nation's wetlands and, thus, is an appropriate definitional tool for the section 404 regulatory program. Other persons respond that the wetlands inventory is primarily a scientific effort, with purposes and goals that differ from those of a regulatory program, and should not be utilized for purposes of regulation.

Pro

The Federal wetlands inventory, now being conducted by the Fish and Wildlife Service is designed to identify all the Nation's wetlands. It will provide a current national assessment of wetland resources (see page 62). The inventory should be periodically updated to show changes in each of the major categories of wetlands resources. As an all-inclusive survey, it locates wetland areas that are both within and outside the jurisdiction of section 404 as the regulations currently define wetlands. Some persons argue that the inventory would be a good point of departure for determining if a wetland area is to be subject to section 404. Their view is that is an area is identified as a wetland by the inventory, then it should be regulated as a wetland, that is, making the area subject to section 404.

Con

Other persons respond that the inventory is a tool of wetlands science. Its purpose and goals are primarily scientific, while the wetland regulatory program has different goals (compare pages 61-64 to pages 79-82). Further, State programs already use different definitions for wetlands, and many of these programs even have their own inventory requirements. As with the Federal regulatory program, the key question at State and local levels is whether an area is or is not part of a regulated wetland. Therefore, the inventory should not be a major tool in the regulatory program.

The maps, covering large areas, are prepared from aerial photography. Many wetlands are located in dense vegetation or forested areas. Consequently, for reasons of scale and ground cover, boundaries can only be approximated. While these boundaries are accurate, they are not of the precision necessary to make regulatory decisions. Most regulatory proposals require a site visit or precise mapping to determine resource boundaries and predict possible

impacts. These persons point out that the inventory will be extremely valuable for wetlands scientists and as a resource survey tool; it should not be placed in a situation where it could be discredited through attempts to use it to solve regulatory questions.

The new classification system and more sophisticated survey tools show areas that have not been designated as wetlands before, for scientific purposes. The regulatory program is not going to expand because the inventory has designated additional wetland areas. Some States have found the Federal inventory to be insufficient, initiating their own efforts at determining boundaries and areas under jurisdiction. The roles of the regulatory program and the inventory should not be blurred together--to do so would discredit each effort.

CHAPTER II: WETLANDS: THE STATUS OF KNOWLEDGE

INTRODUCTION

Wetlands have characteristics that make them different from other landforms. Because of these characteristics, certain functions are provided more successfully than in other areas, functions that have considerable value. But if wetland areas are altered, they can provide still different functions of high value. In this conflicting set of choices, society has, in recent years, decided to manage and preserve more wetland areas.

Management of wetland areas requires knowledge about the qualities of this resource, about measuring and comparing functions and values found in wetlands, and about the status of these functions and values in current policy. In managing wetland resources, scientists are the knowledge brokers, managers the implementers, and policy makers the rule setters. One presumes that the rules will be most logical and the management most effective if the rules are set and wetlands managed using the best knowledge base. This chapter sets out the current status of knowledge about wetlands and discusses the implications of what is known, as well as what is not known, for wetlands management. The contribution of science to wetlands management is addressed by reviewing the functions and values which research has identified as associated with wetlands. Forms of wetland alteration are also reviewed.

DEFINING WETLANDS

General Characteristics

Swamps, tidal marshes, fens, freshwater marshes, bogs, prairie potholes--these are but a few of the many names that describe wetland areas. No single generally-accepted definition of the term wetland exists--a fact that makes public controversy more difficult to resolve. Some are sandy, intertidal areas with little vegetation, others have high water tables and grasses or shrubs, while still others are dominated by tall trees and little water is apparent from a cursory glance. But all wetlands have important unifying characteristics that distinguish them from other landscape features.

First, wetland areas are distinguished by the degree of exposure to water. Plant communities and animal populations found in wetlands are different from surrounding areas because the ground is wetter, often saturated or inundated, and the specialized plant and animal communities that succeed in wet conditions are found in this habitat. Yet wetlands vary greatly, depending in part on the pattern of wetness at individual sites. Different plant species tolerate water at different depths; some wetland plants are found where there is no visible standing water during a portion of the year. Coastal wetlands maybe inundated by tides each day. Other wetland areas may be wet seasonally. Other characteristics of water, or the hydrologic regime, that influence the nature of wetlands include temperature, water depth, and water chemistry.

Second, wetland areas lie on the margin that separates water areas from upland areas. Runoff from upland areas flows into wetlands, carrying sediments and pollutants. When adjacent water bodies flood, water elevations in wetlands are raised and the wetland community is stressed. But even in normal conditions, wetlands are influenced by inputs from both environments.

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While all wetlands have these two characteristics, they differ from site to site. Three additional characteristics, size, location and condition, further distinguish each wetland.

Wetlands vary greatly in size, from broad expanses along the Southeast and Gulf Coasts to small pockets in the arid West and the formerly-glaciated Northeast. Some large wetland areas have been the sites of large manmade alterations. One might rationalize that any recognized functions that are reduced by alteration of small portions of larger wetland areas are insignificant, since only a small part of the total area is altered. 1/ This reasoning is often inaccurate, however. Wetlands are water systems and any alteration affecting the movement or quality of water is transmitted to other areas where water movement patterns or quality are also changed.

Size does not necessarily correlate with the ability to perform the various functions associated with each type of wetland. While some of the smallest wetlands contain less complex ecosystems and may, therefore, have less overall natural value, the opposite also may be true.

The location of any wetland area in relation to adjacent ecosystems and human activities has a major influence on the functions it performs. Human activities that alter land adjacent to wetlands, such as clearing surrounding vegetated areas for agriculture or developing land as building sites, affect wetland functions. These changes alter key natural inputs that sustain wetlands, including the rate and pattern of water flow and the rate, pattern, and makeup of sediments. Wetlands most distant from developments will usually be altered least. A second aspect of location is relationships among wetland

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1/ The terms "function" and "value" are used throughout the report. "Function" means the service provided by wetlands such as habitat or flood control. "Value" is a measure, usually economic, of wetlands performing one or more functions.

types. In many coastal areas different types of wetlands are found in close proximity, exchanging materials and chemicals, and increasing the overall ecological diversity and natural productivity of the composite wetland and water system.

Condition (the degree to which a wetland has been altered by human activity) is an important variable for assessing the functional potential of wetlands. The most productive wetlands, that is areas that support large and diverse populations, are usually associated with minimal human modification. Wetlands are dynamic and transitory systems that respond easily and rapidly to external changes. Wetlands can also be manipulated to provide more of a desired function, but often at the expense of the diversity of the system's productivity. For example, the U.S. Fish and Wildlife Service has been mandated by Congress to establish wildlife refuges that provide habitat for waterfowl. In some locations this habitat has been enhanced by constructing low dams and establishing permanent shallow water areas for nesting and feeding. This change in habitat may be an improvement for the waterfowl, but it may reduce the overall wetland ecosystem's productivity.

Different types of wetlands are being altered at different rates, largely in response to local economic activities rather than determinations that wetland losses will not be significant. For example, with the accelerated demand for farmland, the prairie potholes in the Northern Plains have been drained at a fast rate in recent years. In south Louisiana, the increased pressure to locate and develop domestic sources of oil and gas has intensified efforts to modify coastal wetlands.

Given the wide variation in size, location, and condition, many distinct wetland types can be identified. A layman's list might include marshes, swamps, and potholes. Similar wetlands may have different names in various

regions. Scientists have developed a complex taxonomic structure for differentiating wetlands. For example, the Fish and Wildlife Service's current scientific classification system identifies 55 classes of wetlands and deepwater habitats. 2/ These have complex names such as tidal rocky shore, or intertidal scrub-shrub wetland.

Scientists and Wetland Managers

Two distinct interests in wetlands have evolved during the past years. One is the study of wetlands, or wetland science. The other is management of wetlands through regulations designed to control their modification, either through prohibiting or modifying changes or through enhancing certain funtions. These interests overlap considerably. Research results contribute to an understanding of wetlands that will, in theory, lead to an improved management program. Management programs have been designed to protect the functions and values articulated by scientists. These programs have become more prominent at a time when a growing number of wetland areas have been altered and when scientists are learning more about functions and values. While management programs and science often work together, they have significant differences. These differences include defining the extent of wetland areas of interest, on the one hand, and concerns for the functions and values of wetlands on the other. While both interests agree that wetlands are described by the qualities described in the preceding subsection, they define the term in different ways.

Wetland science takes an expansive and flexible approach to the subject. The most recent national scientific classification system was developed and

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2/ U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services. Classification of Wetlands and Deepwater Habitats of the United States. FWS/OBS-79/31. Prepared by Lewis Cowardin, et al. Washington, U.S. Govt. Print. Off., Dec. 1979. p. 50.

adopted by the U.S. Fish and Wildlife Service in 1980. 3/ In it, wetlands are defined as follows:

> Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes, (2) the substrate is predominantly undrained hydric soil, and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year. 4/

Federal regulatory programs 5/ 6/ take a more circumscribed view, so the area regulated is smaller than the area encompassed by the types of conditions described as wetlands for scientific purposes. These Federal programs apply only to wetlands greater than a minimum size (10 acres) and areas with water flows greater than a minimum rate (5 cubic feet per second). The definition of each area, this is, whether it is a wetland or not, is critical, having economic and other implications. The Federal regulatory definition found in the U.S. Army Corps of Engineers regulations, " describes them in the following way:

> The term "wetlands" means those areas that are inundated by surface or ground water with a frequency sufficient to support and under normal circumstances does or would support a prevalence

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3/ The U.S. Fish and Wildlife Service has interests in both wetland science and wetland management. It has traditionally been the leading Federal agency in wetland science.

4/ U.S. Department of the Interior, Classification of Wetlands, p. 3.

5/ Unless otherwise stated, all references to management programs refer specifically to the Federal permit programs administered by the U.S. Army Corps of Engineers under Section 404 of the Clean Water Act, as amended, and under Section 10 of the Rivers and Harbors Act of 1899. The complex structure of the Federal programs is discussed in Chapter III.

6/ A further confusing factor is that State and local regulatory programs, using different wetland definitions, regulate different wetland areas.

> of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds. 7/

Scientists are particularly interested in variations among wetlands. What are the functions and values of different wetland types under different conditions? For example, recent research results show tidal wetlands less important in supporting juvenile populations of commercially-valuable fish populations in southern California than in the southeastern United States. 8/ Tidal wetlands, although located in similar positions in the hydrologic systems of both regions of the country, are performing different functions at different levels. Economists and ecologists have been using this knowledge of functions to attempt to estimate the economic value of wetlands. Success in these efforts has become increasingly important as all levels of government have been confronted with the need to define more precisely why wetland areas should be protected.

Wetland managers' needs may seem less complicated. Most importantly, they must determine if a site is a wetland. When a site is determined to be a wetland, then the regulatory rules apply. (These rules have limited latitude to accommodate variations in wetland functions.) While scientists are concerned with understanding the differences in the two types of tidal wetlands described above, managers treat them in a similar way in the present Federal regulatory program. One wetland question that exemplifies the differing concerns of the scientist and the manager is determining wetland boundaries.

7/ 33 C.F.R. 323.2.

8/ Clark, John and Judith Clark, eds. Scientists' Report: The National Symposium on Wetlands. Washington, National Wetlands Technical Council, 1979. p. 11, 15.

Wetland Boundaries

Setting wetland boundaries is an especially critical issue because they determine who may be subject to regulation. Areas outside defined wetland areas are generally subject to less stringent regulation and planning standards. Pressures to define wetland boundaries can be extensive. One author noted that economic factors are extremely important:

> Although many boundary problems appear to be of a technical nature, very few really are. Almost all difficulties are directly caused by or relating to money, sometimes big money.
>
> The Problem. Three kinds of money are involved:
>
> 1. The money which the land owner expects to gain by developing waterfront property and other wetlands.
>
> 2. The money which each city or town must spend to define wetlands under the Act. [Act refers to the Connecticut State wetlands law]
>
> 3. The money which will be needed for the policing of the Act and the defense of the wetlands. 9/

A major problem with determining where boundaries should be drawn for purposes of regulation is that all areas included under a definition of wetland areas do not perform the same functions. From an ecological point of view, the wetland communities with the greatest diversity and productivity are generally of highest value. Other points of view recognize other measures of comparative value such as hydrologic recharge/discharge potential, pollution control, general economics, and aesthetics. Boundaries for each value may differ. Federal regulations recognize a number of functions that can give value to wetlands, but are silent on how these functions are to be measured

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9/ Greulich, Gunther. Problems in Delineating Wetlands Boundaries. In Proceedings: Second Wetlands Conference. Report No. 24. Storrs, University of Connecticut, Institute of Water Resources, 1974. p. 55.

in the evaluation of a permit for activities that may affect a wetland area. 10/

One group of wetland scientists made the following observation:

> An area can be considered a wetland when its value to society as a wetland is higher than when it is used for any other purpose. If wetlands are appreciated only for their dollar value then most of these areas might rapidly disappear to take the form of housing developments, dumping grounds for pollutants, filled land, etc. This definition points out sharply that no one factor, neither dollar value nor soils characteristics nor biology, should be used to define wetlands. 11/

Defining wetland areas is still a difficult legal and regulatory problem. In a 1981 U.S. District Court decision in Louisiana, the court was asked to determine what is a wetland. 12/ The judge considered wetlands based on three characteristics: frequency of inundation, soil type, and plant type. Of particular importance is that the judge determined that if water tolerant plants

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10/ 33 C.F.R. 320.4. Recognized functions, "important to the public interest," include:

(i) Wetlands which serve important natural biological functions, including food chain production, general habitat, and nesting, spawning, rearing and resting sites for aquatic or land species;

(ii) Wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;

(iii) Wetlands the destruction or alteration of which would affect detrimentally natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;

(iv) Wetlands which are significant in shielding other areas from wave action, erosion, or storm damage. Such wetlands are often associated with barrier beaches, islands, reefs and bars;

(v) Wetlands which serve as valuable storage areas for storm and flood waters;

(vi) Wetlands which are prime natural recharge areas. Prime recharge areas are locations where surface and ground water are directly interconnected; and

(vii) Wetlands which through natural water filtration processes serve to purify water.

11/ Helfgott, T.B., et al. Island wetland definitions. In Proceedings: Third Wetlands Conference. Report No. 26. Storrs, University of Connecticut, Institute of Water Resources, 1976. p. 11.

12/ Avoyelles Sportsmen's League v. Alexander, 511 F. Supp 278 (W.D.La. 1981).

define a wetland area, then their absence must define the end of the wetland area. 13/ Decisions such as this one have ramifications for large areas where it is unclear whether lands should be defined as wetlands for regulatory purposes. Of particular concern in this decision is the area known as bottomland hardwoods in the lower Mississippi basin. Some say that thousands of acres located in this area should be classified as wetlands while others say they should be classified as non-wetlands. At stake are areas that would generate high returns if they could be logged and then converted to other uses, especially agriculture.

Pressure to set wetland boundaries can also be influenced by values that vary among or within wetland areas. Past modifications, often associated with changes in water flow patterns, have reduced wetland values at many sites.

In other areas, human action has accidentally created or expanded existing wetlands which actually may have enhanced values. For example, in certain areas of the arid West, poor construction practices on irrigation canals have led to extensive seepage and a high water table, creating adjacent wetlands. Wetlands in these areas are usually of high habitat value as few alternative sites exist. Increases in knowledge about wetlands, especially when changes such as the examples cited above are being considered, have influenced the evolution of wetlands policy. Knowledge about the functions of wetlands, and measurements of value that those functions can provide are reviewed in the next section.

13/ Anonymous. Judge Scott Decides Landmark Case--What is a Wetland. In Aquanotes, v. 10, Issue 2. Louisiana State University, Sea Grant College Program, June 1981. p. 1-3

WETLAND RESOURCES

Functions of Wetlands

Wetland functions, the beneficial roles for which wetlands may be valued, have been described extensively by scientists. The values of these functions, individually and in composite, have been articulated by policy makers and the public as rationale for protecting wetlands. The result has been a sometimes confusing justification for halting conversion of wetlands to other uses on national, State, and local levels. The functions that scientists generally attribute to wetlands are reviewed below. It is important to remember that all functions are not reinforcing, and some are incompatible. A leading wetland scientist noted the variability among wetland functions:

> Each state and federal regulatory program does not recognize or protect all functional values of wetlands. When viewed collectively, however, these programs recognize values of wetlands that involve flood control, storm damage, water quality, fish nursery, nutrient productivity, groundwater supply, visual-cultural values, and wildlife. It is widely accepted, but not well specified by scientific documentation, that each wetland functions neither to provide all of these values nor any of them equally. 14/

The functions of wetlands can be variously described. A recent national conference of wetland scientists was organized around the following functions: food chain, habitat, hydrologic and hydraulic, water quality maintenance, and harvest and heritage. 15/

14/ Larson, Joseph S. Wetland Value Assessment--State of the Art. In National Wetlands Newsletter, v. 3, no. 2. Washington, Environmental Law Institute, March-April 1981. p. 5.

15/ Greeson, Phillip, John Clark and Judith Clark (eds.). Wetland Functions and Values: The State of Our Understanding. TPS79-20. Minneapolis, American Water Resources Association. 1979. 674 p. and Clark and Clark, Scientists' Report, 129 p.

Food Chain

The food chain (relationships between production and consumption of plants and animals) in wetlands, as in all ecosystems, is based on primary productivity, in which plants produce plant tissue through photosynthesis. A portion of the tissue is consumed by animals while the plants are living and another portion is consumed after plants die. Wetlands are among the most productive ecosystems in the world. Wetlands along the East Coast produce about 5 to 10 tons of organic matter per acre annually. By comparison, moist agriculture produces 1.5 tons to 5 tons per acre annually, dry agriculture produces 0.3 tons to 1.5 tons per acre annually, and coastal waters (estuarine and nearshore areas) produce 1.0 tons to 1.5 tons per acre annually. 16/

Only a few studies have compared food chain values in different wetlands. One study of two large drainage systems with extensive wetland areas along the Gulf Coast of Florida, the Apalachicola and the Apalachee, concluded that the food webs in the two systems which appear to be similar in terms of hydrology and physical characteristics were different. The chief researcher determined that these differences were caused by a number of factors.

> Overall, these studies indicate that hydrologic cycles and wetland functions which mediate peak inflow and material transport can control macro and micro-habitat distribution in the coastal bay ecosystem, as well as nutrient flux and productivity. The form and composition of wetlands-related foodwebs may be the result of combinations of individual population strategies and physically controlled biological interactions...Within specific spatial and temporal boundaries, upland (fresh water) wetlands are inextricably linked, directly and indirectly, with riverine and near-shore productivity. 17/

16/ Teal, John and Mildred Teal. Life and Death of a Salt Marsh. Boston, Little, Brown and Co., 1969. p. 196-197.

17/ Livingston, Robert J. and Orie L. Loucks. Productivity, trophic interactions and food-web relationships in wetlands and associated systems. In Greesen, Clark and Clark (eds.), Wetland Functions and Values, p. 114. Robert Livingston studied both systems for six years.

Most productivity studies have been undertaken in coastal areas, especially along the Southeast and Gulf Coasts. Few freshwater systems have been investigated for productivity. Scientists are still debating a number of basic questions, including total system productivity relationships between primary production and individual species of commercial importance--oysters and finfish species for example, and relationships between changing wetland plant communities (successional stages) and productivity. 18/

Habitat

Wetlands may provide a wide variety of animals with food, breeding sites, resting areas, nesting materials or sites, moulting grounds, or protection from weather or predators. Some animals depend on wetlands for all these functions while others may use them for just one or two, or only during a portion of their life cycle. The pattern of use, including time and specific site needs within a wetland, makes it difficult to calculate the composite value of wetland habitat. Habitat function is also affected by surrounding land uses, natural changes in wetlands over time and the species diversity and carrying capacity of each wetland type.

Habitat for fish has been most extensively studied along the East and Gulf Coasts. In 1980, an estimated 62.7 percent of the 6.7 billion pounds of commercial fish caught by American fishermen was dependent on estuarine areas, and wetlands are a key source of nutrients in most estuaries. 19/ Some regional catches, such as those from the South Atlantic and Gulf Coast

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18/ Clark and Clark, Scientists' Report, p. 8-9.

19/ U.S. Department of Commerce. National Oceanic and Atmospheric Administration. National Marine Fisheries Service. Fisheries of the United States, 1980. Current Fishing Statistics, No. 8100. Washington, U.S. Govt. Print. Off., 1981. p. 11.

fisheries, were estimated to be more then 90 percent estuarine-dependent. 20/ Vegetative wetlands provide nursery and feeding areas for a large number of species. Knowledge about wetland functions for fisheries in fresh water areas is spotty and confined mostly to the Great Lakes.

Enhancement of waterfowl may still be the strongest force behind wetland protection in this country. One scientist has noted that salt marshes are the home of up to 60 species of birds, and that 200,000 waterfowl are produced in the best years in eastern coastal marshes and 700,000 in the marshes bordering 14 southern coastal States. 21/

Wetlands may be most important for habitat where they are least common and animals have no alternative sites. The importance of small prairie marshes to ducks has been demonstrated in research. 22/ When scarce wetlands are lost as habitat, the migratory bird populations may decline because alternative potential habitat is not available.

Wetlands also provide necessary habitat for many rare or endangered plant and animal species identified by the U.S. Fish and Wildlife Service. More than half of the areas identified as critical habitat under provisions of the Endangered Species Act involve wetland areas. 23/ In addition, wetland areas

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20/ Chapman, Charles R. Freshwater Discharge. In John R. Clark, ed. Coastal Ecosystems Management. New York, John Wiley and Sons, 1977. p. 635.

21/ Niering, William A. Salt Marshes. In John R. Clark, ed. Coastal Ecosystems Management. New York, John Wiley and Sons, 1977. p. 701.

22/ Clark and Clark, Scientists' Report, p. 34.

23/ Hirsch, Allen. Wetland Protection Programs of the U.S. Fish and Wildlife Service. In National Wetlands Protection Symposium Proceedings. FWS/OBS-78/97. U.S. Department of the Interior, Fish and Wildlife Service, Office of Biological Services. Washington, U.S. Govt. Print. Off., 1978. p. 113-114.

directly support a large and diverse community of invertebrates and vertebrates, including beaver and other fur-bearers, and, indirectly, animals that inhabit adjacent upland areas but use the wetlands as a source of food and water. The condition of wetland habitat is important for these animal populations.

