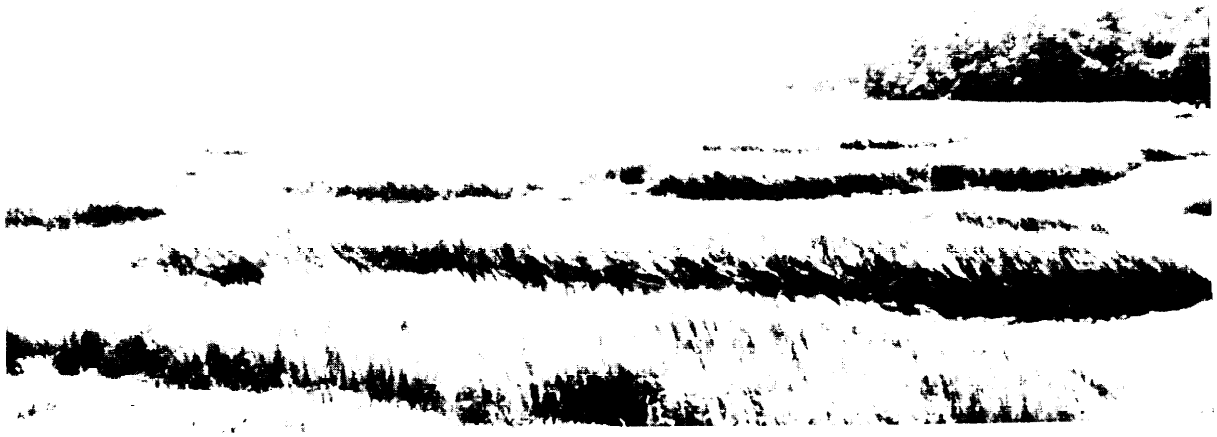
Chapter 1
Summary



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Contents