Hydrologic and Hydraulic

Hydrologic and hydraulic functions of wetlands include damping floods, stabilizing shorelines or absorbing the destructive energy of storm waves, and recharging groundwater sources. Different types of wetlands vary widely in their ability to carry out these functions.

Controlling floods may be the most important wetland function on a national basis. Wetlands can serve as basins that both detain and retain flood waters. Their effectiveness depends on their size and location in the drainage basin, as well as on the hydrologic characteristics of the entire basin. Wetlands are most effective during floods of high intensity and short duration. Statistical studies have shown that if a watershed has 15 percent of its area in wetlands or lakes, peak flow will be 60 to 65 percent lower than if no wetlands or lakes are present. 24/ Case studies have been conducted at several sites. Perhaps the best-known is in the Charles River basin in Massachusetts, where the Corps of Engineers decided to acquire and protect more than 8,000 acres of wetlands because it was more cost-effective for flood control than channelizing 10 miles of the river at an estimated cost of $30 million. 25/

24/ Clark and Clark, Scientists' Report, p. 54.

25/ Larson, Wetland Value Assessment, p. 5.

Shoreline erosion control can be an important function, especially adjacent to large water bodies in coastal areas. Many of the plant species found in wetland areas dampen the intensity of waves and dissipate their energy. They also slow the rate of water flow, trapping sediments. Scientists debate under what conditions wave energies prevent establishment of wetland areas along exposed coasts and how effective these areas are, in fact, in controlling erosion. 26/

Wetlands have an important role in groundwater recharge. For example, one of the principal identified functions of the Pine Barrens, an area of swamps and forest in southern New Jersey, is as a water source stabilizing an aquifer of immense dimensions. 27/ However, not all wetlands recharge groundwater, and some actually discharge water, especially in coastal areas.

Water Quality Maintenance

Water flow is slowed when passing through wetlands, allowing increased sedimentation and some absorption of pollutants. One scientist summarized these processes:

> In the anaerobic soils of wetlands, denitrification removes nitrogen from the water and during the growing season, plant uptake of nitrogen and phosphorous removes the nutrients from water passing in and through wetlands. 28/

Major mechanisms for removing waste include filtration, sedimentation, anaerobic decomposition, and biological assimilation. Each operates differently in different types of wetlands. For example, in most tidal wetlands, wastes are assimilated during the summer growing season only, but in wetlands of central Florida, nitrogen is assimilated throughout the year. Wetlands have

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26/ Clark and Clark, Scientists' Report, p. 62-64.

27/ Representative William Carney has introduced a bill, H.R. 5362, to protect the eastern portion of Long Island, also a groundwater recharge area.

28/ Larson, Wetland Value Assessment, p. 6.

widely varying assimilative capacities and some re-release of wastes also occurs. Plants can also take up heavy metals, toxic chemicals, and other waste materials. 29/ Some small wetland areas are being used for waste treatment; scientists are closely following these experiments.

The ability of wetlands to treat wastes varies with the wetland's condition. Stressed wetlands usually have diminished capacities, and further introduction of waste increasingly stresses the overall system. Waste assimilation reduces other functional values, especially for living resources. Waste assimilation capacity of wetlands also varies with "time (diurnal, seasonal, historical) and water flow distance," according to a recent review of the scientific literature. 30/

Harvest and Heritage

Harvest functions are difficult to define because wetland boundaries are not respected by many of the harvestable resources, such as fish and fur bearers, and because timber resources lie on both sides of wetland boundaries. Harvesting includes recreational activities, especially hunting and fishing, as well as commercial activities. The potential yield of a wetland can be estimated as a composite of all harvestable resources present in optimum proportions. Actual catch figures are lower than the potential yield. Many studies have been published on individual resources, such as ducks, crab or mink, but there are no data on the composite harvest for all plants and animals of commercial and recreational value in a wetland site or wetland type. 31/

29/ Clark and Clark, Scientists' Report, p. 90-94.

30/ Kadlec, Robert H. and John A. Kadlec. Wetlands and Water Quality. In Greeson, Clark and Clark, eds. Wetlands Functions and Values, p. 451-452.

31/ Ibid., p. 102.

The heritage function of wetlands has received some attention in literature and lore. The human experience in wetlands such as canoeing, and the high recognition of habitat for endangered species convey these values. The size of the wetland for these functions is usually less important than location. A small but accessible and productive wetland in an urban area may have a high value to many people. The value of heritage functions is subjective, but presumed to increase as the resource becomes increasingly scarce, or as the public grows increasingly interested in the functions unique to wetland areas.

Value of Wetlands

Increased knowledge about wetland functions and the value of wetlands to perform certain beneficial services has led to the development of several evaluation techniques. A recent study prepared for the U.S. Water Resources Council surveyed evaluation methods presently in use around the country. 32/ The researchers found that all the methodologies addressed one or more of the following wetland functions: habitat, hydrology, recreation, agriculture/silviculture, and heritage features. Most of the evaluation techniques yield qualitative, rather than quantitative, results. At least two major different points of view are identified in the various evaluation efforts--biological and economic. One reason for the large number of different approaches and a general reliance on qualitative methods is an inability to evaluate categorically wetlands according to physical classification, type, or location. For now, the best capability appears to be individual evaluations of a specific site based on observed functional capabilities. Determining whether wetlands

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32/ Lonard, Robert I., et. al. Analyses of Methodologies for the Assessment of Wetland Values. (final draft report). Vicksburg, U.S. Army Engineers, Waterways Experiment Station, 1981. 121 p.

will continue to perform desired services or maintain their functional value over an extended period of time cannot be measured at this time and the answer probably varies with the size, location and condition of each wetland.

The different methods of calculation, the need to translate some noneconomic values into economic terms, and the broad range of values found in various types of wetlands lead to estimated values varying widely. One method has yielded estimated values of $15,000 to $33,000 per acre in Maine, $2,500 per acre in Massachusetts, $6,000 per acre in a Texas estuary, and $8,000 for mangroves in South Florida. A second method has yielded lower values: $400 per acre in New York, $2,200 per acre in Massachusetts, and $138 per acre in Florida (at a 5 percent rate of interest). Three ecologists using an "energy theory of value" estimated wetland worth at $83,000 per acre. Finally, economists at Virginia Polytechnic Institute have estimated values to range from $9 to $2,000 per acre, depending on location and choice of capitalization rate. 33/

The wide range of estimated values and the lack of estimated values for many types of wetlands tend to limit the usefulness of these economic measures for policy making purposes. The wide range of estimated values makes a comparison of different combinations of functions or of different wetland types almost meaningless. The limited figures, for example, make it impossible to

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33/ For a brief summary of past estimating efforts, see Gary L. Lynne and Patricia Conroy. Methodological Considerations in Estimating the Economic Value of Marsh and Estuarine Areas to Marine Production Processes. Staff Paper 127. Gainesville, University of Florida Food and Resources Economics Department, 1979. p. 2-4. A more detailed summary was recently released and has an extensive bibliography. National Wildlife Federation. Wetlands Functions and Examples of Economic Values. Washington, 1982. 18 p. Debate over the most appropriate methodology within the discipline of economics has been extensive, and no single approach has been generally accepted by the profession.

Analyses of economic benefits of wetlands have been based on the potential of an area to perform certain functions, or on its biological carrying capacity. Most do not appear to take into accout value lost or gained for other functions as a result of performing one or more these functions.

compare directly a prairie pothole to a southeastern coastal marsh. Additional capability is also lacking to translate the individual functions briefly reviewed above into economic terms to allow value tradeoffs. For example, even after three years of detailed study of relatively homogeneous coastal wetlands in Virginia, two economists concluded:

> The point of this discussion is not to suggest that the ecological services of wetlands are nonexistent; however, there is a high degree of uncertainty about these services. Therefore, as indicated by the discussion of oysters, improved estimation of the technical linkages between wetlands and natural services must exist before sound economic values for wetlands can be estimated. 34/

One example of a function for which a number of value estimates have been made is waste assimilation. One study has estimated that an acre of estuary-marsh is capable of doing $14,000 (1971 dollars) worth of waste treatment work each year with a daily loading of 19.4 pounds of biochemical oxygen demand (BOD). 35/ Another study states that a wetland treatment system designed to receive the pollution for a community of up to 10,000 should cost less to construct and operate than a conventional plant. 36/ An artificial marsh pond system at Brookhaven National Laboratory effectively treats 20,000 gallons of sewage per day from the town of Brookhaven. 37/

34/ Shabman, Leonard A. and Sandra S. Batie. Estimating the Economic Value of Coastal Wetlands: Conceptual Issues and Research Needs. VPI-SG-79-08. Blacksburg, Virginia Polytechnic Institute, Department of Agricultural Economics, 1979. p. 13.

35/ Chapman, Freshwater Discharge, p. 635-636.

36/ Adapted from Illinois Institute of Natural Resources, Illinois Wetlands: Their Value and Management. Doc. No. 81133. Prepared by Howard E. Ball, III. Chicago, October 1981. p. 45.

37/ Horwitz, Elinor L. Our Nation's Wetlands: An Interagency Task Force Report. Council on Environmental Quality. Washington, U.S. Govt. Print Off., 1978. p. 230. This report cites a number of examples of waste assimilation.

One Federal regulatory tool that requires an ability to estimate the value of wetland functions is mitigation. Under the mitigation concept, recently implemented by the U.S. Fish and Wildlife Service, the Service may not oppose a proposed action if the permit applicant agrees to enhance or restore other wetland areas to a level that approximates wetland values lost as a result of the proposed project. 38/ This approach, which requires detailed knowledge about the functions common to different wetland types, has been tried in a number of cases in the recent past, following guidelines developed by the Service.

WETLAND ALTERATION

Wetlands are altered by human activities in a variety of ways. Wetlands may be altered directly by filling, dredging, draining or creating impoundments. Indirectly, alteration of waterflow patterns at other locations, and changes in adjacent land use can change the functions and values of wetland areas. Appendix A, which contains a detailed listing of the physical and biological impacts associated with transportation fills, illustrates the growing understanding of wetlands functions and impacts. The table below lists some common activities which impact wetlands.

TABLE 1. Common Activities Which Impact Wetlands

- o Direct removal of vegetation
- o Direct removal of topsoil

38/ U.S. Department of the Interior. Fish and Wildlife Service. U.S. Fish and Wildlife Service Mitigation Policy, Notice of Final Policy. Federal Register, v. 46, no. 15, January 23, 1981. p. 7644-7663.

TABLE 1. Common Activities Which Impact Wetlands--Continued

- Habitat destruction by dumping and surfacing
  - Landfill from construction projects
  - Hard-topping for roads, factories, etc.
  - Grading and concreting for drainage ditches
  - Rip-rapping of banks
  - Dumping of mine overburden, spoil, tailings
  - Dumping of dredged material
  - Levee construction
  - Construction of primitive access, logging, and mining roads (especially in steep or rough terrain)
- Habitat destruction by digging
  - Ditching (main, as well as lateral ditches)
  - Mining (especially placer mining and sand and gravel excavation)
- Habitat modification by water level manipulation
  - Permanent flooding
  - Alternate flooding
  - Protection from flooding
  - Drainage
  - Lowering of soil water table
- Habitat modification by indirect methods
  - Erosion and loss of nutrients
  - Chemical modification by leaching of acids, metals, and sulfides from soil; leaching of chemicals from pavement; addition of salts (sodium and calcium chloride); motor vehicle wastes (petroleum products, heavy metals); other chemical wastes from factories; etc.
  - Introduction of exotic vegetation

Source: U.S. Congress. Office of Technology Assessment. Wetlands Technology Assessment Project Proposal. 1981. p. 7.

Filling

Filling of wetlands has been undertaken for a variety of purposes, ranging from construction of parking lots or industrial plants to building of causeways for transportation corridors. Filling of wetlands has also resulted from disposal of dredged material. Wetlands adjacent to river channels have often been the most cost-effective sites for disposing of dredge spoil. Fills are

usually the first step in a transition to other uses. If other uses are intended, the fill may be stabilized using a variety of engineering techniques, such as planting and sloping embankments to minimize erosion. However, when no other use is anticipated--for instance, if the fill is excess material from a dredge area--often little effort has been made to stablize the fill. This was particularly true in the past.

Filling destroys the wetland by smothering the habitat and raising the surface elevation. The fill is piled on top of wetlands and develops a different, and typically less productive, habitat which is not subject to the periodic saturation or inundation of water. Fills can also alter the functions of adjacent wetlands. If the edges of a fill are not stabilized, sediment may wash into adjacent wetland areas and stream courses. Siting of the fill can alter water flow or change the nature of water movement patterns. This, in turn, can lead to either drier or wetter conditions on adjacent wetlands.

Dredging

Dredging may be undertaken in the wetlands themselves or in adjacent stram channels. Dredging in wetlands is often undertaken as the first step in building a firm base for a fill. The soft organic material, which typically lies under a wetland area, is not stable enough to support most structures. It is removed by dredging and the open area is surcharged, or refilled, usually with rock. This process usually provides a satisfactory base for construction.

Dredging is associated with navigational improvements to stream channels or harbors. Dredging a navigation channel can affect nearby wetlands in several ways. First, the altered river channel changes river flow patterns (including flow velocity and movement), disturbing the relationship between wetlands and water courses. Second, when navigation is made possible, wakes from vessels can erode adjacent streambank areas. This problem has been documented as

especially serious in coastal areas of Louisiana. 39/ Third, dredged material disposal in or adjacent to wetlands can affect their environment. Moreover, if the spoil comes from an established channel or a channel that is downstream from industry or large-scale agriculture, it may contain a variety of contaminants that can further alter the quality of the wetlands as habitat.

In areas along the Gulf Coast, two of the most common reasons for dredging are to lay oil and gas pipelines and to site drill rigs and production platforms. Dredged channels provide the least expensive form of access. The material removed to lay the pipe or create a channel is sidecast, creating fills along both sides of the channel that protect it from the natural flow and flood patterns in the adjacent wetlands. 40/

Draining

Wetlands are drained to convert them to other uses. Drainage is usually undertaken by diking a wetland area to seal it from surrounding areas, then pumping or draining the water out so the soil can dry. Large tracts in the Lower Mississippi River drainage and along the North Carolina coast have been

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39/ Wicker, Karen M. Habitat Degradation and Management Alternatives in St. Bernard Parish, Louisiana. In Proceedings: Seventh Annual Coastal Society Conference. Bethesda, Maryland, in press. p. 4.

40/ Two publications contain considerable information on the impacts of dredging in wetlands: U.S. Environmental Protection Agency, Office of Research and Development. Impacts of Construction Activities in Wetlands of the United States. EPA/600/13-76-045. Prepared by Rezneat M. Darnell. Springfield, National Technical Information Service, 1976. 392 p. and U.S Department of the Interior, Fish and Wildlife Service, Office of Biological Services. Impacts of Navigational Dredging of Fish and Wildlife: A Literature Review. FWS/OBS-80/70. Prepared by Kenneth Allen and Joe Hardy. Washington, U.S. Govt. Print. Off., 1980. 81 p.

converted to agricultural uses by draining wetlands. 41/ Drainage has also been a common practice in the upper Great Plains where prairie potholes are located.

Draining can have permanent effects on wetlands, and it may be difficult to return drained soil to a productive wet condition. After wetlands are drained, soil becomes compacted. On the "super farms" of coastal North Carolina, the experience has been that after being drained the soil's natural productive capabilities deteriorate rapidly drained due to compaction and oxidation. 42/ When this happens, their value for crops becomes limited. Considering the expense of diking and draining, this use may not offer a good return on the investment. Other agricultural problems that accompany drainage include poor plant-soil-moisture-air relationships, excess wetness, difficult cultivation, lack of available nutrients for certain crops, land subsidence, and acidity. 43/ At the 370,000 acre Old Colony Farm in coastal North Carolina, 100 pounds of nitrogen, 1,000 pounds of phosphorous and 6,000 pounds of lime are added to each acre each year. 44/ These chemicals further alter these soils from their wetland condition making even more difficult any effort to return the area to productive wetlands. Diking or draining, like dredging,

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41/ Pugh, Mary Joan M. Superfarms and the Coastal Environment: an Indepth Look at a Large-Scale Problem. In Carolina Planning Journal, v. 2, no. 2. Chapel Hill, University of North Carolina, Department of Regional Planning, 1976. p. 9-16.

42/ Zinn, Jeffrey A. Agriculture and Coastal Fisheries: Future Trends. In Coastal Zone 78, v. IV. New York, American Society of Civil Engineers, 1978. p. 2704.

43/ Dideriksen, R. I., A. R. Hidlebaugh, and K. O. Schmude. Trends in Agricultural Land Use. In Max Schnepf, ed. Farmland, Food and the Future. Ankeny, Iowa, Soil Conservation Society of America, 1979. p. 16.

44/ Pugh, Superfarms and the Coastal Environment, p. 14.

can upset functions in adjacent wetland areas by altering flow velocities and patterns of water elevation.

Impoundment

Enclosing an area in order to flood it is the opposite of draining, but the effect on wetland functions and values is similar. Farm ponds may be the most common type of impoundment. Also, low dams are often installed in wildlife refuges. Large impoundments, such as those created by the nation's major dams, drown wetland areas adjacent to former stream channels. In some cases these have been replaced by new wetland areas along the banks of the resulting reservoir, but the new wetlands are usually of little functional value because reservoir water elevations may be seasonally altered, often substantially, to meet other needs. The comparative magnitude of lost wetlands and created wetlands associated with reservoir development has not been measured.

Impoundments generally reduce the overall functions of wetlands. Some impoundments, such as for the salt ponds in San Francisco Bay, destroy all the natural functions of the area converted to the pond. Of the four classes of activities directly affecting wetlands, impoundments may be both the least common and the least understood at this time.

Indirect Alterations

Activities occurring at some distance from the wetlands can also affect wetland functions. The key to most wetland functions is water, so any actions that alter flow or quality characteristics are important. Common activities altering water that have affected wetland areas range from damming and withdrawal of water for other uses to polluted discharges. Some of these changes

alter wetland functions; declines in wetland function as a result of such actions have been documented. 45/

Modification to adjacent lands also affects wetlands. Whether these lands are modified for an extensive purpose, like agriculture, or a more intensive but geographically limited use, such as residential or commercial structures, the runoff from both types of areas typically reduces wetland functions. Runoff may contain contaminants and sediments. For example, the runoff from highway surfaces contains petroleum residues and various heavy metals as well as road salts and other chemicals or contaminants that may have been spilled or washed off passing vehicles. Indirect activities are generally more difficult to control both because their impacts on wetlands are often not anticipated, and because these activities have other economic and social values that many believe should not be limited or altered due to uncertain effects on wetlands.

Creating Wetlands

While the activities described above have reduced wetland acreage and functions, the U.S. Army Corps of Engineers has initiated a program to create new wetlands at six sites around the country in an effort to dispose of dredged spoil in an environmentally positive manner. 46/ Alternative plant species are being tried, and some wetland functions are being evaluated. Guidelines

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45/ Darnell, Rezneat M. Impact of Human Modification on the Dynamics of Wetland Systems. In Greeson, Clark and Clark, Wetlands Functions and Values, p. 200-209. Many articles on aspects of this topic have been published in popular literature. A good example is: Gary A. Soucie. We Can Still Save Salt Marshes of Georgia, Carolina. In Smithsonian Magazine, v. 5, no. 12. Washington, Smithsonian Associates, March 1975. p. 82-89.

46/ Environment Laboratory. Wetland Habitat Development with Dredged Material: Engineering and Plant Propagation. Technical Report D5-78-16. Vicksburg, U.S. Army Engineers Waterways Experiment Station, 1978. 107 p. and Appendices.

have been developed that address project planning, engineering considerations, development of the site as habitat, and costs. Little information is available yet on what functional values are found in the created wetlands, how their functional values compare to those in nearby "natural" wetlands, and how quickly they develop the ecosystem characteristics of nearby wetlands. 47/

WETLAND CENSUS--MEASURING CHANGE

Large-scale conversions of wetlands to other uses started in the 19th century, encouraged by the Swamp Lands Acts of 1849, 1850, and 1860. Quanitative knowledge of the changes derives from various surveys. The two most recent national surveys were conducted by the U.S. Fish and Wildlife Service. The earlier one was completed in 1954. 48/ The survey found 75.2 million acres of wetlands, under the definitions used. About 90 percent of the total was classified as inland freshwater. 49/ The classification system used in this survey, which contained 20 categories, became the basis for locating

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47/ Some research has been completed on benthic fauna. For examples, see: H. H. Allen, et al. Habitat Development Field Investigations: Bolivar Peninsula, Marsh and Upland Habitat Development Site, Galveston, Texas; Technical Report D-778-15. Vicksburg, U.S. Army Engineers Waterways Experiment Station, 1978. 67 p. More recently, the Fish and Wildlife Service, Office of Biological Services, published proceedings of a workshop entitled "Rehabilitation and Creation of Selected Coastal Habitats" (FWS/OBS-80/27) which contains a number of articles on creating marshes.

48/ U.S. Department of the Interior. Wetlands of the United States, p. 5-7. The study estimated that a minimum of 45 million acres, more than 35 percent of the national total during the Colonial period, had been lost. Some States have more recently updated figures on wetlands loss, but the inventory now underway will provide the next national set of figures. In an unrelated activity, the U.S. Army Corps of Engineers has determined that approximately 148 million acres of wetlands are subject to their regulatory program, including 67.2 million acres in Alaska.

49/ U.S. Army Corps of Engineers, Engineer Institute for Water Resources. Impact Analysis of the Corps Regulatory Program. Draft. Washington, November 1981. p. 106. A recent assessment by the Corps of wetlands subject to Federal regulatory programs estimated that 15 percent, or 11.5 million acres of wetlands (excluding Alaska) were coastal.

and defining areas subject to Federal regulations which evolved later. Many agencies continue to use this classification system although a new classification system has been adopted.

The new classification system was developed as part of the second inventory, initiated in 1974. Whereas the 1954 inventory contained 20 classes, the current inventory contains 5 systems, 10 subsystems and 55 classes. This inventory was initiated under the broad responsibilities for resource protection and management contained in the Fish and Wildlife Coordination Act. The general mandate of the inventory is to "develop and disseminate a technically sound comprehensive data base concerning the characteristics and extent of the Nation's wetlands. 50/ The inventory is primarily a scientific study, but it has already been of value to the regulatory program in areas where mapping has been completed.

When the new inventory was started, the earlier wetlands classification system, developed during the 1950s, was determined to be inadequate because of advances in wetland science and the expanding set of values considered in the Federal wetland regulatory program. 51/ This new classification system was designed to meet four objectives:

1. to describe areas that have similar natural attributes;
2. to arrange these areas in a system that will enable better resource management decisions to be made;

50/ Wilen, William and Rudolf Nyc. National Wetlands Inventory Project. In Proceedings--Coastal Zone 80. Vol. III. New York, American Society of Civil Engineers, 1980. p. 1847.

51/ U.S. Department of the Interior. Wetlands of the United States. The Circular was first issued in 1956, then reissued, unchanged, in 1971 to provide reference for implementing the Water Bank Act of 1970.

3. to convert these areas into a format for inventory and mapping; and

4. to provide a uniform classification system and terminology. 52/

The Fish and Wildlife Service adopted the new classification system on September 15, 1980. The Service is encouraging other agencies to use this system and promote government-wide consistency, but no legal authorities require Federal agencies to adopt it. 53/ Other Federal agencies involved in wetland management are participating in the inventory, and are becoming familiar with the new classification system. 54/

The new classification system is the first to include special modifiers for two types of wetlands, those that are man-made, and natural ones that have been modified by man. The modifiers, used alone or in combination, include "excavated," "impounded," "diked," "partly drained," "farmed," and "artificial." 55/ These modifiers allow the inventory to distinguish wetland areas where significant modification has occurred and where values have been altered.

The inventory is being conducted using a complex remote sensing system that transfers information from aerial photos onto map overlays. Products include large-scale maps (1:24,000 or 1:62,500) and small-scale maps (1:100,000) accompained by "notes to users." By January 1, 1980 the inventory had completed 206 small-scale maps, and an additional six were in production. In addition, draft narratives had been completed for all 206 maps. At the same time, 189

52/ Wilen and Nyc, National Wetlands Inventory Project, p. 1848.

53/ The Soil Conservation Service is using it on an interim basis for a year.

54/ Federal agencies supplying staff to assist in the inventory activity include the U.S. Geological Survey, the Soil Conservation Service, and the U.S. Army Corps of Engineers.

55/ U.S. Department of the Interior, Classification of Wetlands, p. 25-26.

large-scale maps were in final form, and an additional 215 maps were in draft form. Areas have been selected for mapping based on a priority need, such as sites of proposed major projects that might affect wetlands. Consequently, maps completed are mainly along coastal areas and the lower Mississippi River. Large areas of Arizona and New Mexico and some portions of the Wyoming-Montana coal fields have also been completed. Maps are in preparation for portions of the Great Lakes, the Northern Plains, and the lower Mississippi River drainage. 56/

In addition to this national inventory, laws in several States, including Connecticut, Rhode Island, New York, New Jersey, Delaware, Maryland, Virginia and Mississippi, require a Statewide inventory of all wetlands or of all of a certain type of wetland. Inventories are part of State programs to regulate wetlands' use or establish standards for their management. 57/ The major reason for this interest in wetlands is concern that alterations are reducing the resource.

The surveys identify a rapid rate of change. Until recently, almost all changes have been identified as economic improvements to lands considered to

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56/ Data sheets prepared by the National Wetlands Inventory which list the status of mapping activities through December 25, 1981. Additional information obtained in conversation with John Montanari, group leader of the National Wetlands Inventory, February 2, 1982.

57/ U.S. Department of the Interior. Fish and Wildlife Service. Office of Biological Services. Strengthening State Wetland Regulations. FWS/OBS-78/98. Washington, U.S. Govt. Print. Off., 1978. p. 74-78.

have little or no value in their natural condition. 58/ One Federal report contained case studies of converting wetland areas to other uses including agriculture, forestry, residences, transportation, industry, and, in recent years, recreation. 59/ The rate of conversion has varied with private and public incentives, but the capability to alter wetlands has accelerated with technological and engineering advances. Waterfront property which is more desirable for some uses, such as second homes, can now be more easily modified. In some urbanized areas, including New York and Los Angeles, as the available upland sites have been built up, wetland sites, the least expensive remaining large tracts of undeveloped land, have become increasingly desirable. The Fish and Wildlife Service estimated that the coterminous United States had lost 45 million of an estimated original 127 million acres of wetlands by 1956. 60/

Other surveys of smaller areas show a more rapid loss rate during this century, especially since World War II. An estimated 45 percent of Connecticut's

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58/ The present U.S. Army Corps of Engineers regulations for permiting actions in wetlands under Section 404 of the Clean Water Act recognize the eight functions of wetlands listed in footnote 10. By contrast, 25 years ago, about the only function ascribed to wetlands in national policy was habitat for waterfowl. The only Federal agency concerned with protecting wetlands 25 years ago was the Fish and Wildlife Service. Its limited interests were defined in: Wetlands of the United States, Circular 39, published in 1956. More recently, the Fish and Wildlife Service has continued to recognize a limited number of reasons to protect wetlands. As recently as a 1967 publication, entitled, Your Stake in Wetlands (Circular 140), the Service recognized functional values to include only waterfowl, wetland big game, fur, and fisheries.

59/ Horwitz, Our Nation's Wetlands, p. 22-46.

60/ U.S. Department of the Interior. Fish and Wildlife Service. Wetlands of the United States: Their Extent and Their Value to Waterfowl and Other Wildlife, Circular 39. Prepared by Samuel P. Shaw and C. Gordon Fredine. Washington, U.S. Govt, Print. Off., 1956. p. 7.

coastal marshes were lost between surveys in 1914 and 1959. 61/ Over 40 percent of the potholes in western Minnesota were converted to other uses during a 10 year period between 1964 and 1974, according to a U.S. Fish and Wildlife Service survey. 62/ By 1954, only 450,000 acres of wetlands remained of California's estimated 3.5 million acres when the State was first settled. 63/ In coastal areas of California, only 125,000 acres of an original 381,000 acres remain, many of them greatly altered. 64/ The U.S. Army Corps of Engineers has summarized national wetland loss data, noting that the loss rate between 1922 and 1954 was about 0.2 percent a year; between 1954 and the mid-1970s it rose to 0.50 to 0.65 percent a year; and currently estimate it to be about 0.4 percent a year. 65/

Wetland loss is associated with other human and natural activities. For example, the State of Louisiana is losing coastal wetlands to open water at a rate of 47 square miles per year. Causes include levees that retain sediments upstream, canals for oil and gas that alter natural water channels, and a rise in sea level. A 1980 U.S. Fish and Wildlife Service study noted that

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61/ Rankin, John S. Salt Marshes as a Source of Food. In Connecticut College Bulletin, No. 12. New London, Connecticut Arboretum, University of Connecticut. 1961. p. 4.

62/ U.S. Department of the Interior, Fish and Wildlife Service. Western Minnesota Wetlands Inventory. Unpublished, 1974. Mixed pagination.

63/ U.S. Department of the Interior, Wetlands of the United States, p. 7.

64/ Anonymous. California's Coastal Wetlands. La Jolla, University of California, Sea Grant College Program, no date. p. 7.

65/ U.S. Army Corps of Engineers, Impact Analysis, Draft, p. 104.

fresh water marshes in the Mississippi Delta area declined by 55 percent, to 405,000 acres, between 1955 and 1978. 66/

Financial benefits associated with conversion to alternative uses continue to increase. For example, the demand for agricultural lands to supply domestic and international markets has been growing rapidly during the past decade. Wetlands previously uneconomic to convert to cropland are increasingly being developed as demand rises, the technological capability is available, and alternative sites become more difficult to locate. 67/

The potential for drainage and conversion to agriculture is a significant matter. The Soil Conservation Service estimates that 32 million acres of potential cropland, nationwide, are too wet in their present condition for agricultural use. Wetness is second only to erosion as a factor limiting agricultural activities in the country. 68/ Wet soils are more extensive than wetlands. Conversion to productive agricultural land is expensive in these areas. One recent study noted that corn worth $18.8 billion is produced on wet soils. The cost of preparing wet soils for production in one watershed in Iowa was

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66/ This estimate comes from more detailed estimates of wetlands loss in six deltic parishes in southwestern Louisiana prepared by Karen Wicker, Coastal Environments Inc., Baton Rouge, for the State of Louisiana.

67/ Demand for agricultural land varies from year to year, depending on a number of crop demand and supply, and public policy variables. In 1981, harvests were large and a surplus resulted. But in most recent years, the trend has been to bring additional marginal land into production.

68/ U.S. Department of Agriculture. 1980 Appraisel Part I: Soil, Water, and Related Resources in the United States: Status, Condition and Trends. Washington, 1981. p. 111. This study noted that "nearly 105 million acres of cropland soils have a wetness limitation."

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about $55 per acre per year, making the return marginal when climatic or economic conditions are unfavorable. 69/ A few conversion uses, such as for new highway locations, are declining, but the overall pressure for conversion to other uses, such as agriculture, appears to be strong.

Reaction to this pressure is different in various parts of the country. Wetlands are a common feature in the Southeast, but rare in many parts of the West. Coastal wetlands are found in an almost continuous band along the Atlantic coast, but along the Pacific Coast, wetland areas are few and small. This geographic variation is important because it influences perceptions of the value of wetland areas. In the East, wetlands have generally been avoided as areas of settlement, and only in recent years has large-scale alteration, such as development of the "super farms" in coastal North Carolina, become possible. In the arid West, by contrast, wet areas have generally attracted nearby settlement. High water tables have usually meant shallow wells and better agriculture and development potential.

SUMMARY

Only in the past 20 years have knowledge and awareness of wetlands grown rapidly. Scientific findings have directly contributed to wetlands management. But at least four general topics need additional attention from wetland scientists is needed in at least four areas in order to improve the nation's ability to consider wetland policy issues. These topics are:

69/ Diedrick, R. T. The Agricultural Value of Wet Soils in the Upper Midwest. In Richardson, Brandt, Ed. Proceedings--Midwest Conference on Wetland Values and Management. Minneapolis, Minnesota Water Planning Board, 1981. p. 103.

1. better comparative knowledge of different types of wetlands;
2. better ability to measure and compare wetland values;
3. better knowledge of the value of wetlands in optimum and sub-optimum natural conditions; and
4. improved understanding of the effect of wetland size on value.

Our knowledge of some types of wetlands, especially in coastal areas of the Southeast, is extensive, fostered by a rich and diverse research tradition. On the other hand, knowledge about most inland wetlands is limited, and almost no research has been conducted on some of the rarer forms of wetlands in the arid West. The result is an unclear picture of the actual value of many types of wetlands. The wetlands which have been studied the most, coastal wetlands in the Southeast, generally have higher overall values, as measured by either rates of biological productivity or ability to serve more of the functions described earlier in this chapter.

Very little research has been conducted which compares different types of wetlands in terms of functions and values offered. Developing a national wetlands policy is difficult when the resource is so diverse, and knowledge of components is highly variable. Most wetlands do not perform all the functions ascribed to wetlands, nor could they perform all of them simultaneously. For example, wetlands may be valuable for assimilating waste, but, as a result of assimilating that waste, the soils or vegetation may become contaminated. Better analyses of how functions interrelate are needed.

Most wetlands have been studied as natural systems. Research on the impact of introduced stresses on an unmodified ecosystem have received limited attention. After an ecosystem is stressed, its ability to perform functions is altered. Usually, the overall value is reduced. However, certain functions may not be affected, or may be enhanced by stress. A large percentage of the

Nation's wetlands are directly or indirectly stressed in a variety of ways. Wetland stresses are difficult to forecast because they are part of larger hydrologic systems. Actions that change hydrologic patterns in other parts of the system can alter a wetland downstream. A common problem is the effects of upstream activities that increase sediment loads on hydrology downstream. Isolated inland wetlands, such as prairie potholes, seem more easily affected by change, perhaps because of their small size and separation from a larger hydrologic system.

Finally, the size of a wetland seems to be an important factor in determining value. A few functions, such as habitat and heritage value, may not be influenced by size, but smaller wetlands are generally less complex ecosystems and may be less productive then their larger counterparts. In some areas, small but undisturbed wetlands are of high value, while, ironically, man's ability to alter them indirectly or directly is much greater. For example, some of these small wetlands have extremely high value for waterfowl along the flyways, but other values are limited. Policy debate on wetlands would be assisted if the effect of size and scarcity on value of wetland areas could be expressed.

Growing knowledge about wetland functions has gradually been incorporated into Federal wetlands programs. Incorporation takes many forms, but it usually appears first as arguments in legal decisions, and then may appear in regulation or law. A growing appreciation of wetlands, their threatened status and unusual value has led to development of Federal regulatory programs, discussed in Chapter III, which attempt to consider a broader set of wetland concerns. The ability to manage wetlands resources in a rational manner should improve if answers to the scientific questions introduced above are found.

CHAPTER III: FEDERAL WETLAND PROGRAMS

INTRODUCTION

Wetlands are not managed under a single law or program. The Federal effort is a composite of provisions in numerous laws, as interpreted by regulations and the courts. The most important of the provisions, section 404 of the Federal Water Pollution Control Act (P.L. 92-500, as amended), does not define or even mention wetlands. Rather this section, enacted in 1972 and amended in 1977, established a dredge and fill permitting program, expanding on a permit program that had been established earlier under section 10 of the Rivers and Harbors Act of 1899.

While these two programs are generally viewed as key regulating activities in wetland areas, several others also affect wetlands use and alteration. These programs include:

1. Activities of the Fish and Wildlife Service and the National Marine Fisheries Service under provisions of the Fish and Wildlife Coordination Act ensure that wildlife resources are given equal consideration in water resource project planning, including the section 404 program;
2. the Water Bank Program, which provides economic incentives to protect wetlands through contracts with rural landowners;
3. the wetlands acquisition programs of the Fish and Wildlife Service;
4. Land and Water Conservation Fund, which provides funds to Federal agencies for land acquisition for the purpose--among others-of protecting endangered species habitat and protecting such important natural areas as National Wildlife Refuges; and

5. Executive Order 11990, which requires all Federal agencies to develop policies to enhance wetlands and to take actions to minimize damage to them.

Still other programs of the Federal government can influence management of wetland areas, but their influence is limited by geography or because wetlands are not a principal focus of the program. They include activities under the Coastal Zone Management Act, 70/ the Endangered Species Act, the National Flood Insurance Act, the Resource Conservation and Recovery Act, the Clean Air Act, and several programs under other provisions of the Federal Water Pollution Control Act. 71/ While these programs are not discussed in this chapter, a more comprehensive list of Federal programs affecting wetlands is presented in Appendix B. This list includes 38 programs in six departments and four agencies, illustrating the diversity of programs that can affect wetland resources.

HISTORY OF NATIONAL INTEREST IN WETLANDS

The present Federal policy for wetland protection is very different from past policies. Before the middle of this century, the Federal government expressed little interest in wetlands, with the exception of migratory waterfowl

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70/ The Federal Coastal Zone Management program is a good example of how wetlands protection can vary from place to place. Under its provisions, State coastal programs, based on broad criteria, are approved by the Federal Government. Some States, such as Connecticut and Massachusetts, have extensive wetland programs which are central to implementing their State coastal program successfully, but others give minimal attention to wetlands in their coastal programs. One of the most innovative programs, undertaken as a joint effort between North Carolina and the U.S. Army Corps of Engineers, is discussed later in this chapter.

71/ The Environmental Protection Agency administers a number of programs that can impact wetlands under the Federal Water Pollution Control Act. These include section 208 planning grants, section 201 wastewater treatment construction grants, the section 402 permit program (NPDES) for discharge of industrial and municipal wastes; section 106 State water grants; and section 311, liability for oil and hazardous substance spills.

habitat protection. In the last century, a series of enactments encouraged destruction of wetlands and conversion to uses of higher value. The Swamp Lands Acts of 1849, 1850, and 1860 gave approximately 65 million acres of wetlands to 15 States for reclamation. 72/ A century ago, the president of the American Public Health Association made the following statement, which reportedly expressed a common view of the day:

> Wetlands and saturated soils are not only unremunerative, but if the area is considerable, they prove a source of enervation and disease to the section in which they exist. Although individuals may neglect swamp lands, or find their reclamation and drainage too expensive, the State cannot afford to be indifferent to their continuance, because they check production, limit population, and reduce the standard of vigor and health. Their value, too, when reclaimed, in an economic view will be greatly enhanced. 73/

Increased awareness during the last decade about the functions and values of wetlands is reflected in growing efforts to create programs that protect wetlands and the retailoring of older programs that originally had little to do with wetland protection. Efforts to protect remaining wetlands expanded greatly after wider recognition of their role in larger ecosystems, in assimilating pollutants, and in dampening floodwater. Belated recognition of these values is captured in an introductory passage from a recent State report on wetlands.

> In the beginning, wetlands were considered valueless. Only when most of the native waterfowl vanished was it determined that wetlands might ensure the survival of many endangered plants and animals. Only after billions of dollars were spent on structural flood control that resulted in further flooding were wetlands recognized for reducing flood peaks. Only after additional billions were spent to purify streams was it realized wetlands naturally filter pollutants for free. 74/

72/ U.S. Department of the Interior, Wetlands of the United States, p. 5.

73/ Toner, Richard. A View of Some of the Leading Public Health Questions in the United States. II Public Health Reports, v. 1, 1876. p. 22.

74/ Illinois Institute of Natural Resources, Illinois Wetlands, p. ix.

FEDERAL PROGRAMS REGULATING ACTIVITIES IN WETLANDS

Section 10

While visible concern for wetland protection did not develop until the past 15 or 20 years, the Corps of Engineers has been required since 1899 to issue permits for dredge and fill activities and modification of waterways under Section 10 of the Rivers and Harbors Act, commonly referred to as the Refuse Act. 75/ As one authority noted, "The jurisdiction of this act was essentially based on the necessity of maintaining the navigability of the Nation's waterways." 76/ The Corps' jurisdiction was limited to navigable waters under this provision and its primary concern was to prevent alteration or obstruction of these waters. The courts and the Corps defined navigable waters to be waters below the ordinary or mean high water level, or in coastal regions, to the mean high tide level, plus adjacent wetlands. 77/

Thus the Corps confined its regulatory authority solely to activities taking place below the mean high water line and/or waters that are presently used, were used in the past, or are susceptable to use to transport interstate commerce. This was called the area of navigable capacity, or navigable servitude. The concept of past, present, or future navigable capacity is frequently referred to as the traditional definition of navigability. Under this definition the Corps limited its review to activities that might obstruct some form

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75/ Section 10 requires a permit from the Corps of Engineers to build any structure (dams, dikes, or bridges) in or over navigable waters, or the excavating or filling of any lobe or channel in any navigable water. 33 USC 401 (1976).

76/ Schneider, William F. Commentaries--Federal Control Over Wetland Areas: The Corps of Engineers Expands its Jurisdiction. University of Florida Law Review, v. 28, Spring 1976. p. 789.

77/ 33 C.F.R. 209. 260(a)-(k) (1975).

of navigation. However, this approach provided no protection for many wetland areas, including most fresh and saltwater wetlands, and most nonprimary tributaries of navigable waters.

While not altering the geographic boundaries of the Corps' jurisdiction, several legislative enactments and judicial decisions led to expansion of the Corps' permitting review to factors other then navigability. Among these was an amendment to the Fish and Wildlife Coordination Act in 1958. 78/ The 1958 amendments strengthened prior law by elevating fish and wildlife values to equal consideration with other objectives, such as navigational and flood control improvements, whenever waterways are impounded, diverted, or modified. The Act required that the U.S. Fish and Wildlife Service and appropriate State wildlife agencies be consulted prior to such construction or modification. Before 1967, when the Corps (the Department of the Army) signed a Memorandum of Understanding with the Department of the Interior, the sole criterion for reviewing permit applications was protecting navigability of waters actually used for navigation. Under terms of the 1967 agreement, the Corps gave equal consideration to environmental effects, along with the traditional interest in navigability, and created a process for resolving disputes by negotiation between higher levels of the Department of the Army and the Department of the Interior. 79/ In 1968, the Corps published regulations in response to these 1958 amendments stating that its review would include evaluation of all

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78/ Public Law 85-624, 16 U.S.C. sec. 661-668 (1970).

79/ Holmes, Beatrice H. Federal Participation in Land Use Decision Making at the Water's Edge--Floodplains and Wetlands. Natural Resources Lawyer, v. 13, no. 2, 1980. p. 386.

relevant factors, including "effect...on...fish and wildlife, conservation, pollution, aesthetics, ecology, and the general public interest. 80/

Creation of the Section 404 Program

In 1972 Congress totally revised the Nation's water quality program and, with it, triggered expanded protection of wetlands adjacent to the Nation's streams and lakes. In the Federal Water Pollution Control Act Amendments of 1972, 81/ Congress established ambitious water cleanup goals and stated that all pollutant discharges into waters of the United States are unlawful unless authorized by a permit. Almost all the comprehensive permitting and implementing authorities of the Act were assigned to EPA. The single major exception to this permitting authority is contained in Section 404 which authorized the Corps to administer a separate permit program concerning dredge and fill material. The new permitting program was similar to the Section 10 program of the Rivers and Harbors Act, and allowed for the consolidated processing of permits if both were required. The Corps was delegated this authority because of its past experience administering the Section 10 program, although the basis for the Section 404 program was support of water quality goals, while the Section 10 program had been administered to protect navigability.

More significantly, the Section 404 program greatly expanded the jurisdictional scope of the Corps' program, because the reach of the many programs

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80/ 33 C.F.R. 209.120(f) (1975). Today the Corps' public interest review includes additional factors: "conservation, economics, aesthetics, general environmental concerns, historic values, fish and wildlife values, flood damage prevention, land use, navigation, recreation, water supply, water quality, energy needs, safety, food production, and, in general, the needs and welfare of the people." 33 C.F.R. 320.4(a)(1) (1979).

81/ Public Law 92-500, 33 U.S.C. 1251 et seq. (1976).

established by the FWPCA extended to "navigable waters" which were defined broadly in Section 502(7) as "the waters of the United States, including the territorial seas." The effect of this broad definition was to transform Section 404

> from a restatement of Corps authority to protect navigation with the addition of EPA water quality oversight to a provision vesting the Corps with responsibility for permitting all dredge and fill activities occurring in "waters of the United States." 82/

From a water quality standpoint, the concern with dredged or fill material is to prevent contaminated or noncontaminated material from diminishing water quality or disrupting aquatic life, particularly in biologically sensitive areas such as wetlands.

At the same time that the amendments of 1972 were being debated, Congress was considering national land use legislation. Some viewed the wetland protection question as essentially one of land use, one in which wetlands were a special type of land and should receive special treatment in any general approach to land use planning and management. If national land use planning legislation had been enacted, wetland protection probably would have taken a different form. Many analysts who might have wanted to see wetlands protected under a land use approach were able to see that for the most part they were protected under a water quality program, which provided a different set of opportunities and limitations. One analyst observed that "Because of the program's [section 404] close relationship with land use practices adversely affecting water quality, critics contended that it represented an unprecedented Federal presence in land use matters." 83/

82/ Myrhum, Christopher B. Federal Protection of Wetlands through Legal Process. Boston College Environmental Affairs Law Review, v. 7, no. 4, 1979. p. 595.

83/ Blumm, Michael C. The Clean Water Act's Section 404 Permit Program Enters Its Adolescence: An Institutional and Programmatic Perspective. Ecology Law Quarterly, v. 8, no. 3, 1980. p. 412.

Despite the geographic expansion afforded by Section 404 and the 1972 Amendments, some observers were concerned that the law lacked explicit incorporation of wetlands within the definition of "waters of the United States" in order to provide similarly explicit protection for such areas. 84/ Moreover, some persons expressed concern that the new water quality considerations assigned to the Corps would clash with its traditional water resource development and navigation responsibilities. 85/

Implementing Section 404

After passage of the 1972 FWPCA, the Corps continued to operate its regulatory program under the same geographical limits that had been defined by the courts for Section 10, that is, utilizing the traditional definition of navigable water rather than the expanded concept of "water of the United States." 86/ In final permit regulations issued in 1973, the Corps declared that its jurisdiction under both statutes was limited to waters lying within the traditional test of navigability. 87/ The effect of this limitation was exclusion from the Corps' regulatory program of such lands as marshes, swamps, bogs, salt meadows, inland shallows, and many other coastal wetlands.

However, a series of court decisions in 1974 and 1975 rejected the navigational limits adopted by the Corps in favor of regulation and abatement of pollution at its source. Most of these cases were resolved with individual

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84/ Myrhum, Federal Protection of Wetlands, p. 596.

85/ Ibid., p. 586.

86/ Frasca, Joanna M. Federal Control of Wetlands: The Effectiveness of Corps' Regulations Under [Section] 404 of the FWPCA. Notre Dame Lawyer, v. 51, February 1976. p. 509.

87/ 33 C.F.R. 209.260(c) (1974).

determinations concerning whether the area in dispute fell within the boundaries of waters that Congress intended to regulate. These decisions did not yield general guidelines to delineate the scope of the Corps' enlarged jurisdiction. 88/

The most significant case in the series which tested the Corps' actions was brought by the Natural Resources Defense Council and the National Wildlife Federation. The court decision in this case, NRDC v. Callaway, 89/ required the Corps to revoke its dredge and fill permitting regulations and issue new rules conforming to the broader statutory mandate of the FWPCA. The effect of this judicial order was to make the application of Section 404 consistent with the remainder of the Federal Water Pollution Control Act, by bringing together the definition of "waters of the United States" for water quality purposes with the Corps' definition of waters for the purpose of regulating dredge and fill activities. Environmentalists and others applauded the court's order and claimed that it "transformed the 404 program from a convenient exemption from EPA's [general] permit requirements into a vehicle for wetlands protection." 90/

Responses

Following the Callaway order, the Corps began the process of revising its regulations by issuing four alternative regulatory proposals, which were accompanied by a press release suggesting that the expanded jurisdiction of Section 404 could result in permit requirements for ranchers' and farmers' routine activities, such as enlarging stock ponds, plowing fields, or

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88/ Frasca, Federal Control of Wetlands, p. 511.

89/ 392 F. Supp. 685 (D.D.C. 1975).

90/ Blumm, The Clean Water Act's Section 404 Permit Program, p. 417. (footnote omitted from quotation).

deepening irrigation ditches. 91/ The press release became the center of its own controversy, and many persons criticized it as misleading. 92/ The Corps noted later that many of the public comments that it received "appeared to be responses to the widespread news coverage of the proposed regulation." 93/ Yet the possibility of vastly expanded regulation alarmed the public and legislators and led to the introduction of numerous bills during the 94th Congress to reduce the scope of the Corps' jurisdiction. Even before final rules were issued, Congressional hearings were held to assess the possible scope and impact of an expanded Corps of Engineers regulatory program. 94/

The Corps issued revised regulations on July 25, 1975. 95/ Here, for the first time, the Corps attempted to define wetlands that, together with "navigable waters," would be subject to Section 404 regulations. Coastal wetlands were defined as "marshes and shallows and...those areas periodically inundated by saline or brackish waters and that are normally characterized by

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91/ The May 6, 1975, press release appears in U.S. Congress. Senate. Committee on Public Works. Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Hearings. 94th Cong., 2nd Sess., July 27 and 28, 1976. Washington, U.S. Govt. Print. Off., 1976. p. 517-20.

92/ Ehrlich, Mitchell G. Jurisdictional Expansion of the Army Corps of Engineers under the Federal Water Pollution Control Act Amendments of 1972. Houston Law Review, v. 13, October 1975. p. 145.

93/ U.S. Department of Defense. Corps of Engineers. Permits for Activities in Navigable Waters or Ocean Waters. Federal Register, v. 40, no. 144, pt. iv, July 25, 1975, p. 31320.

94/ U.S. Congress. House. Committee on Public Works and Transportation. Subcommittee on Water Resources. Development of new regulations by the Corps of Engineers, implementing Section 404 of the Federal Water Pollution Contol Act concerning permits for disposal of dredge or fill material. Hearings, 94th Cong., 1st sess. July 15, 16, 22, 1975. Washington, U.S. Govt. Print. Off., 1975. p. 292. (Serial no. 94-18)

95/ U.S. Department of Defense, Permits for Activities in Navigable Waters, Federal Register, p. 31320.

the prevalence of salt or brackish water vegetation capable of growth and reproduction." 96/ Freshwater wetlands were defined as "areas that are periodically inundated and that are normally characterized by the prevalence of vegetation that requires saturated soil conditions for growth and reproduction." 97/

The extent of Federal jurisdiction for inland waters was also defined. In addition, the Corps retained the discretion to require a permit in other waters (such as areas less frequently inundated), if necessary for water quality protection. The Corps also announced that in the future it would utilize a vegetative index, rather than reference to the ordinary or mean high water mark of inland waters, as one indicator of the characteristics of areas within its jurisdiction.

The regulations enumerated several factors that would be considered in evaluating dredge and fill permit applications because they are recognized functions important to the public interest. They include the following:

> (i) Wetlands which serve important natural biological functions, including food chain production, general habitat, and rearing and nesting, spawning, resting sites for aquatic or land species;
> (ii) Wetlands set aside for study of the aquatic environment or as sanctuaries or refuges;
> (iii) Wetlands...the destruction or alteration of which would affect detrimentally the natural drainage characteristics, sedimentation patterns, salinity distribution, flushing characteristics, current patterns, or other environmental characteristics;
> (iv) Wetlands which are significant in shielding other areas from wave action, erosion, or storm damage. Such wetlands are often include with barrier beaches, islands, reefs and bars;
> (v) Wetlands which serve as valuable storage areas for storm and flood waters; and

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96/ Ibid., p. 31324.

97/ Ibid., p. 31324-31325.

(vi) Wetlands which are prime natural recharge areas. Prime recharge areas are locations where surface and ground water are directly interconnected. 98/

The regulations also include this statement of policy: "As environmentally vital areas, [wetlands] constitute a productive and valuable public resource, the unnecessary alteration or destruction of which should be discouraged as contrary to the public interest." 99/ Figure 1 compares jurisdiction of the Corps under section 10 and section 404.

The regulations proposed phased implementation of the expanded program to ease the new administrative burden on the Corps. Regulation of Phase I waters took effect immediately and covered areas that had been subject to the program in the past. The Phase I program represented 85 percent of all waters, but it covered only 15 percent of total wetland acreage under the Corps' regulatory jurisdiction. 100/ Phase II, to be implemented one year later, extended regulation to primary tributaries of traditionally navigable waters, natural lakes greater then five acres in surface areas, and adjacent wetlands. Phase III, to be effective July 1977, extended coverage to all other waters falling under the expanded jurisdiction of the Corps.

The total geographic jurisdiction of the Corps' regulatory program thus includes the following: 25,000 miles of waterways, 3 million miles of river, 124,000 miles of tidal shoreline, 4.7 million miles of lakes shoreline, 30,000 miles of canal shoreline, and 148 million acres of wetlands. Of the national totals, the State of Alaska accounts for about one-third of the river miles 38 percent of the tidal shorelines, 94 percent of the lake shoreline, and 45

98/ Ibid., p. 31328.

99/ Ibid.

100/ U.S. Army Corps of Engineers, Impact Analysis, Draft, p. 105.

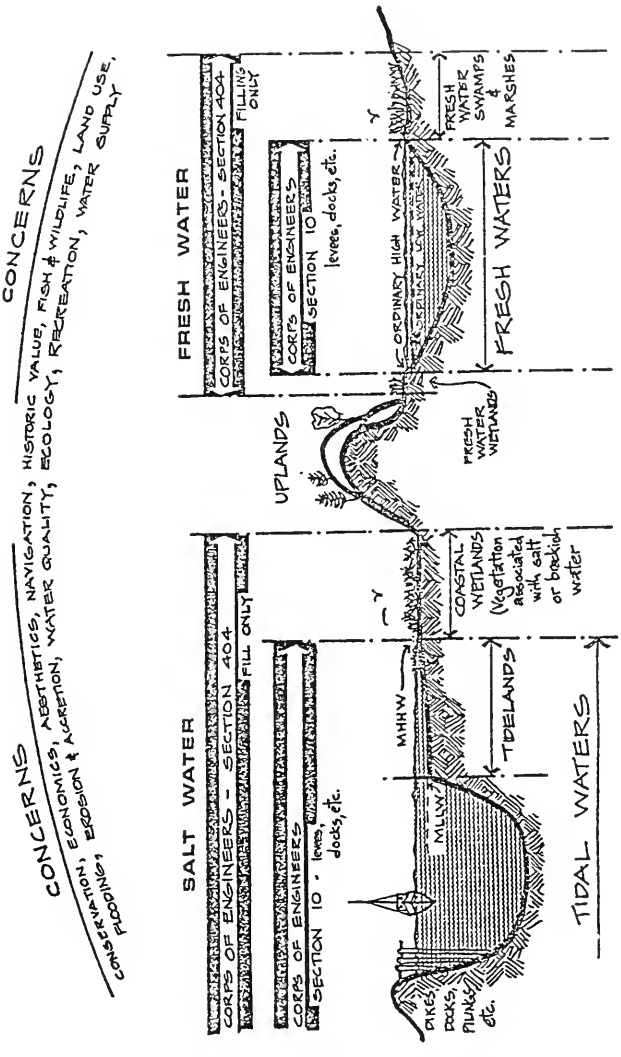

Figure I

The Jurisdiction of the Corps in Conducting its Section 10 and Section 404 Authorities

Source: U.S. Army Corps of Engineers Institute for Water Resources. Impact Analyses of the Corps Regulatory Program (Draft). Washington, Nov. 1981, p. 20. This figure was prepared by the Corp's District Office in Portland, Oregon.

percent of wetland acreage. 101/ Table 2 summarizes the extent of the Corps' jurisdiction under different definitions of navigable waters.

Reacting to the concern about activities covered by the rules, the Corps proposed in the 1975 regulations to exempt certain routine or normal farming, ranching, and forestry activities from regulation, including: plowing, cultivating, seeding, harvesting, and maintenance or emergency reconstruction of structures in waterways.

As an additional effort to lessen administrative complexity, the regulations authorized issuance of general or categorical permits for certain activities that would cause minimal adverse cumulative effect on the environment, such as beach erosion control projects. After issuance of a general permit, no further permit would be needed for similar work.

Some observers noted approvingly that the absence of a detailed definition of dredge and fill materials in the legislative history of section 404 allowed the Corps to fashion a workable program, including the exemptions for normal farming, ranching, and forestry. 102/ Other persons in the agriculture, forestry, and construction industries contended that the Corps' regulations created major uncertainties about how the term "normal" would be interpreted. Much of this concern stemmed from the decentralized nature of the Corps' regulatory activities, with each of the Corps' District Engineers traditionally exercising considerable latitude in decision making. 103/

In 1977 the Corps issued final regulations concerning its regulatory program under both the FWPCA and the Rivers and Harbors Act of 1899. These were

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101/ Ibid., p. 28.

102/ Myrhum, Federal Protection of Wetlands, p. 604.

103/ Blumm, The Clean Water Act's Section 404 Permit Program, p. 438.

TABLE 2. Summary of Changes in Extent of Corps Jurisdictional Authority as Brought About by Changes in Definition of Navigable Water

	Centerline River (Miles)	Tidal Shoreline (Miles)	Lake Shoreline (Miles)	Manmade Canals (Miles)	Total Wetland (Acres)
ior to 1975:					
1) Navigable water exclusive of those historically navigable or susceptible to navigation	53,000	98,000	44,000	0	10,880,000
2) Historically navigable or susceptible to navigation	518,000	0	37,000	0	3,840,000
Total prior to 1975	571,000	98,000	81,000	0	14,720,000
75-1977 Previous water plus expansion to adjacent wetlands (Corps Reg. of July 1977)	571,000	98,000	81,000	0	22,400,000
ly 1977 Previous waters plus expansion to all waters of U.S. (Corps Reg. of July 1977)	3,500,000	125,000	4,700,000	31,000	148,090,240
77 - All waters of U.S. minus those delegated to the states (Clean Water Act October 1977)*	2,100,000	65,000	3,290,000	unk.	22,400,000

lthough the Clean Water Act provided for the possibility of transfer of certain 404 jurisdiction to the states, as y
o state has established a program to undertake Section 404 permitting.

Source: U.S. Army Corps of Engineers Institute for Water Resources. Impact Analysis of the Corps Regulatory Program (Draft). Washington, November 1981. Appendix B.

revisions of the interim final rules of July 1975. Major elements of the new rules included:

> (1) rejection of the term "navigable waters," which had long troubled the program, in favor of the term "waters of the United States" that was defined to include all areas both traditionally and newly within the scope of the FWPCA (the traditional definition of navigable waters continued to apply to permits sought only under the Rivers and Harbors Act, although in many cases a permit would be required under both laws);
>
> (2) expansion of the general permit concept by establishing nationwide permits for specific types of discharges (such as minor road crossing fills or some materials discharged for bank stabilization) and discharges into certain waters (such as non-tidal rivers and streams above the headwaters); and
>
> (3) redefinition of wetlands by abandoning the distinction between coastal and inland areas and including the term "and adjacent wetlands" to each category of "waters of the United States" in order to emphasize protection and control of the total aquatic system. 104/

In the preamble to these regulations the Corps stated the view that the wide expanse of the section 404 program stemmed from concepts of hydrologic cycles, demonstrating that, after its initial reluctance to broaden its regulatory program, the Corps had accepted a wider view of its responsibilities.

> The regulation of activities that cause water pollution cannot rely on these artificial lines [such as mean tide line], however, but must focus on all waters that together form the entire aquatic system. Water moves in hydrologic cycles, and the pollution of this part of the aquatic system, regardless of whether it is above or below an ordinary high water mark, or mean tide line, will affect the water quality of the other waters within that aquatic system. 105/

These final regulations also spelled out in greater detail the Corps' general public interest review policies and coordination with other Federal

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104/ U.S. Department of Defense. Department of the Army. Engineers Corps. Regulatory Program of the Corps of Engineers. Federal Register, v. 42, no. 138, pt. ii, July 19, 1977. p. 37122.

105/ Ibid., p. 37128.

agencies and statutory authorities, noting, for example, that the Corps would "give great weight" to the views of the U.S. Fish and Wildlife Service, National Marine Fisheries Service, and State fish and wildlife agencies "with a view to the conservation of wildlife resources by prevention of their direct and indirect loss and damage." 106/ Concerning wetlands in particular, the regulations stated that each permit review would take into account the cumulative impact of numerous piecemeal alterations and that

> no permit will be granted...unless the District Engineer concludes...that the benefits of the proposed alteration outweigh the damage to the wetlands resource and the proposed alteration is necessary to realize those benefits. 107/

The Chief of the Regulatory Functions Branch recently interpreted the evolution of the Corps' public interest review process, a process intended to make determinations in the face of competing and conflicting claims of what is socially valued. He made the following comments about the evolution of considerations in making a permit decision.

> For the past few years, considerable weight has been assigned to the loss of wetlands. On the other side of the balance, energy development has been gaining weight at a steady pace. Food and fiber production are also gaining weight. On the deny side of the balance, we saw a rapid gain in the attention given to cultural and historic values, but this appears to have leveled off. Water supply and conservation are already major factors out West and promise to be of great importance in the East as well. This factor may find itself on the issue or deny side of the balance depending on the nature of the proposal. Water quality and fish and wildlife values continue to be of great interest to the public and, consequently, command respectable weights on the balance.
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> Not only do the weights given to the public interest factors change in time but they vary considerably geographically. The regional fine tuning of the public

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106/ 33 C.F.R. 320.4(c).

107/ 33 C.F.R. 320.4(b)(4).

interest balancing process is a very important aspect of the Corps' regulatory program. 108/

Despite the apparent expansive scope of its regulatory jurisdiction, the Corps has estimated that approximately 20 percent of total wetlands are beyond the reach of its programs. Excluded areas are wetlands that are not linked to a tributary system, those that are less than 10 acres in size, and those that are in headwaters of tributary streams with average annual waterflows less than 5 cubic feet per second (cfs) (essentially upland wetlands). Included among the major areas outside of the regulatory program are bottomland hardwoods of the Lower Mississippi Valley and many prairie potholes in the North Central United States. 109/

The Permitting Process

The permit process is complicated. Different types of activities and scales of anticipated environmental impact follow different review processes. While the Corps of Engineers takes the overall lead, the Environmental Protection Agency, the U.S. Fish and Wildlife Service, the National Marine Fisheries Service, and State agencies all play important roles, and other Federal agencies may have a key voice in certain circumstances. Another reason for the complicated nature of the program is that standards by which permits are issued are broadly-stated, and interpretion of those standards in granting permits or attaching conditions to permits has varied from district to district. 110/

The Corps has four general criteria for evaluating permit applications. These are:

108/ Goode, Bernard N. The Public Interest Review Process. National Wetlands Newsletter, v. 3, no. 1, 1981. p. 7.

109/ U.S. Army Corps of Engineers, Impact Analysis, Draft, p. 107.

110/ Goode, The Public Interest Review Process, p. 7.

* the relative extent of the public and private need for the proposed structure or work;

* the desirability of using appropriate alternative locations and methods to accomplish the objective of the proposed structure or work;

* the extent and permanence of the beneficial and/or detrimental effects which the proposed structure or work may have on the public and private uses to which the area is suited; and

* the probable impact of each proposal in relation to the cumulative effect created by other existing and anticipated structures or work in the general area. 111/

Wetlands are given special attention in this evaluation process, which also applies to non-wetland areas. 112/ Permits for activities in wetlands are not given if the wetland performs one or more of the functions identified earlier. The two questions the District Engineer must answer are whether the proposed activity is dependent on wetland resources and environments, and whether feasible alternative sites are available. 113/ If the activity is not water-dependent and alternative sites are available, a permit is only awarded when strong public benefits can be demonstrated.

The recent history of this program is summarized in the following statistics. In FY80, approximately 17,700 applications requiring individual permits or letters of permission were received and 15,000 permits were issued. Both

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111/ Hill, Jr., Lt. Col. John R. Corps of Engineers Efforts Related to Wetland Protection. In Proceedings--National Wetlands Protection Symposium. FWS/OBS--78/97. U.S. Fish and Wildlife Service. Washington, U.S. Govt. Print. Off., 1978. p. 129.

112/ It is important to remember that a percentage of 404 permit requests do not deal directly with wetland areas; the exact percentage, however, is unknown.

113/ Hill, Corps of Engineers, p. 129.

figures increased by approximately 1,000 in FY81. 114/ These totals represent all applications: those for section 404 and section 10 of the Rivers and Harbors Act, and those for section 10 permits only. The Corps has estimated that approximately 45 percent of all applications are for section 10 permits only, 38 percent are for section 404 and section 10, and 17 percent are for section 404 only. 115/ Only 300 to 400--about 2 percent of all applications processed --are denied outright each year. Two explanations for the small number of denials are that a large number are modified or have conditions attached before the permit is issued, and an estimated 3,000 to 4,000--about 16 percent of all applications--are withdrawn or cancelled each year. Some applications are probably withdrawn when it is clear that there is no chance of approval. 116/

The 38 District offices make the vast majority of the permit decisions. The District Engineer has considerable discretion in these actions; seemingly similar proposals have been treated in different ways in different districts in the past. In FY81, only 49 of the approximately 18,700 permit applications were considered at a level higher than the District Engineer. 117/ Objections from other Federal agencies, the governor's office of the State where the application is pending, or the public can lead to a Division review of the District's permit decision. In rare cases of major interagency conflict or strong political pressure, the permit application can be forwarded to headquarters

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114/ Phone conversation with Mr. Jerry Chastein, staff member, Regulatory Functions Branch, January 1982. Figures for FY81 are estimates made by the Regulatory Functions Branch, Office of the Chief of Engineers, U.S. Army Corps of Engineers. A more precise count is planned later this year.

115/ U.S. Army Corps of Engineers, Impact Analysis, Draft, p. 23.

116/ Ibid. Figures collected by the Regulatory Functions Branch, Corps of Engineers Civil Works Division. These explanations are their interpretations.

117/ Ibid.

for a decision, under referral authority provided in section 404 and implemented by interagency Memoranda of Agreement. In many cases when this happens, as with the Hampton Roads, Virginia oil refinery proposal, the section 404 permit is used as leverage for debating other issues, ones that typically have environment versus economic development overtones. 118/

The general permit program, available where only minimal adverse environmental effects from single or cumulative actions are anticipated, has greatly reduced administrative burdens. These permits, which can be issued at three scales--nationwide, regional, and State--were initiated by the Corps in 1975 to reduce regulatory delays, and were made part of the statute in the 1977 amendments. 119/, 120/ As of late 1981, the Corps had issued 374 general permits, of which 361 were regional and 13 were nationwide. A proposal to issue 30 additional nationwide permits is pending. According to estimates of the Corps that are believed to be conservative, general permits have reduced annually the need to process 60,000 individual permits annually. 121/ In proposed regulations issued in 1980, the Corps specified 23 types of activities for which national permits would be issued. Representative activities include placing navigational aids, fish and wildlife harvesting devices, survey activities, Outer Continental

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118/ U.S. Senate. Committee on Environment and Public Works. Energy Development Project Delays: Six Case Studies. Prepared by the Congressional Research Service. Library of Congress. Washington, U.S. Govt. Print Off., 1979. Serial No. 96-7.

119/ U.S. Department of Defense. Department of the Army, Corps of Engineers. Proposal to Amend Permit Regulations for Controlling Certain Activities in Waters of the United States. Federal Register, v. 45, No. 184, pt. vi, Sept. 19, 1980 p. 62734-62736 and 62775-62777.

120/ The 1977 Amendments to section 404 are discussed more fully in Chapter V.

121/ U.S. Army Corps of Engineers. Impact Analysis, Draft. p. 21.

Shelf structures in Bureau of Land Management lease areas, certain bank stabilization activities, minor road crossing fills, and fills and dredging of less than five cubic yards. All national permits have eight special conditions attached to protect water quality, living resources, and navigation. 122/ The regulations include two additional safeguards, a review of all permits at least once every five years, and an ability to cancel general permits for specified waterbodies. 123/

Regional permits are issued by the Division or District Engineer for certain categories of activity. Examples of activities covered under this program include: minor bridge fills, certain aids to navigation, portable water intake facilities, and specified shore protection activities. 124/

An estimated 50-plus percent of permits involving wetlands include special requirements or project modification to minimize anticipated impacts of the proposed dredge or fill activity. 125/ One of the most common types of condition designed to control runoff from a waste disposal area to protect water quality in adjacent areas, requires a barrier to be placed around the disposal

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122/ U.S. Department of Defense. Department of the Army. Corps of Engineers. Proposal to Amend Permit Regulations for Controlling Certain Activities in Waters of the United States. Federal Register, V. 45, No. 184, pt. vi, Sept. 19, 1980, p. 62777.

123/ Ibid.

124/ U.S. Army Corps of Engineers. Summary of Regional Permits Corpswide. [unpublished]. This summary reflects information available on April 27, 1981. The Regulatory Functions Branch plans an update, to be completed in late 1982.

125/ Phone conversation with Mr. Jerry Chastein, Regulatory Functions Branch, January 1982.

site. Conditions and general permits have both been subject to controversy and analysis about their environmental and regulatory effectiveness. 126/

Concerns about the permit process have caused the Presidential Task Force on Regulatory Relief to request that the Corps, with OMB, review the section 404 program. The five topics addressed in the review were:

1. shorten permit processing time;
2. give states more opportunities to issue permits;
3. eliminate conflicting and overlapping policies;
4. expand regional and nationwide general permits to give blanket approval to certain dredge and fill activities; and
5. more explicitly define the objectives and jurisdictional extent extent of the permit program. 127/

The review was conducted using the Regulatory Impact Analysis process defined in Executive Order 12291 on regulatory reform. A draft study has been completed which reviews the present program in terms of benefits and costs, and suggests several alternatives. This report has been submitted to the Task Force on Regulatory Relief 128/

The Role of EPA

EPA has substantial responsibilities under the section 404 program. These diverse responsibilities, which presume active cooperation between the Corps and EPA, include the following:

126/ For example, see Blumm, The Clean Water Act's Section 404 Permit Program, p. 428-432; and Holmes, Federal Participation in Land Use Decision Making, p. 394-396.

127/ National Wetlands Newsletter, Corps Reviews Section 404, v. 3, no. 5, 1981. p. 6.

128/ U.S. Army Corps of Engineers, Impact Analysis, Draft.

1. Works with the Corps in developing 404(b)(1) guidelines; 129/
2. Under Section 404(c), EPA has the ultimate authority to veto permits based on certain environmental criteria; this authority has been used only once for a proposal in Florida.
3. EPA can designate geographic areas and ecosystems where EPA will make final determinations on all permit proposals; the bottomland hardwoods area in the lower Mississippi and a bay in California are the two areas to be designated to date.
4. EPA is to assist States in developing supervisory responsibilites where the responsibility for issuing permits in certain areas has been delegated from the Federal level; there are no approved State programs at this time.
5. Pursuant to a 1977 advisory opinion of the U.S. Attorney General, EPA can locate where the boundary line of navigable waters, that is, determine where the 404 program comes into play, are located.
6. EPA has the authority is required to halt discharges, where a section 404 permit has not been obtained. This is a common violation of the 404 program requirements. 130/

EPA's multifaceted role in the 404 program has been the subject of considerable debate. The environmental community has generally expressed increased confidence in the program because of EPA's strong role. One analyst, however, cites a lack of funding that inhibits EPA from carrying out this role. In

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129/ Under section 404(b)(1) of the FWPCA, EPA has issued guidelines for specification of acceptable disposal sites. Final rules were issued December 24, 1980 (40 C.F.R. 230).

130/ Summerized from Holmes, Federal Participation in Land Use Decision Making, p. 393-398. The specific facts about implementation were obtained during a August 1981 phone conversation with David Davis, Office of Federal Activities, Environmental Protection Agency.

1979, EPA had funding sufficient only to review 10 percent of the permit applications. 131/ On the other hand, many critics of the program contend that EPA's role is too strong. They feel that since EPA is charged with making environmentally-oriented decisions, based on its primary mission to protect water quality, EPA's influence tends to disrupt the primary missions of the Corps, which are developing water resources and maintaining navigability of water courses.

EPA has published a program strategy outlining its role in meeting its responsibilities under section 404. 132/ The Strategy defines EPA's approach to implementing its wetland authorities, including its legislative mandate and institutional structure to address section 404 program goals and objectives, and its agency policies and strategies. The Strategy places this program within the context of EPA's broader organization and related programs which help define the regulatory environment of the section 404 program. The Strategy has been in effect for less than two years, and no evaluation of its accomplishments or shortcomings has been published.

Roles of the Fish and Wildlife Service and National Marine Fisheries Service

Both Services participate in the 404 permit process through their responsibilities under the Fish and Wildlife Coordination Act. This Act requires that wildlife receive "equal consideration" in Federal water resource development activities. The Fish and Wildlife Service is generally involved in freshwater wetland areas, and both services are likely to be involved when actions in coastal wetlands are contemplated.

131/ Blumm, The Clean Water Act's Section 404 Permit Program, p. 422.

132/ U.S. Environmental Protection Agency. Office of Water Regulations and Standards. Criteria and Standards Division. Section 404 Program Strategy. Washington, June 1980. 15 p.

The Corps and the Fish and Wildlife Service work through a memorandum of understanding, signed in 1967, which requires consultation and consideration of fish and wildlife resources in permit decisions. If the Corps' district office and the Service's regional office cannot agree on a permit decision, the disagreement can be referred to the national offices of both agencies.

The role of both Services is only advisory. 133/ In reviewing permits, the Fish and Wildlife Service uses two concepts; whether alternative non-water sites are feasible, and whether construction and operation can be accomplished in the least environmentally destructive manner. Subsequent legislative enactments such as the National Environmental Policy Act and administrative pronouncements, such as the Executive Order on Protection of Wetlands (E.O. 11990), have strengthened the coordination process and the role of these two advisory agencies, as well as other Federal agencies and departments.

OTHER WETLAND PROGRAMS

Water Bank Program

The Water Bank Program, administered by the Agricultural Stabilization and Conservation Service (ASCS) in the Department of Agriculture, makes payments to landowners and farm operators under 10-year land-use agreements in important migratory waterfowl nesting and breeding areas. Agreements include provisions for renewal. During the life of the agreement, the property owner agrees not to destroy the wetland qualities of the area by such activities as draining, filling, or burning. The payment rate varies for each agreement, and the rate

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133/ Hirsch, Allan. Wetland Protection Programs of the U.S. Fish and Wildlife Protection Symposium. In Proceedings-National Wetlands Protection Symposium, FWS/OBS-78/97. U.S. Fish and Wildlife Service. Washington, U.S. Govt. Print. Off., 1978. p. 112.

can be reviewed after 5 years and at the time of renewal, to bring it in line with changing market conditions.

By 1979 the program, operating since 1972, had resulted in 5,205 agreements that designated more than 585,000 acres for wetland protection. In FY 1981, an additional 80 agreements and 11,000 acres were expected to come into the the program. Participation is concentrated in the prairie pothole region of the upper Great Plains. States with the largest areas participating in this program are North Dakota, South Dakota, and Minnesota. 134/

Wetland Acquisition Programs of the Fish and Wildlife Service

In 1977, the Service managed approximately 12 million acres of wetlands. 135/ Most of these wetlands have been acquired under provisions of the migratory bird land acquisition program. A representative of the Fish and Wildlife Service stated that this program, funded mainly through the sale of "duck stamps," has been used to acquire over 2.2 million acres of waterfowl habitat in the lower 48 States between 1935 and 1976. In 1977 alone, revenues from the sale of duck stamps totaled $12 million. The goal of the program, in 1975, was to preserve an additional 1.9 acres through fee acquisition and easements. 136/ This goal is also supported by funds from the Wetlands Loans Act of 1961, which authorizes funds to accelerate wetland purchases (ultimately to be repaid from future "duck stamp" revenues).

134/ U.S. Department of Agriculture. 1982 Budget Explanatory Notes, v. 2. Washington, 1981. p. 306-311.

135/ Holmes, Federal Participation in Land Use Decision Making, p. 383. Approximately 8.8 million acres are in Alaska and the remainder are in the lower 48.

136/ Hirsch, Wetland Protection Programs, p. 110-111.

Additional areas, including wetlands, are acquired under the Land and Water Conservation Fund Act to protect endangered species, to extend National Wildlife Refuges, and to protect important natural resource areas. Through FY77, approximately 60,000 acres had been acquired for endangered species protection and an additional 40,000 acres for the other two purposes. 137/ Since 1981, appropriations have been proposed that would greatly reduce this fund, but Secretary of the Interior James Watt has expressed a strong commitment to wetland protection in the future. 138/ It is unclear how these two contrasting policies (reduction of the fund versus increased wetland protection) will be made compatable.

Executive Order 11990--Protection of Wetlands

In May 1977, President Carter issued a series of Executive Orders concerning protection and enhancement of the environment. Executive Order 11990 specifically established a broad national policy for conserving and protecting wetlands. It requires all Federal agencies to refrain from supporting, assisting, or financing new construction in wetlands unless there is no practicable alternative and the activity will utilize all feasible means of minimizing harm. 139/ It also provides opportunity for early public review of Federal agency plans or proposals regarding new construction in wetland areas.

137/ Ibid., p. 110.

138/ Department of the Interior News Release. Nation's Wetland Acquisition Program Must Continue, Watt Says. Washington, October 9, 1981. p. 1-2.

139/ The President (Carter). Executive Order 11990--Protection of Wetlands. Federal Register, v. 42, no. 101, May 25, 1977, p. 26961-26963.

In a statement accompanying this order, President Carter noted, "The problem of loss of wetlands arises mainly from unwise land use practices." 140/ The Federal government can cause or influence such practices in several ways, including actual construction, management of its own properties, and provision of financial or technical assistance. The intention of the Order, he said, was to insure that Federal agencies avoid actions having both short and long-term adverse impacts on wetlands.

Another environmental protection Executive Order issued at the same time was E.O. 11988 concerning floodplain management. This Order establishes a step-by-step procedure to evaluate and minimize flood hazards by seeking practical alternatives. If none exists, the required analysis is extensive, and provides for review and consultation by several agencies. Because most wetlands are situated in floodplains, implementation of both Executive Orders has been virtually identical. According to the Water Resources Council, which was required to evaluate the effectiveness of the Orders, by May 1981, all but a few of the Federal agencies had issued joint regulations to implement both Orders in interim or final form. Based on limited analysis, it appears that the requirement in both Orders to consider all practicable alternatives prior to a construction activity has proven cost-effective (by preventing activities that would damage wetland areas). 141/

The actions of the Bureau of Land Management are perhaps typical of agency responses. The Bureau developed and issued, in draft form in 1978 and in final

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140/ U.S. President, 1977-1981 (Carter). Protection of Wetlands. Statement by the President accompanying Executive Order 11990. Weekly Compilation of Presidential Documents, v. 3, no. 22, May 30, 1977. p. 808.

141/ Thomas, Frank. Progress Report. Implementation of Executive Order 11988, Floodplain Management, June 1, 1981. Washington, U.S. Water Resources Council. Unpublished report.

form in 1980, new guidelines for protection of wetlands and riparian areas on public lands under its jurisdiction. The guidelines address several topics, including methods to protect and enhance wetlands and wetland management practices. Management practices include use of buffer strips, designations of critical environmental areas, public land withdrawal, and managing such common practices as grazing and timber harvesting. 142/

Adverse Effects of Other Federal Programs

At the same time that the Federal programs discussed above are operating to protect wetlands, paradoxically, a number of other Federal programs are contributing to degradation of wetlands and water quality, by encouraging conversion of wetlands for alternative land use practices. These include various agricultural subsidies, price supports, low interest loans, and flood control projects for agricultural development in floodplain areas.

For example, the Farmers Home Administration makes grants and low interest loans to promote agricultural development, much of which has led to losses of bottomland hardwood forests in the Lower Mississippi Valley. The Department of Agriculture provides crop subsidies which can influence conversion of natural bottomlands to farmland, as well as increase water pollution. Likewise, flood protection programs of the Soil Conservation Service and of the Corps itself have modified or eliminated many floodplains wetlands through alterations to the hydraulic/hydrologic regime. Thus, the national programs that

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142/ U.S. Department of the Interior. Bureau of Land Management. Wetlands--Riparian Area Protection and Management; Policy and Protection Procedures; Final Guidelines. Federal Register, v. 45, no. 25, Feb. 5, 1980. p. 7889-7895.

exist to protect wetlands may be viewed as means to balance and mitigate the degrading effects of other Federal programs such as these. 143/

SUMMARY

Section 404 is clearly the key program in Federal wetland management. It has been the subject of numerous concerns and complaints, mostly by permit applicants who have encountered what they see as unnecessary, unreasonable, or unwise delays and decisions. These concerns, coupled with concern about the expanded geographic coverage of the program, have brought pressure on Congress to give the program an intensive review. Current issues include delay, uncertainty, possible inconsistency of permit decisions, and the interagency review process inherent in the section 404 program. These concerns are part of two more general issues about the current set of programs that provide for wetland management.

First, there is no national wetland law. Experts in the wetland field have debated the need for such a law in many forums in the past. Many prefer the present arrangement because it covers most wetland areas, has some regulatory flexibility by focusing attention on the more significant proposals, and minimizes usurpation local land use planning prerogatives. Others would like to see a wetlands law that sets clear policy for wetland areas, defines the term wetland in Federal law, and directly confronts wetland value issues.

Second, the issue of whether wetlands use and modification should be regulated through a water quality approach or through controls on land use continues to be troublesome. The water quality approach, as presently used, is a very imprecise fit with wetland resources. It does not cover all activities that affect wetlands, yet, it applies to virtually all water areas. As one

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143/ U.S. Army Corps of Engineers. Impact Analysis, Draft, p. 76-77.

member of EPA's staff who works with this program stated, "Section 404 is both bigger and smaller than a comprehensive wetlands program." 144/ Alternative approaches oriented to land use controls might have found some favorable response in Congress five to ten years ago, when coastal zone and national land use legislation proposals were being debated; but in the recent past, any legislation that can be even tangentially tied to Federal land use planning has died a quick death or been subject to such extended scrutiny and criticism that final affirmative action has not been taken.

One result of disagrement as to the most appropriate approach at the Federal level has been growing efforts by States, and to a lesser degree, local government, to create their own programs. These programs differ from the Federal effort in many ways, and vary greatly from State to State. The next chapter briefly reviews these programs.

144/ Phone conversaion with David Davis, Office of Federal Activities, Environmental Protection Agency, August 1981.

CHAPTER IV: STATE AND LOCAL WETLAND MANAGEMENT PROGRAMS

INTRODUCTION

Programs for wetland management have been developed by a number of State and local jurisdictions in recent years. As the number of programs grows, they are becoming an increasingly significant force in wetland management. These programs take many alternative approaches to wetland management. Their recent evolution is an indication that Federal programs are not satisfying all State and local needs. Many of these programs are efforts to implement wetland goals that differ from Federal programs.

The number of State and local programs to regulate wetland area uses and alteration is now substantial. A 1979 survey found

> at least 15 states regulate or establish standards for local regulation of coastal wetlands. Six states exercise some control over inland wetlands. More than 1000 local communities have adopted wetland protection regulations pursuant to these acts or other standards contained in broader shoreland or coastal zone acts." 145/

Development of coastal zone management programs, greater awareness of wetland values, and the expanded jurisdiction of the Clean Water Act's section 404 program have contributed to the growth of State programs. 146/

145/ Kusler, Jon. Regulating Sensitive Lands. Cambridge, Ballinger Publishing Co., 1979. p. 32.

146/ U.S. Department of the Interior. Fish and Wildlife Service. Office of Biological Services. Strengthening State Wetland Regulations. FWS/OBS-78/98. Prepared by Jon Kusler, Environmental Law Institute. Washington, U.S. Govt. Print. Off., 1978. p. 7-9.

STATE AND LOCAL PROGRAM CHARACTERISTICS

State programs vary widely, and all are different from the Federal program. 147/ Important variations are found in definitions of wetlands, activities subject to regulations, and geographic extent of coverage.

State and local programs most commonly define wetlands in coastal areas using vegetation and high water lines. Inland wetlands are more difficult to define; they can vary much more widely in vegetative, hydrologic, and soil characteristics over a small area. They can be defined by flooding patterns, vegetation, or (only in Connecticut) soil types. As a result, not only may State programs be inconsistent in the areas covered, but the State programs often do not coincide with the Federal one. Where the U.S. Fish and Wildlife Service national inventory defines wetlands under a different definition from the State's definition, boundaries of designated areas do not coincide. With different definitions and boundaries, Federal permit program does apply at the same sites as do State or local programs.

Most State wetland programs have geographic limits. Most coastal wetland programs are tied to the State's coastal zone management program, and wetlands covered under the program are located within coastal zone boundaries. The Federal Coastal Zone Management program has only general guidelines on defining a State coastal zone, so it varies in width inland from the shoreline, from several hundred feet to several miles or more in different States. Most State inland wetland programs only apply to wetlands larger than a minimum size. For example, the New Hampshire act applies to lakes or ponds larger than 10 acres, the New York act applies to areas greater than 12.4 acres,

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147/ Local programs are even more diverse than State programs in their procedures and requirements, and in the definition of protected wetland areas.

and the Rhode Island act definition includes swamps larger than three acres and marshes larger than 10 acres. 148/

Almost all programs regulate dredge or material removal and fill in one way or another. Other objectives of different State programs include protection of fish spawning and duck nesting areas, aquifer recharge areas, hunting areas, rare plants and animals, scientific research areas, scenic beauty, and certain ecological functions, and flood storage and pollution control. 149/ Many State programs also exempt certain uses.

Legislation creating many of these programs touches on similar topics, including

1. legislative finding of fact concerning wetland losses;
2. statement of statutory purposes and policy;
3. definition of wetlands;
4. authorization for a designated agency to map wetlands;
5. delegation of powers to regulate wetland uses directly or indirectly;
6. requirement that landowners seek permits for certain kinds of land uses in wetland areas;
7. penalties for violating standards; and
8. appeal procedures. 150/

Table 3 summarizes several characteristics of State programs including coverage, regulatory roles, and program features. Some States treat all wetlands equally, while others combine a general regulatory approach with a more

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148/ U.S. Department of the Interior. Strengthening State Wetland Regulations, p. 17.

149/ Kusler, Regulating Sensitive Lands, p. 34.

150/ Ibid., p. 11.

protective program for certain highly threatened or particularly valuable wetland areas.

TABLE 3. State Wetland Programs

State	Coverage	State/Local Role	Program
Alabama	coastal	State regulation	After a State plan has been completed, permits are required for activities in the coastal zone (dredging, dumping, certain structures) which alter tidal movement or damage flora and fauna.
California	coastal	regional regulation	Permit required for development up to 1000 yards from mean high tide, and for fills within 100 feet of San Francisco Bay shoreline.
Connecticut	coastal	State regulation	Permit required for all regulated activity; State inventory required.
	inland	local regulation	State regulates if local units do not; local regulation resumes upon State approval of local program.
Delaware	coastal	State regulation	Permits required for activities in coastal wetlands.
Georgia	coastal	State regulation	Permits required for activities in coastal marshlands.
Maine	coastal	State and local regulation	Local permits required for filling, dumping, dredging, or sewage discharge into coastal wetlands; State may disapprove permit.
Maryland	coastal	State regulation	State and local permits required for activities in State wetlands; State permits for many activities include dredging, filling, and removing on private wetlands; coastal wetlands to be inventoried.

TABLE 3. State Wetland Programs (continued)

State	Coverage	State/Local Role	Program
Massachusetts	coastal/ inland	State and local regulation	State permits required in some instances for fill or alteration of wetlands in coastal areas; local permits also required. Local permits required for alteration of inland wetlands. State permits may be required.
Michigan	inland	State regulation	Permits required for dredging, filling or construction on bottomland, and creating or interfering with an inland lake, stream or artificial channel.
Mississippi	coastal	State regulation	Permits required for regulated activities including dredging and dumping; many exemptions.
New Hampshire	coastal/ inland	State regulation	State permit required to excavate, dredge or fill lands in or adjacent to tidal or inland waters; notice to local governments and abutting landowners required.
New Jersey	coastal	State regulation	State permits required for dredging, removing or filling a wetland; agricultural activities are exempted. An inventory is required.
New York	coastal (tidal)	State or local regulation	State permits required for wetlands alteration; State inventory required.
North Carolina	coastal	State regulation	State permits required for excavation; may be denied on certain grounds. Abutting landowners to be notified.
Rhode Island	coastal/ inland	State regulation	State designates coastal wetlands by order, and limits use; permits required for depositing materials on intertidal salt marshes. State permit required for altering inland wetlands.

TABLE 3. State Wetland Programs (continued)

State	Coverage	State/Local Role	Program
Virginia	coastal	State and local regulation	State permits required for activities in tidal wetlands; local units may adopt ordinance contained in the statute; State board reviews certain local conditions; prior non-conforming uses exempted.
Washington	coastal	State regulation and standards for local regulation	State adopts guidelines for local programs for certain shorelines; State may regulate if local unit fails to do so in shorelines of Statewide significance; State directly regulates certain uses of Statewide significance.

Source: Adapted from: Kusler, Regulating Sensitive Lands, Appendix B: Profile of Selected State Sensitive Area Regulatory Programs, p. 175-184.

Note: Kusler made judgments in deciding what programs to include. For example, Minnesota and New York operate extensive freshwater wetland programs which are not included. Other State programs may also affect wetland management. Many States have programs to control uses in flood plains. Because most wetland areas are in flood plains, these programs influence State and local wetlands regulation. Several States have critical area programs that may affect wetlands, depending on designation. These States include: Florida, Maine, Maryland, Minnesota, Nevada, North Carolina, Virginia and Wyoming.

When States have a permit program, the applicant may be confused by inconsistent State and Federal requirements or duplicative review procedures. If an applicant must apply for both a Federal and a State permit, most States will have two reviews, one for the application submitted to the State and the second as part of the Federal permit review process. The Corps of Engineers has apparently followed an unofficial policy of denying permits when the State has objected to the permit application. However, the reverse has not been true State approval of a permit does not automatically mean Federal approval.

The Clean Water Act Amendments of 1977 allow EPA to delegate program responsibility for dredge and fill permits in areas outside navigable waters and adjacent wetlands, sometimes referred to as Phase II and Phase III waters, to States that meet a variety of requirements. To date, States have been deterred by these cumbersome requirements and regulations, issued in 1980. 154/ Some States have been dissuaded because the Act offers no direct financial support for such a program. 152/ Others may object because they can only assume management of certain waters within their jurisdiction. Further, EPA can always override a State decision to award a permit. In summary, States would assume a potentially large workload without a desirable level of control over the program or a desirable geographic range of control. For these reasons, no State has submitted a program proposal, although several have received small grants to conduct feasibility and pilot studies. 153/ State interest has been revived recently, according to an EPA representative, by a combination of problems with Corps' inactivity in Phase II and Phase III waters, and an expression of States' rights. 154/

151/ U.S. Environmental Protection Agency. Consolidated Permit Regulations. Federal Register, v. 45, no. 98, May 19, 1980. p. 33290.

152/ Moreover, in view of current Federal budget cutting efforts which have included reduced grant support for State environmental programs generally (for FY 1983 the Administration proposed a 20 percent reduction in grants for State water quality programs), many States may find it increasingly difficult to assume new responsibilities, such as section 404 permitting.

153/ Phone conversation with Lauri Williams, EPA Office of Federal Activities. She stated, during a conversation in January, 1982, that eight states had received grants, averaging about $60,000 to conduct feasibility studies. If these studies are successful, funding is then provided for pilot studies. She believes one or two states may assume programs by the end of 1982. States participating (and their status) are: Rhode Island (pilot), Pennsylvania (feasibility), Michigan (pilot), Oklahoma (feasibility), Nebraska (feasibility), Wyoming (feasibility), Washington (feasibility), and Alaska (feasibility).

154/ Ibid.

One State attempting to develop a stronger program, North Carolina, has been granted a general permit from the Corps of Engineers for most activities in coastal counties, the area under the jurisdiction of the State's approved coastal zone management program. 155/ Under its agreement with the Corps, if the State issues a permit, the section 404 permit is automatically awarded. This program has a permit rescission provision if objections to the proposed project are raised. Permit applications are sent to all Federal agencies for review and comment, just as under the Corps program. This program provides a single stop for the permit application in coastal areas.

A second State attempting to improve the permit process is Michigan. This State has made a number of administrative and technical adjustments that allow the program to process permit applications much more rapidly in non-controversial projects. When a new centralized processing capability comes on line in 1982, the average processing time for 75 percent of the applications should be 10-15 days. The average processing time was 90-120 days in 1978. 156/

VIEWS FROM STATE PROGRAMS

Individuals with wetland management responsibilities in seven States were contacted by CRS during preparation of this report. The seven States were

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155/ Owens, David. North Carolina's Regulatory Program. In Coastal Zone Management Information Exchange. Washington, National Oceanic and Atmospheric Administration, February 1982. p. 10-11.

156/ Shafer, Chris. Michigan's Shoreline Construction Permit System. In Coastal Zone Management Information Exchange. Washington, National Oceanic and Atmospheric Administration, February 1982. p. 9-10.

Louisiana, California, Wyoming, Utah, Massachusetts, Minnesota, and Connecticut. 157/ Only the last three have been recognized by analysts as having a distinct wetland regulatory management program, but wetland managers from each State saw their programs as having a key role. 158/ Four of the seven (California, Massachusetts, Minnesota, and Connecticut) have State wetland laws. The seven States were chosen to provide geographic variation, to include a broad range of wetland situations (in terms of scarcity, degree and scale of alteration, and natural values), and to include a range of programs from those that have received national acclaim as leaders in the field to those that are considered by analysts to be insignificant.

In phone interviews with managers of these State programs, several issues were addressed, including: flexibility of the State program, problems and variables in differentiating wetland types, concerns about regulatory processes (Federal and State), and views on State and Federal responsibilities.

State wetland managers view their programs to be different from the Federal program in several ways. A basic premise of the Federal program appears to be that all wetlands are equal, so the key in protection is to have an area designated as a wetland. Most of the State wetland managers felt that further distinctions should be made among wetlands. Managers from States recognized to have stronger programs and stronger protection constituencies

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157/ Individuals contacted included: Louisiana - Joel Lindsey, Coastal Resources Program; California - Bob Randovich, Department of Fish and Game and Eric Metz, California Coastal Commission; Wyoming - Paul Cleary, State Planning Coordinator's Office; Utah - Casey McGirley, Division of Wetlands; Minnesota - John Wells, Minnesota Water Planning Board; Connecticut - Allan Williams, Natural Resource Center. The contacts were made by phone during July and Auguest, 1981. A CRS intern, Julia Johnson, contacted most of these individuals.

158/ Kusler's work is probably most-widely recognized among policy analysts. Another analyst who has worked extensibely on State wetlands programs is Nelson Rosenbaum, formerly with the Urban Institue.

seemed to want to strongly protect wetlands under their jurisdiction. 159/ The manager from Connecticut thought that wetlands should be judged on the values of functions they perform today, not on either the causes of change or former values. This basis for making a judgment is evidently a problem in deciding whether some permits should be issued. The California coastal zone management program distinguishes degraded wetlands in coastal areas. These wetlands, which have little or no remaining biological value, are not as well protected, and instead, efforts are centered on the protection and restoration of more viable wetland areas. 160/

Three of the surveyed States, Minnesota, Connecticut, and Massachusetts, recognize size as an important variable. In the first two States, statutes set a minimum size for wetlands to be included in the regulatory program. There was a general sense expressed by all three managers that small wetlands are more difficult to administer through their programs. Managers from three of the States (Connecticut, Utah, snd Wyoming) cited special problems in reviewing permit proposals that would modify small created wetlands. Managers from the two western States (Utah and Wyoming) were especially concerned that these wetlands, which appear to have limited ecological value in many cases, had become the center of some serious conflicts between Federal permiting authorities and project proposers.

159/ Flexibility has been a contentious issue in wetlands management. Some have argued that programs should be flexible, recognizing that many small or modified wetlands have limited value for each wetland function. Others call for protection of all remaining wetlands, citing both the large losses in the past and increased knowledge about high values generally.

160/ Metz, Eric and Michael Delapa. California's Wetland Regulatory Program: Developing an Interpretive Guideline for Protecting Significant Natural Resources. In Edge, Billy, ed. Coastal Zone 80. New York, American Society of Civil Engineers, publication pending.

Several of the State managers were most concerned with the cumulative loss of wetlands and the impact of those losses on larger ecological systems. As a result, programs for mitigation and restoration seem to be rapidly gaining in popularity. None of the State respondents discussed either the cumulative loss or the incremental impact questions in detail, nor were any specific suggestions given on how to consider these problems in future permit decisions.

Several managers also pointed to problems and concerns in differentiating wetland types. The wetland manager from Massachusetts pointed out that coastal wetlands are all treated similarly because, from the standpoint of the State's requirements, they are similar natural units. Inland wetlands, on the other hand, present difficult problems because of the wide variety of natural systems, each with its own set of functions and values.

The State of Louisiana is developing a three-tiered system to deal with its wetlands. The highest tier will include special management areas, where protection will be strongest. These areas are being proposed by a team of scientists using 12 factors including measures of biological productivity, the condition of the wetland, and the species that inhabit it.

The Minnesota wetland manager pointed out another problem in differentiating wetlands--seasonal variation. Many inland wetland types expand and contract during wet and dry seasons. He reported that, in one recent case, a permitting decision had been appealed to the district court. The case was heard during the dry season. The judge visited the site, walked across it without getting his feet wet and declared that it was not a wetland and could be converted to another use. If he had visited the same site during the wet season, he would have had trouble wading through the birds.

Concern was expressed about limited compatibility between Federal and State programs. Several State program managers said that the Federal classification

and inventory systems are not specific enough to be of high value in State and local programs. Part of this problem stems from variations in the legal definition of wetlands. For example, in Connecticut the State defines coastal wetlands and inland wetlands in two different ways, and neither conforms to the definition used by the Corps of Engineers or the U.S. Fish and Wildlife Service. 161/ The States need maps that accurately delineate boundaries to use for making specific decisions. The Massachusetts respondent saw the Federal maps from the current Fish and Wildlife Service inventory as a planning tool, while State maps needed to make decisions are almost survey maps. A line on Federal inventory map marking a wetland boundary would be 100 feet or more wide and is of little value if transferred directly to the ground. For example, in his State, maps at 1:600 are used in coastal areas and indicator plant species are used to locate inland areas. Some States, such as Minnesota, require their own inventory. The Utah respondent stated that the inventory products would be far more useful if the State could participate in the designation process, along with the Federal agencies, so that future programs would agree on the general location and boundaries of wetland areas.

The regulatory process was the subject of another set of comments. Some managers felt that there were problems between the State and Federal programs. Not surprisingly, these concerns were most strongly expressed by representatives of States with the most sophisticated programs. The duplication of the permit process was specifically mentioned by managers from Louisiana, Connecticut, and Massachusetts. Duplicative programs translate into more work for the applicant, often for no apparent reason. In all three States, the State is

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161/ Connecticut defines coastal wetlands by high water elevation and vegetation type. Inland wetlands are defined by soil types that are poorly drained, alluvial, or in the floodplain.

attempting to work out cooperative arrangements with the key Federal agencies to develop a simpler system that operates through the State, at least for certain types of permits. In Connecticut, under the present system, applicants file two permits. But the State and Federal government define wetlands differently, so in some cases, only one or the other permit is needed. This State is trying to arrange with the Corps to review permits so that both applications could be processed in a single step.

It is not uncommon for Federal agencies and the State agency to disagree on a permit. Most of these disagreements are evidently not on whether to award the permit or not, but rather on conditions to be attached to the permit. These conditions, which further define how or when the work is to be done, may be inconsistent or even incompatible. This lack of coordination can leave the applicant bewildered about what to do next and can further delay his project. Several managers differentiated large, controversial proposals which receive detailed attention from smaller proposals. State and Federal wetland people tend to coordinate their review and analysis of large projects, but work independently on smaller proposals, primarily because of time constraints.

Other sources of concern to individuals seeking a permit are the length of time required to process it and actual Federal review. On the first point, the Louisiana wetlands manager noted that the State processed 65 percent of its applications in 55 days while the Corps processed 50 percent in 75 days. According to the Massachusetts manager, his State requires action within 70 days, while the Corps can take up to six months. In terms of Federal review, it should be noted that individual District offices of the Corps vary in the average length of time required to process a permit application; this fact may, in part, explain differences reported by the States. For example, the

General Accounting Office recently found differences among three District offices. Average processing time ranged from 168 days for the Baltimore District offices to 203 days for the Philadelphia District office. 162/ Yet the nationwide average for all District offices is 128 days, according to the Corps. 163/

In addition, in Massachusetts, the Corps only reviews a very small percentage of all applications. The State reviews 3,000 applications a year while the Corps District office averages 250 per year for the entire New England region. Several managers thought the States could do a better permit review job at a lower cost than the Federal program. The States, according to these individuals, have fewer bureaucratic procedures and are more aware of local situations and conditions.

But the States do not want the Federal presence to disappear. The Minnesota manager best stated this when he said that his State is sometimes faced with an application that should be denied, but rejection is not politically feasible. The Federal agencies have been very cooperative in backing the State by denying the permit, he said. The Massachusetts manager saw the most useful role of the Corps as being able to step in and police the program. Thus, in the ideal situation they would like to see the Corps participate on a selective basis, with the State helping to determine how selections are made.

162/ U.S. General Accounting Office. Managerial Changes Needed to Speed Up Processing Permits for Dredging Projects. CED-80-71, June 9, 1980. Washington, 1980. p. 15.

163/ U.S. Army Corps of Engineers, Impact Analysis, Draft, p. 40.

SUMMARY

State and local programs to manage decisions about wetlands use are diverse. They range from strong regulatory programs to weak review and comment programs. The interest in changing the balance between State and Federal program roles in the seven States contacted seems high. State representatives feel they can manage programs more effectively and be more responsive to local considerations and needs than can the Federal government. They also implied, through their responses, a frustration with the organization and operation of the Federal program. Two of the representatives commented that they could do the same job better than the array of Federal agencies at a fraction of the cost. This contention may be important as reauthorization of the Clean Water Act (including review of section 404) is debated in the Congress.

The diversity of State programs frequently conflicts with the uniform and relatively inflexible qualities of the Federal program. This conflict is largely a measure of the variation between national and more local goals for managing the wetland resource and it has repeatedly surfaced in Congress. In Chapter V, that conflict, as measured through the variety of wetland legislation lation introduced and debated since 1973 is examined.

CHAPTER V: CONGRESSIONAL INTEREST IN WETLANDS

INTRODUCTION

Congressional attention to wetland issues has been growing during the past decade as conflicts have intensified between those who would modify these areas for other uses and those who would leave them as naturally productive areas. Growth in congressional interest is a result of both increasing knowledge and awareness of the variety of values provided by wetlands, and the expanded jurisdiction of section 404 resulting from legal interpretations. Before the 1960s, the only widely recognized wetland values were as habitat for waterfowl and for certain fish species. Positive congressional action was limited to waterfowl protection, yet that congressional interest took several forms: establishing national wildlife refuges, enactment of the Wetlands Loan Act and subsequent amendments, and continuing oversight hearings on wetland acquisition and on appropriations for the Fish and Wildlife Service, which was responsible for direct acquisitions. Few conflicts came to congressional attention because wetland resources seemed extensive enough to meet recognized habitat needs and still satisfy the demand of those who would convert them to other uses. In addition, most refuges are in rural settings, where alternative demands were minimal, with the exception of agriculture and timber harvests. As awareness of habitat values has expanded and been reinforced by recognizing other values, pressure to protect wetlands has increased. At the same time, development pressures on wetlands have also intensified, as alternative sites have declined in number and increased in value. Combined,

these trends have stimulated consideration of a variety of wetland legislative proposals.

Congressional interest has taken three general forms, addressed in the policy issues in Chapter I. First, Federal legislation has treated wetlands as a water pollution question; the goal of section 404, which requires permits for all dredge and fill activities in navigable waters of the United States, is to maintain or improve water quality. Wetlands are protected from the two direct alterations, dredging and filling, that are associated with water pollution under the Clean Water Act; but many questions have been raised by this approach.

Second, the geographic coverage of the section 404 provision in wetland areas has been of high concern. More than 45 bills have been introduced in the past four sessions to change the definition of wetlands that are subject to the 404 provision. Even now, after several years of congressional debate, legislative reauthorization, and a number of judicial decisions, major interagency battles are still being fought over the wetlands definition. For example, the Corps of Engineers, EPA, and the Fish and Wildlife Service are still debating which areas of bottomland hardwoods should be defined as wetlands for purposes of the section 404 program. 164/

Third, Congress has addressed wetlands both as a generic issue and site-specifically. In each session, legislation has been introduced to consider a number of refuge and other site-protection proposals. At the same time, legislative proposals that would look at all wetlands as single resource category have been offered. Table 4 identifies topical categories of proposed legislation under consideration over the past five Congresses (1973-1982).

164/ Clark, John and Jay Benforado, eds. Report on a Bottomland Hardwood Wetlands Workshop. Washington, National Wetlands Technical Council, 1978. p. i-v.

TABLE 4. Numbers of Wetlands-Related Bills Introduced by Topical Category: 93rd through 97th Congresses

Topics	93rd	94th	95th	96th	97th*	Total
Inventory and Study	2	1	1	1	1	6
Amend Section 404 Program	0	27	12	3	6	48
Wetlands Acquisition	3	2	4	2	1	12
Wetlands Establishment	0	2	2	0	0	4
Wetlands Protection (includes Water Bank Program)	0	3	3	2	0	8
Establish and Maintain Refuges	8	3	4	9	3	27
Site-Specific Proposals	0	1	3	4	5	13
Other	1	1	1	0	0	3
Total	14	0	30	21	16	121

* To October 12, 1981.

Source: SCORPIO listing of legislative activity under the terms "wetlands," "wetland conservation," and "dredging." During the period 1973-1981, the indexing of legislative proposals has not always been consistent, and some bills that deal with wetland issues may not be included because the bill, as introduced, did not appear to specifically address wetland issues. This listing incorporates some judgments regarding placement because the categories do not overlap and each bill is only listed in one category. Alaska Lands legislation, appropriation bills, flood insurance reauthorization, and specific flood control and public works projects are examples of bills which have not been included.

Congressional interest has centered on possible revisions to section 404, especially its geographic coverage. Constituent pressure, legal actions, and publicity have all stimulated this interest. This debate did come to acknowledge that protection and enhancement of water quality--the purpose

of the FWPCA--include controlling both direct pollutant discharges and activities with the potential for altering the normal movement of water in hydrologic cycles. The public debate has not focused the differing nature, function, or relative value of any particular wetland area. While scientific researchers have studied these differences and attempted to estimate values, results of their efforts are not reflected in Federal law or regulations. In terms of management or affording protection, existing legislation does not distinguish among different types of wetland areas. Thus, under the current regulatory program, uses in all wetlands--whether natural, manmade, or unintended--are equally controlled by the dredge and fill permit program if they meet definitional qualities that identify wetland areas. 165/ The following paragraphs summarize congressional interest in wetlands during the past decade. Debate about the section 404 program, especially the topic of geographic coverage, is emphasized.

THE 93rd CONGRESS (1973-1974)

Following passage of the 1972 Amendments to the Federal Water Pollution Control Act, there was little congressional interest or activity concerning wetlands or the section 404 program that had been established in 1972. Controversies that would later surround the Corps' implementation of the program as a result of court interpretations and expanded regulation (see discussion in chapter II) had not yet surfaced. Until the Corps was challenged in court in 1974 (at the end of the 93rd Congress), it restricted its regulatory program

165/ Some wetlands areas are further protected through other programs at the Federal level, such as Fish and Wildlife Service's National Wildlife Refuge System, and at the State level, through special designations such as "critical areas".

to those waters considered to fall within the traditional definition of navigability. Thus, concern over the geographic scope of the Federal regulatory program was not yet evident.

More than a dozen wetland-related bills were introduced during the 93rd Congress. The majority of those bills, however, concerned establishing and maintaining wildlife refuges. Several other bills concerned acquisition of wetlands through the sale of Federal migratory bird hunting stamps, and one bill would have established an Atlantic Wetlands Research Center in order to maintain wetland resources for migratory birds in the Atlantic flyway. None of these bills was enacted during the 93rd Congress.

THE 94th CONGRESS (1975-1976)

Questions about the Corps' 1975 regulations (see pages 79-84) were brought to the attention of Congress, which held hearings in 1976. Issues raised at that time included: (1) possible duplication of Federal and State activities, because section 404 did not authorize delegation to the States, although 15 States were operating specific wetland programs under their own laws 166/; (2) possible future legal action by citizens to expand the Corps' authority into the routine activities that had been exempted by the regulations; (3) authority of the Corps to issue general permits; and (4) the need for clarification in defining those excluded activities.

In testimony before the Senate Public Works Committee, Senator Dole discussed the lack of congressional directive in the FWPCA for wetland protection, saying, "Congressional intent as reflected in the language of section 404 was admittedly vague and unspecific with respect to the issues of Federal wetlands protection,

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166/ U.S. Congress. Senate. Committee on Public Works. Section 404 of the Federal Water Pollution Control Act Amendments of 1972. Hearings, 94th Congress; 2d session. July 27 and 28, 1976. Washington, U.S. Govt. Print. Off., 1976. p.42. (Serial no. 94-H49.)

tributary protection, and of defining dredging and filling activities." The result had been "scattered judicial decisions [and] interpretive gyrations that bear questionable relationship to congressional language." 167/ He said that an important question for Congress to resolve was to what extent Federal regulation of minor streams was desirable or necessary for achieving the purpose of the law.

EPA Administrator Russell Train responded that protection of water quality must encompass protection of interior wetlands and smaller streams in order to preserve the multiple services performed by the wetland resources and to prevent degradation of other aquatic resources downstream from such areas. 168/

Many of the bills introduced in the 94th Congress in response to the Corps' regulatory proposal contained several common elements, including endorsement and clarification of exemptions for normal farming, ranching, forestry, and construction activities; and redefinition of "navigable waters" to restrict the territorial jurisdiction of the dredge and fill regulatory program.

During consideration of legislation to reauthorize the FWPCA, H.R. 9560, the House Public Works and Transportation Committee adopted an amendment offered by Representative Breaux to restrict the term "navigable waters" to include waters that presently are navigable for commercial transport or are capable of being made navigable with reasonable improvement, i.e., the traditional legal definition minus the concept of historic navigability. The Administration, which opposed this proposal, estimated that the impact of its enactment would be to leave up to 85 percent of the Nation's wetlands unregulated and unprotected. 169/

167/ Ibid., p. 34.

168/ Ibid., p. 42.

169/ U.S. Congress. House. Committee on Public Works and Transportation. Federal Water Pollution Control Act Amendments of 1976; report to accompany H.R. 9560, including cost estimate of the Congressional Budget Office. (94th Cong. 2d sess. House. Report no. 94-1107). Washington, U.S. Govt. Print. Off., 1976. p. 71.

Instead, the Administration supported a Cleveland-Harsha substitute that would have retained the Corps' broad territorial jurisdiction, authorized certain regulatory exemptions, and provided for issuance of general permits.

The proposal finally adopted by the House in 1976 was offered by Representative Wright and was something of a compromise. It contained the reduced scope of the Breaux amendment and provided for a number of permitting exemptions.

The Senate supported a slightly different proposal offered by Senators Baker and Randolph. It would have retained broad jurisdiction but would have transferred authority over waters in Phase II and III from the Corps to EPA.

However, Congress failed to enact any FWPCA legislation at that time, in part due to the controversy over amending section 404. 170/ An unintended result of the controversy, according to one author, may have been "to draw attention to the need for a more specific and more comprehensive wetlands protection act." 171/

In 1976, however, Congress did enact legislation (P.L. 94-215) that extended until 1983 the period during which the Department of the Interior could acquire wetlands for migratory waterfowl with appropriations authorized by the Wetlands Loan Act. Enacted in 1961 (P.L. 87-383), the Wetlands Loan Act was one part of an overall Federal program that envisioned acquiring 2.5 million acres of wetlands. That Act authorized Federal Treasury advances on future receipts from the sale of "duck stamps" (under the Migratory Bird Hunting and Conservation Stamp Act--then known as the 1934 Hunting Stamp Act) to increase the amount of monies, along with those available under the Migratory Bird Conservation Fund, that could be used for direct wetland acquisition. However,

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170/ Corps's Wetlands Control Survives Trip Through a Legislative Swamp. National Journal, v. 8, Oct. 23, 1976. p. 1505-1512.

171/ Ibid., p. 1512.

in 1975, the Department of the Interior revised its wetland acquisition goal and identified an additional 1.3 million acres of prime waterfowl habitat. The Department stated that one-half of this revised goal, or 1.9 million acres, would be acquired by June 1976, when authorizations under the 1961 Act were due to expire. According to the Department, that acreage represented the most vital habitat for continental waterfowl and areas that were the most vulnerable to destruction or severe adverse modification. 172/

Therefore, the legislation enacted in 1976 increased authorizations under the Act from $105 million to $200 million and provided a seven-year extension to the wetlands acquisition provisions. In its report accompanying the legislation, the Senate Committee on Commerce discussed the importance of continuing the wetland acquisition program.

> The need to prevent irreversible damage to (or loss of) wetlands breeding areas and other habitat areas for waterfowl is at least as great as it was in 1961, when the Wetlands Loan Act of 1961 was enacted. Wetlands are disappearing at an ever-increasing rate, and the cost of acquisition of the remaining wetlands is increasing.
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> Wetlands are not wasteland. The draining, filling, diking, impounding, and altering of wetlands as part of some "development" does not result in eliminating wasteland, but in destroying land vital to the ecosystem which supports mankind. 173/

Extension of the acquisition program was seen as perhaps the principal means of enabling the Fish and Wildlife Service to protect migratory birds and the lands needed for their nesting and wintering areas, including bottomland hardwood habitat areas in the Mississippi River Delta and flood plains of the Southeast from Kentucky to the Gulf Coast. 174/

172/ U.S. Congress. Senate. Committee on Commerce. Wetlands Loan Extension Act of 1976. Report to Accompany H.R. 5608. Senate Report no. 594, 94th Cong., 2d Sess. Washington, U.S. Govt. Print. Off., 1976. p. 2.

173/ Ibid., p. 4.

174/ Ibid., p. 15.

THE 95th CONGRESS (1977-1978)

The section 404 and wetland issues not resolved by the 94th Congress resurfaced in the 95th Congress, which did enact legislation amending the FWPCA. Once again, a large number of bills were introduced, many of them calling for a restricted definition of "navigable waters." Other bills proposed specific permit exemptions and delegation of certain permitting functions to the States.

Working from more than a dozen legislative proposals, (including the Wright and Baker-Randoph amendments from the 94th Congress) and the new Corps regulations, the Congress fashioned a compromise that retained the broad territorial jurisdiction of the existing regulatory program. Amendments to section 404 were contained in legislation to reauthorize and refine a number of provisions of the FWPCA, H.R. 3199, enacted December 27, 1977. 175/

During debate on the 1977 amendments, as during the 94th Congress, there were efforts to reduce the expanded jurisdiction of the Corps, limiting it to regulation of coastlines, traditional navigable waters, and adjacent wetlands. Senator Bentsen offered a proposal to restrict the program of the Corps, while authorizing States to designate other waters and wetlands to be included in the Corps' jurisdiction. He argued that his amendment would halt the program's overregulation and prevent it from further disrupting and frustating activities of ranchers, farmers, foresters, and average citizens. 176/ This floor amendment was defeated, however, as other Senators responded that such an approach would

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175/ P.L. 95-217, 33 U.S.C. 1251 et seq.

176/ Remarks of Honorable Lloyd Bentsen. Congressional Record, v.23, Pt. 21, Aug. 4, 1977. p. 26711-26712.

leave many vital wetlands unprotected and open to potentially destructive discharges. 177/

As adopted, the amendments to section 404 endorsed the Corps' exemptions for certain "normal activities" of farming, ranching, and forestry, and added other exemptions for construction or maintenance associated with established stock ponds, irrigation and drainage ditches, and forest roads. As a safeguard, however, Congress said that a permit would be required if one of these activities should have the effect of altering or converting an area to a new farming, forestry, or ranching use. 178/

The amendments also authorized EPA to delegate the regulatory program for Phase II and III waters from the Corps to qualified States. This provision for delegation recognized that a number of States and localities had previously been attempting to protect wetland areas, while it ensured that a federally coordinated program would provide consistency and assure that sensitive wetland areas located adjacent to privately held lands would receive protection. Thus, it conformed with the Act's policy to give primary implementation responsibility to the States. 179/ However, EPA retains significant oversight: it may review and may veto individual and general permits; it may take enforcement actions in individual situations; and it may withdraw approval of the delegated program, if it finds that the State is failing to meet requirements of the Act. If all States were to accept this delegated authority, they would then be responsible for permitting activities in wetlands adjacent to 85 percent of waters currently

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177/ See, for example: Remarks of Honorable Gary Hart. Congressional Record, v. 123, Part 21, August 4, 1977. p 26712-26713; and Remarks of Honorable John Chafee. Congressional Record, v. 123, part 21, August 4, 1977. p. 26716-26717.

178/ P.L. 95-217, section 67(b).

179/ Federal Water Pollution Control Act, FWPCA, section 101(b).

under Federal regulatory jurisdiction. (As discussed in Chapter III, no State has, as yet, been delegated program management authority.)

The 1977 amendments also allow States under some circumstances to exempt certain categories of minor discharges by implementing statewide regulatory programs for so-called nonpoint sources of pollution under section 208 of the same Act. (Nonpoint source pollution includes stormwater runoff from rural and urban areas, forestry and construction activities, and abandoned mine drainage that does not enter the waterway from a single point, usually a pipe.) Programs established under section 208 would utilize "best management practices (BMPs)," such as streambank protection or planting of vegetation that would be appropriate for controlling farm roads or maintaining existing fills, and they would offer States the opportunity to effect controls using less detailed procedures than those required under section 404. However, the Act limits the types of activities that may be regulated under section 208 rather than under section 404, to those having minor individual and cumulative impacts. 180/ Moreover, the utility of the section 208 program for displacing the Federal process is at least procedurally limited, since States must have an EPA-approved section 404 program as a prerequisite, and none is yet in place.

Some concern had been expressed that there was significant potential, if not actual, delay resulting from the review of section 404 permits by varioua Federal agencies. In response, Congress also added in 1977 two provisions to ensure speedy processing of such applications. The first required the Fish and Wildlife Service to submit any written comments on the permit application within 90 days. The second required the Corps to enter into a Memorandum of Agreement with other Federal agencies, including the Departments of Agriculture,

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180/ FWPCA, section 208(b)(4).

Commerce, Interior, and Transportation, to assure that, if possible, permit decisions can be reached within 90 days.

Following disposition of the section 404 issues in the 1977 Clean Water Act Amendments, Congress passed two other wetland-related bills in the second session of the 95th Congress. First, in October 1978, Congress enacted amendments to 1934 Hunting Stamp Act (popularly known as the "Duck Stamp Act"). Now known as the Migratory Bird Hunting and Conservation Stamp Act, it requires persons 16 years old or older who hunt migratory waterfowl to purchase "duck stamps." Receipts from the program help support Federal acquisition of migratory bird refuge lands and waterfowl production areas from private landowners. The 1978 amendments, P.L. 95-552, included provisions to raise the price of the stamp from $5 to $7.50 in order to raise additional monies for new acquisitions. 181/

Seventy-five percent of the receipts from "duck stamps" are to be used for wetland acquisition under the Wetlands Loan Act of 1961, as amended in 1976. (Beginning October 1, 1983, the "duck stamp" receipts are to be returned to the Federal Treasury to repay expenditures made under the Wetlands Loan Act since 1961. Wetland acquisition also is supported by purchases with appropriated general revenues authorized by this same statute.) Thus, the "duck stamp" program constitutes one of the two major, but closely related tools for obtaining and protecting wetland areas which are prime migratory bird habitats.

As in several other enactments during the 1970s, Congress noted the decline in annual acquisition of migratory bird habitat (from 159,000 acres in 1970 to 75,000 acres in 1977) and identified increased land costs as the prime reason

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181/ The original price of a "duck stamp" in 1934 was $1.

for the decline. The House Committee on Merchant Marine and Fisheries reported that between 1962 and 1977 the average price per acre of these lands doubled. Thus, the 1978 amendments were needed, if the Federal Government's land acquisition program was to be completed. 182/

One issue debated in connection with this legislation was the authority under the existing program for a Governor to veto Federal wetland acquisition. This had occurred in two States, Texas and North Carolina (in the latter case, acquisition had been blocked by a State statute requiring an affirmative recommendation from the appropriate County Board of Commissioners prior to the Governor's final approval). 183/ The Administration recommended that Congress eliminate this veto power. The House of Representatives, however, adopted a modified approach, as recommended by the Merchant Marine and Fisheries Committee in its bill. That approach would have waived the Governor's veto of Federal wetland acquisition if the land transaction were being made voluntarily between a willing seller and the Secretary of the Interior.

The Senate refused to endorse the House-approved change regarding State approval. In remarks during floor debate, Senator Stevens stated his opposition.

> This situation is simply unacceptable to Western States. We cannot tell at this time what pressure might come to bear on a private landowner who possesses lands that the Department of the Interior wished to buy. It is not hard to imagine the Department restricting a private landholder's use so greatly that he would be forced to be a "willing seller." I do not foresee the Department of the Interior going into my State and trying to strong-arm the private landowners or native corporations who have their land titles into selling their lands. But I do feel we must preserve the checks and balances that now exist in the law. The Governor of a State must continue to have the right to coordinate migratory waterfowl protection with the Federal

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182/ U.S. Congress. Committee on Merchant Marine and Fisheries. Duck Stamp Act Amendments. Report to accompany H.R. 13372. House Report No. 95-1518, 95th Cong., 2d Sess. Washington, U.S. Govt. Print. Off., 1978. p. 6-7.

183/ Ibid., p. 8.

> Government. By allowing the Governor to maintain his veto power we insure that this will continue to take place. 184/

The legislation as finally enacted did not contain the House-approved change to the State approval process. It did require the Secretary of the Interior to consult with appropriate State and local agencies before entering into a land acquisition. This requirement for consultation had not existed in the Hunting Stamp Act previously.

The second enactment also occurred in October 1978 when Congress passed related legislation, the Fish and Wildlife Improvement Act (P.L. 95-616), a measure which amended several existing laws so as to improve administration of the programs of the Fish and Wildlife Service. In particular, the law contained amendments to broaden the Service's land acquisition authority under the Fish and Wildlife Act of 1956 and the Migratory Bird Hunting and Conservation Stamp Act. Previously under those laws, land acquisition had been limited to the purchase of refuge lands, and other means of acquisition (such as through accepting donations) had not been authorized.

This 1978 law provided additional means to acquire lands. It authorized the Fish and Wildlife Service to obtain partial interest in lands and waters and authorized the Secretary of the Interior to accept gifts, devises, or bequests of real or personal property for the benefit of programs administered by the Fish and Wildlife Service. In making these changes, Congress intended to respond to "rising land costs and increased public pressures to provide wildlife habitat for current and future public enjoyment by providing alternative means to acquire lands." 185/

184/ Remarks of Hon. Ted. Stevens. Congressional Record [daily edition], v. 124, Oct. 7, 1978. p. S17673.

185/ U.S. Congress. House. Committee on Merchant Marine and Fisheries. Administration of Fish and Wildlife Programs. Report to accompany H.R. 2329. House Report No. 95-29, 95th Cong., 1st sess. Washington, U.S. Govt. Print. Off., 1977. p. 4.

Public Law 95-616 also contained a specific provision for enhancement of critical waterfowl habitat in the grasslands areas of the Central Valley in California. This area has been regarded as important both as a year-round habitat area in the San Joaquin Valley and as a prime wetland area used by wintering waterfowl in the Pacific flyway. The provision was intended to provide an economic incentive to Central Valley landowners to maintain their land for waterfowl, rather than converting the land to other purposes offering greater economic returns. The Act provided that water from the Central Valley reclamation project would be made available to landowners at no cost for the purpose of maintaining marshy habitat required by the migratory waterfowl.

The Senate added this provision as a floor amendment to the House-passed version of the Fish and Wildlife Improvement Act of 1978 (H.R. 2329). The language was identical to that in a bill passed by the Senate earlier in the 95th Congress (S.691) and was similar to legislation that passed both the House and Senate in the 94th Congress but which was not enacted at that time (H.R. 15007).

THE 96th CONGRESS (1979-1980)

Despite congressional efforts in 1977 to streamline and simplify the section 404 program, by exempting certain categories of activities from permitting requirements and by authorizing general and nationwide permits, criticism of that program continued. Some of the criticism took the form of legislation that would impose further restrictions on Federal authority respecting dredge and fill activities. Several bills were introduced during the 96th Congress to restrict the definition of "navigable waters" in section 404 to the traditional concept of navigability, thus limiting the regulatory jurisdiction of the Corps of Engineers. Other legislation sought to establish a maximum time period for issuance of section 404 permits, in view of concern about the costs

of delay resulting from procedural review requirements, such as that for consultation among Federal and State agencies over permit applications. Congress took no action on these bills.

A bill passed by the House but ultimately not enacted (H.R. 85), contained an amendment to section 404 to "clarify" that the authority to determine "navigable waters"--and the jurisdiction of the section 404 program--rests with the Secretary of the Army for purposes of enforcement, permitting, and defining regulatory exemptions. This provision, had it been enacted, would have reversed a 1979 advisory opinion of U.S. Attorney General Benjamin Civiletti which held that EPA, not the Corps of Engineers acting for the Secretary of the Army, has the final responsibility to determine what constitutes "navigable waters" under section 404. The reasoning for the Civiletti ruling was said to rely on the "structure of the [Clean Water] Act as a whole," rather than explicit support either in the statute or the legislative history. 186/

In mid-1980 the Senate Environment and Public Works Subcommittee on Environmental Pollution held two days of oversight hearings on implementation of the section 404 program. The focus of these hearings was on difficulties in defining wetland areas and resource values to be protected from industrial development in Alaska. 187/ Witnesses criticized in their testimony poor administration of the program as manifested in delays in permit processing and permit requirements for de minimus activities in marginal wetland areas. 186/

186/ Civiletti Rules EPA Has Final Say on What Constitutes "Navigable Waters." Environment Reporter, v. 10, no. 23, Oct. 5, 1979. pp. 1278-1279.

187/ According to data compiled in 1975 by the Corps, Alaska contains more than 67 million acres of wetlands, about 45 percent of the remaining national total.

188/ U.S. Congress. Senate. Committee on Environment and Public Works. Subcommittee on Environmental Pollution. Implementation of Certain Sections of the Clean Water Act. Hearings, 96th Cong., 2d sess., June 23, 24, and July 1, 1980. Washington, U.S. Govt. Print. Off., 1980. (Serial No. 96-H55). p. 1-151, 257-376.

Besides demonstrating interest in section 404, the 96th Congress enacted two bills affecting wetlands. The first measure, P.L. 96-182 (enacted January 2, 1980), was a series of amendments to the Water Bank Act (P.L. 91-559, enacted in 1970). Principal provisions of this law broadened the definition of wetlands under the Water Bank Act and authorized adjustment in rates of payments made pursuant to it.

As the program existed prior to these amendments, certain types of wetlands were eligible for inclusion in a water bank agreement. These agreements are intended to compensate landowners for protecting and maintaining the public resource values of wetlands located on private lands. Prior to the 1980 amendments, the eligible areas in inland freshwater regions and artificially developed inland freshwater areas were so-called Types 1 through 5, as defined in Circular 39, Wetlands of the United States, issued by the Department of the Interior in 1954. The areas are:

1. Seasonally flooded basins or flats,
2. Fresh meadows,
3. Shallow fresh marshes,
4. Deep fresh marshes, and
5. Open fresh water.

These areas primarily constitute breeding and nesting areas that are located mainly in the prairie pothole regions of the North Central United States. The eligibility list did not originally include wetland Types 6 and 7 identified in Circular 39, which are:

6. Shrub swamps, and
7. Wooded swamps.

However, the result of excluding these two types of areas was that certain wintering areas for wood ducks and other migratory waterfowl, such as the Mississippi River bottomlands, were ineligible for the water bank program and were

unprotected. The 1980 amendments expanded the eligibility list under the program to include Type 6 and 7 areas located in inland freshwater regions and to include all artificially developed inland freshwater areas which meet the descriptions of Type 1 through 7.

The second major provision in the 1980 amendments to the Water Bank Act concerned rates of payment to participants in water bank agreements. A 1970 General Accounting Office report stated that, according to one estimate, nearly 40 percent of water bank program agreements made in any one year would be terminated before the end of the 10-year agreement period. 190/ The major reason for terminations was said to be the rising cost of land and rental rates. In many of these cases, landowners had greater economic incentive to terminate the agreements, discontinue conservation of their wetland areas, and turn them to more profitable uses, usually farming, thus destroying such potential wetland benefits as flood water retention, ecological productivity, and nutrient production.

The 1980 amendments to the Water Bank Act therefore authorized the Secretary of Agriculture to reexamine the payment rates to landowners and operators participating in conservation agreements at the end of each 5-year period. Based on current land and crop values, the Secretary could make rate adjustments that would reflect increased land values during the life of the agreements and would provide incentive to the landowners to continue conserving wetland areas.

In commenting on these amendments to the Act, the Secretary of Agriculture said that the legislation was premature. The Administration did not seek expansion of the water bank program. The Department preferred to continue wetland

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190/ U.S. General Accounting Office. Better Understanding of Wetland Benefits Will Help Water Bank and Other Federal Programs Achieve Wetland Preservation Objectives. PAD-79-10, Feb. 8, 1979. Washington, 1979. p. 11.

preservation through such other programs as restrictions on dredging, and authorization of purchases and easements by the Department of the Interior (under the Migratory Bird Hunting and Conservation Stamp Act and the Wetlands Loan Act). 191/

Congress also enacted the Manassas Battlefield Park Amendments of 1980, P.L. 96-442 (H.R. 5048), a measure principally setting forth expanded boundaries of this park in Virginia. As enacted, the bill also contained a provision directing the Secretary of the Interior to conduct a two-year study of appropriate protective measures for natural wetlands and undeveloped uplands of the DeKorte State Park in the Hackensack Meadowlands District in New Jersey. This particular provision, drawn from H.R. 8200, was incorporated in the Manassas Battlefield Park bill as a floor amendment during Senate debate on H.R. 5048 on September 29, 1980.

THE 97th CONGRESS (1981-1982)

In the 97th Congress, critics of the section 404 program have again continued to question Federal authority and the definition of "navigable waters." Legislation similar to earlier proposals to restrict the scope of the Federal program has been introduced. Senator Tower, a sponsor of bills in both the 96th and 97th Congresses, stated in March 1981 that the intent of his current bill, S. 777, is to diminish the regulatory burden associated with the Corps' jurisdiction over waters that are not utilized for commerce and their adjacent wetlands. The effect of his legislation, which would limit the Corps to regulating waters that are navigable now or could be made navigable by reasonable improvement,

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191/ U.S. Congress. Senate. Committee on Agriculture, Nutrition, and Forestry. Water Bank Act Amendments. Report to accompany S. 837. Senate Report No. 96-449, 96th Cong., 1st Sess. Washington, U.S. Govt. Print. Off., 1979. p. 7.

would be to remove all wetlands from the Corps' jurisdiction, "since wetlands are not navigable," he noted. 192/

As of the beginning of the second session of the 97th Congress, hearings had not been held on the pending legislative proposals concerning the geographic scope of the section 404 program. Nor had hearings been held on legislation first introduced by Representative Chappell in the 93rd Congress and each subsequent Congress, as well. Rep. Chappell's bill (H.R. 794 in the 97th Congress) would authorize the Secretary of the Interior to classify and inventory the Nation's wetlands and to evaluate the environmental contribution of natural wetlands.

Wetland issues are likely to remain controversial. Some find that the controversy has produced a "vague and unspecific" intent from Congress toward wetland protection and the administration of section 404 of the Clean Water Act. 193/ The opportunity to address these issues occurs in 1982 during resuthorization of the Clean Water Act. With public views ranging across a spectrum--from those who consider the expansive jurisdiction of section 404 to be the most viable means of accomplishing wetland protection nationwide to others who consider the program overly burdensome, particularly to small landowners and developers, regardless of congressional intent to safeguard wetlands--any upcoming debate will be lively.

192/ Remarks of Hon. John Tower. Congressional Record [daily edition], Vol. 12, Mar. 24, 1981. S2583-2584.

193/ Section 404 hearings, p. 34. Senator Dole characterized the controversy in these terms as early as 1975.

SUMMARY

Congress has expreased interest in wetlands through two principal ways. The first has been the Federal Water Pollution Control Act--that is, the use of a pollution control statute as the chief regulatory mechanism for protecting existing wetlands from industrial, agricultural, and other activities that would disrupt or destroy the fragile ecological systems located in these areas. Congress has utilized this particular regulatory tool since 1972, when it enacted section 404, even though the provision was not generally recognized as a wetlands protection measure at that time.

Following expansion of the section 404 program by several court decisions in the mid-1970s, Congress responded and more directly addressed use of the pollution control provision. In 1977, Congress enacted amendments intended to limit and to specify the scope of the regulatory program, by exempting certain activities and areas from the permitting requirements of section 404. Nevertheless, controversy about section 404 continues and has led to proposals to restrict the geographic coverage of the program still further.

The second way in which Congress has expressed interest in wetlands has been more direct and has included enactment of several measures expanding Federal authority to acquire wetlands for the purpose of safeguarding waterfowl and migratory bird habitat areas. During the 1970s Congress passed amendments to the Water Bank Act intended to keep pace with rising land costs by increasing Federal payments to landowners who would conserve habitat areas, rather than convert them to other uses, and to the "Duck Stamp Act" (now the Migratory Bird Hunting Conservation Stamp Act) in order to raise additional monies for new wetlands acquisition. These generic wetland measures tend to focus on only one of the many functions of wetlands (namely, as habitat areas) and their value to hunters and other supporters of migratory bird

populations. For the most part these programs have generated less controvery than the section 404 issues. The two sets of issues--Federal wetland acquisition for waterfowl breeding and wintering, and dredge and fill permitting under section 404--have rarely, if ever, been joined for broad consideration of national wetland policy.

During this period Congress also has acted on several measures to protect specific sites (such as the DeKorte State Park in the New Jersey Meadowlands).

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Publication of wetland studies have been prolific during the past decade. The sources cited below--only a small sample of that literature--are presented in three categories reflecting the organization of this report: introduction to wetlands, wetland science, and wetland management. Many wetland science publications are proceedings of professional meetings that contain a large number of papers on specific wetland topics. For example, the volume edited by Brandt Richardson contains 75 papers, and abstracts on eight topics.

Publications cited here are all national or general. Some excellent publications on the wetlands of particular States or regions, or on specific typea of wetlands, have also been published. The U.S. Fish and Wildlife Service has prepared ecological characterizations of several regions where wetlands are important, including the Mississippi Delta and the Pacific Coast. Such studies, growing more numerous almost daily, are excluded from this bibliography.

An examination of Congressional Research Service citations and Library of Congress card catalog files revealed the following: Between 1969 and the present, 249 articles on wetlands have been cited by CRS, and the library card catalog has 93 titles under the topic of wetlands. More publications are concerned with wetlands conservation than with any other aspect of the subject.

Many of the publications listed below have lengthy bibliographies. These bibliographies can lead the reader to the extensive resource of wetland publications available today.

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APPENDIX A: TRANSPORTATION FILLS--A CASE STUDY

Examining in more detail one type of activity that alters wetlands can convey the complexity of studying effects of alterations on natural functions. Fills for transportation purposes have been made all over the country in all types of wetlands. Highways, railbeds, and airport runways have all been constructed on wetland fills. Wetlands have been a preferred location for these facilities in the past because of low land costs and ease of right-of-way acquisition. Fills supporting causeways are generally the least expensive form of construction across wetlands, so they have been the preferred engineering technique when other values were not considered. Highway fills, in particular, have been the subject of numerous studies during the past decade because of conflicts between transportation development and wetland protection. A recent study, prepared for the Federal Highway Administration, identified a number of potential physical and biological impacts in wetland areas. The detailed set of conclusions which follow below is representative of the growing understanding about wetland functions, and the range of potential effects associated with wetland alterations.

Physical Impacts:

1. Change in mean water level--levels can be increased by the structure through damming effects or decreased through drainage, altering wetland functions.

2. Change in periodicity--many wetland species require a predictably varied water regime. The extent and timing of fluctuations are important.

3. Change in wetland circulatory patterns--wetland species have differing tolerances for nutrients and dissolved gases which are distributed, in part, based on circulatory patterns.

4. Alteration of local water table levels--changes in water table levels often occur simultaneously with surface water alteration; most wetlands depend on high water table levels.

5. Drainage of surface water--resident and migratory species are affected when surface water is removed; restoration may be slow and difficult.

6. Elimination of periodic flooding and fertilization--stabilization of water levels or elimination of periodic flooding will reduce productivity.

7. Change in retention storage--increase or decrease of flow downstream--wetlands regulate local hydrology by diminishing peak flows and supporting minimum flows; effects of wetland alteration that affect this quality may be observed at some distance from the site.

8. Damping of tidal variation--wetland plants are adapted to tidal patterns, which influence water level periodicity and salinity gradients.

9. Alteration of salinity patterns--distribution of species in coastal wetlands is dependent on the salinity gradient; gradient changes can cause major shifts in species composition and habitat, and affect estuarine food chains.

10. Turbidity--excess suspended solid, inorganic and organic byproducts of almost all phases of highway construction and use adversely affect aquatic primary productivity, and feeding, reproductive, and migratory success of higher organisms.

11. Sedimentation--sediments deposited on bottom plants and animals can greatly reduce their survival and productivity.

12. Chemical pollution--the potential for chemical pollution exists at all phases of highway construction and use; the severity of the impact may be moderated by the water regime, precipitation patterns, topography, and the sensitivity of organisms to the pollutant.

13. Change in temperature patterns--impoundment can increase the surface temperature of water; in summer, higher temperatures may exceed resident species' thermal tolerance; some fish and shellfish species are affected by changes of less than 5 degrees.

Biological Impacts:

1. Change in wetland size--changes in mean levels and periodicity of water will elevate or lower water levels, causing the wetland to grow or shrink as measured by shifts that indicate the edge of the wetland.

2. Change in wetland species composition--almost any change in hydrologic or water quality conditions may alter the vegetative community; biological effects include changes in wetland composition, changes in wetland primary productivity, and changes in plant species diversity.

3. Change in wetland class composition--altered water levels may affect the distribution and abundance of wetland classes, which are a major determinant of wildlife values.

4. Change in wetland primary productivity--energy capture by green plants, primary productivity, may be reduced by all phases of highway construction and use. Primary productivity is important because of its effects on secondary productivity and the rate of plant succession.

5. Sudden mortality of wetland species--creation of temporary but extreme environment conditions can substantially affect existing biota.

6. Barrier to animal movement--barriers can inhibit the normal periodic movement of animal populations, essential for their survival and productivity.

7. Rare and endangered species--all Federal agencies are required to ensure that actions, authorized, funded, regulated or administered by them do not jeopardize continued existence of a species identified as endangered, or destroy or alter critical habitat of the species.

Source: National Research Council, Transportation Research Board. Ecological Effects of Highway Fills on Wetlands. Report 218B. Prepared by P. W. Schuldiner, D. F. Cope and R. B. Newton. Washington, 1979. p. 14-38.

APPENDIX B: GUIDE TO FEDERAL WETLANDS-RELATED PROGRAMS

Department of Agriculture

Rural Clean Water Program

Secretary authorized to enter into contracts lasting 5-10 years with rural landowners or operators, to share costs of implementing Best Management Practices under an approved §208 plan.

Authority: 33 U.S.C. §1288, as amended.

Contact: Denny Burns, Soil Conservation Service, USDA, Washington, D.C. 20250; (202) 447-2470.

Water Bank Act of 1970

Secretary authorized to enter into 10-year contracts with landowners for preservation of wetlands determined to be important for the nesting and breeding of migratory waterfowl. Annual fee paid to landowners.

Authority: 16 U.S.C. §§1301-1311.

Contact: Dr. Larry Libby, Coordinator for Land, Air, Water, and Solid Waste, Office of Environmental Quality Activities, USDA, Room 359A, Washington, D.C. 20250; (202) 447-6827.

Small Watershed Management

Technical and cost sharing assistance provided to states and localities for agricultural water management projects, which may affect wetlands.

Authority: Small Watershed Project Act (Watershed Protection and Flood Prevention Act), 43 U.S.C. §§422a-422h.

Contact: Dr. Larry Libby (see above).

Rural Environmental Conservation Program

Designed, in part, to preserve habitat of migratory waterfowl and other wildlife, increase fish and wildlife and recreation resources, promote management and planning, and improve game habitat, through contracts and easements with landowners.

Authority: Agriculture and Consumer Protection Act, 16 U.S.C. §§1501-1510.

Contact: Dr. Larry Libby (see above).

Soil Conservation Service

SCS Conservation Planning Memorandum-15

Statement of policy of preserving wetlands, and restoring or improving wetlands where possible.

Authority: SCS Conservation Planning Memorandum-15.

Contact: Dr. Larry Libby (see above).

Rural Development Act

SCS authorized to inventory, monitor, and classify wetlands. Various inventories have been conducted.

Authority: 7 U.S.C. §1010a.

Contact: Mel Davis, Soil Conservation Service, USDA, Washington, D.C. 20250; (202) 447-4531.

Forest Service

Renewable Resources Planning Act

Requires assessment of all renewable resources on all U.S. forest and range lands, including wetlands.

Authority: 16 U.S.C. §§1600-1614.

Contact: Max Peterson, Deputy Chief of Forest Service, USDA, Washington, D.C. 20250; (202) 447-6663.

Department of Commerce

Office of Coastal Zone Management

Coastal Zone Management Act

Provides federal grants for development of coastal management and preservation programs, including the planning for the impact of offshore energy development on coastal states (Coastal Energy Impact Program).

Authority: 16 U.S.C. §§1454, 1456a.

Contact: Brian Gorman, Public Affairs Officer, OCZM, 3300 Whitehaven St., N.W., Washington, D.C. 20235; (202) 634-4235.

Estuarine Sanctuary Program

Provides matching grants to states for acquisition of areas to be maintained and operated as estuarine sanctuaries.

Authority: 16 U.S.C. §1461.

Contact: JoAnn Chandler, Sanctuary Programs Office, OCZM, 3300 Whitehaven St., N.W., Washington, D.C. 20235; (202) 634-1672.

Marine Sanctuary Program

Authorizes designation of marine areas as sanctuaries in order to preserve, restore, or enhance conservation, recreation, ecologic or aesthetic values of these water resources.

Authority: 16 U.S.C. §§1431-1434.

Contact: JoAnn Chandler (see above).

National Marine Fisheries Service

Fish and Wildlife Coordination Act

Review of activities, by the federal government or requiring federal permits, in wetlands, with respect to impacts on fish resources.

Authority: 16 U.S.C. §§661-661c.

Contact: Yates Barber, Environmental Assessment Division (F-53), NMFS, 3300 Whitehaven St., N.W., Washington, D.C. 20235; (202) 634-7490.

Council on Environmental Quality

National Environmental Policy

Responsible for receiving and reviewing Environmental Impact Statements; sponsors research and advises the President.

Authority: NEPA, 42 U.S.C. §§4321 *et seq.*; Environmental Quality Improvement Act, 42 U.S.C. §§4371 *et seq.*

Contact: U.S. CEQ, 722 Jackson Place, N.W., Washington, D.C. 20006; (202) 382-4967.

Department of Defense

Army Corps of Engineers

Clean Water Act §404

Provides jurisdiction over discharges of dredged and fill material into the waters of the United States, which includes wetlands contiguous or adjacent to navigable waters and their tributaries. If states adopt an EPA-approved program, Corps jurisdiction restricted to navigable waters and adjacent wetlands. Coordination with EPA required (see below).

Authority: 33 U.S.C. §1344.

Contact: Lt. Colonel George Boone, Asst. Director of Civil Works, Environmental Programs, U.S. Army Corps of Engineers, Washington, D.C. 20314, ATTN: DAEN-CWZ-P; (202) 693-7093; or Office of the Chief Counsel, U.S. Army Corps of Engineers, Washington, D.C. 20314, ATTN: DAEN-CC-H; (202) 693-6169.

Rivers and Harbors Act of 1899

Authorizes permits for structures and discharges in navigable waters, considering navigation, flood control, fish and wildlife management, and environmental impacts.

Authority: 33 U.S.C. §§401, 403, 404, 406, 407.

Contact: Lt. Colonel George Boone or Office of the Chief Counsel (see above).

Dredged Material Research Program

Conducts research on the disposal and reuse of dredged material in order to minimize adverse impacts on wetlands.

Authority: 33 U.S.C. §1165a.

Contact: Lt. Colonel George Boone or Office of the Chief Counsel (see above) or U.S. Army Engineer Waterways Experiment Station, P.O. Box 631, Vicksburg, Miss. 39180.

Environmental Protection Agency

Clean Water Act §404

EPA and Corps must set §404(b)(1) guidelines regulating the discharge of dredged and fill material in sensitive areas. EPA also reviews federal projects claimed to be exempt under §404(r). Under §404(c), EPA may prohibit use of a specific site for the disposal of dredged material on the basis of environmental impacts. EPA is also responsible for overseeing the transition of authority to states which develop §404 permit programs that meet EPA's regulatory requirements.

Authority: 33 U.S.C. §1344.

Contact: John Crowder, Chief, Aquatic Protection Branch (WH-585), EPA, 401 M St., S.W., Washington, D.C. 20460; (202) 472-3400.

Clean Water Act §208

Plans may now regulate certain discharges of dredged and fill material, where state has an approved §404 program, in accordance with Best Management Practices. Also governs water quality of areas under areawide waste treatment plans. Grants available, §§205, 208.

Authority: 33 U.S.C. §§1285, 1288.

Contact: Peter Smith, Office of Federal Activities, EPA, 401 M St., S.W., Washington, D.C. 20460; (202) 755-0770.

Safe Drinking Water Act

EPA may designate an aquifer as a principal water supply source, requiring review of any project affecting the aquifer; no federal assistance to project if it would contaminate the water source.

Authority: Safe Drinking Water Act §144c.

Contact: Paul Baltay, EPA, 401 M St., S.W., Washington, D.C. 20460; (202) 426-8290.

Research and Development

Conducts research on various aspects of wetlands pollution, etc.

Contact: Hal Kibby, Wetlands Research Coordinator, EPA, Corvallis Environmental Research Lab, 200 S.W. 35th St., Corvallis, OR 97330; (503) 757-4713.

Department of the Interior

Bureau of Land Management

Public Lands

Requires protection, maintenance, and enhancement of wildlife habitats on the public lands; BLM must prepare Habitat Management Plans.

Authority: Federal Land Policy and Management Act, 43 U.S.C. §§1701 *et seq.*

Contact: Division of Wildlife, Room 5550, Bureau of Land Management, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 343-6188.

Department of Housing and Urban Development

Interstate Land Sales Full Disclosure Act of 1973

Interstate Land Sales Office requires distribution to purchasers of subdivision lots of a report stating, among other things, whether or not dredge and fill permits needed.

Authority: 15 U.S.C. §§1701-1720.

Contact: Asst. Secretary for Regulatory Functions, U.S. Dept. of HUD, 451 7th St., S.W., Washington, D.C. 20410; (202) 755-8182.

Community Planning and Development

Provides assistance grants for planning and management; requires environmental assessment be done by grantee.

Authority: Community Planning and Development Act, §701.

Contact: Office of Community Planning and Program Coordination, U.S. Dept. of HUD, 451 7th St., S.W., Washington, D.C. 20410; (202) 755-6226.

Bureau of Reclamation

Reclamation Act

Constructs and operates irrigation, flood control, and power projects in 17 western states; operates fish and wildlife sanctuaries on reclamation land.

Authority: Reclamation Act, 43 U.S.C. §§411 *et seq.*

Contact: Recreation and Lands Branch, Bureau of Reclamation, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 343-5204.

Fish and Wildlife Service

NOTE: The Fish and Wildlife Service is currently undergoing reorganization. Therefore, programs, contacts, and phone numbers are likely to change.

Land and Water Resource Development Planning Program

Consultation required on impacts on fish and wildlife of any federal agency action which will modify waters of the U.S.

Authority: Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666c.

Contact: James D. Brown, Division of Ecological Services, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 376-8115.

National Wetlands Inventory Project

Classifying, identifying, and mapping wetlands, in order to create a data base to aid management, particularly by the states.

Authority: Fish and Wildlife Act, 16 U.S.C. §§742a *et seq.*; Fish and Wildlife Coordination Act, 16 U.S.C. §§661-666c.

Contact: John Montanari, Project Leader, National Wetlands Inventory Project, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 634-4910.

Coastal Ecosystem Project

Studying special problems associated with coastal areas.

Contact: William Palmisano, Coastal Ecosystems Project, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 634-4913.

Stream Alterations Project

Studying effects of stream channelization on fish and wildlife.

Contact: Stream Alterations Project, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 634-4913.

Clean Water Act §§208, 404

Required to assist states in developing dredge and fill programs under §208; must review state §404 programs prior to EPA approval.

Authority: 33 U.S.C. §§1288, 1344.

Contact: John Christian, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 634-4908.

Migratory Bird Program

Authorizes inventory of significant waterfowl habitats and purchase in fee or easement of land necessary for refuges. Waterfowl Production Areas purchased.

Authority: Migratory Bird Conservation Act, Wetland Acquisition Act, 16 U.S.C. §§715a-715s; Migratory Bird Hunting Stamp Act, 16 U.S.C. §718.

Contact: Office of Migratory Bird Management, Room 2245, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 254-3207.

Endangered Species Act

Protects and restores threatened and endangered species and their critical habitats; provides for permit program for import/export of certain animals. Federal actions must avoid harm to species and their habitats; if differences between Office and project sponsor irreconcilable, Endangered Species Committee rules on whether or not project should be exempt from Act.

Authority: 16 U.S.C. §§1531 *et seq.* as amended.

Contact: Office of Endangered Species, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240.

Land and Water Conservation Fund Act

Allows purchase of fee and easement interests in land for the protection of fish and wildlife and endangered and threatened species. Administered by Heritage Conservation and Recreation Service (see below).

Authority: 16 U.S.C. §§460*l*-4 to 460*l*-11.

Contact: Division of Federal Aid, Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 343-4172.

Pittman-Robinson and Dingell-Johnson Acts.

Grants-in-aid all available to the states for habitat and species restoration.

Authority: Federal Aid to Wildlife Restoration Act, 16 U.S.C. §§669-669i; Federal Aid to Fish Restoration Act, 16 U.S.C. §§777-777k.

Contact: Division of Federal Aid, FWS (see above).

Heritage Conservation and Recreation Service

Land and Water Conservation Fund Act

The fund provides for the purchase of outdoor recreation areas. At least 40% of the fund must be used for federal purposes; the rest goes to the state as matching grants.

Authority: 16 U.S.C. §§460*l*-4 to 460*l*-11.

Contact: Heritage Conservation and Recreation Service, U.S. Dept. of the Interior, Washington, D.C. 20240.

Geological Survey

Surveys

Collects and analyzes land use data, and has mapped and classified wetlands.

Authority: Varied.

Contact: Land Information and Analysis Division, USGS, Mail Stop 710, Reston, Va. 22092; (703) 860-6341; or Water Resources Division, USGS, Mail Stop 467, Reston, Va. 22092; (703) 860-6071; or Topographic Division, USGS, Mail Stop 514, Reston, Va. 22092; (703) 860-6741.

National Park Service

National Park System

The Service maintains the Park System, and studies areas for nationally significant natural areas that may qualify as natural landmarks or parks.

Authority: 16 U.S.C. §§1-3, 461.

Contact: Natural Landmarks and Theme Studies Unit, National Park Service, Denver Service Center, P.O. Box 25287, Denver, CO.

Office of Water Research and Technology

Water Resources Research Act

Grants and matching grants assist research on water-related problems of interest to the states and regions.

Authority: 42 U.S.C. §§1961a–1961c.

Contact: Frank J. Carlson, Biological Sciences Division, OWRT, Room 4219, U.S. Dept. of the Interior, Washington, D.C. 20240; (202) 343-2101.

Tennessee Valley Authority

TVA Projects

Manages reservoir system containing wetlands; involved in fisheries and wildlife management in that context.

Authority: 16 U.S.C. §831.

Contact: Division of Forestry, Fisheries and Wildlife Development, TVA, Norris, Tennessee 37828.

Department of Transportation

Preservation of the nation's wetlands

Policy to protect wetlands to fullest extent possible during planning, construction, and operation of federal and federally-financed projects. May assist in acquisition or mitigation where destruction of wetlands inevitable.

Authority: DOT Order 5660.

Contact: Office of Environmental Affairs, Dept. of Transportation, Washington, D.C.; (202) 426-4361.

Coast Guard

General Bridge Act

Issues permits for all bridge projects over navigable waters.

Authority: 33 U.S.C. §3525.

Contact: Office of Environmental Affairs (see above).

Water Resources Council

Executive Order 11990

Requires federal leadership in wetlands protection and preservation, and mandates that federal agencies avoid destruction of wetlands if feasible. Alienation of federal wetlands restricted, requiring covenants in the deed or removal of the property from the market.

Authority: E.O. 11990.

Contact: WRC, Suite 800, 2120 L St., N.W., Washington, D.C. 20037; (202) 254-6303.

Adopted from Jon Kusler, Richard Newton, and Corbin Harwood, OUR NATIONAL WETLAND HERITAGE: A PROTECTION GUIDEBOOK (Prepared by Environmental Law Institute for U.S. Fish and Wildlife Service; forthcoming), Appendices E and F.

Source: National Wetlands Newsletter, v. 1, no. 2. Washington, Environmental Law Institute, January, 1979. p. 9-11.

Note: Most of the contacta listed are not accurate today, but program descriptions and authorities have changed little in the past three years.

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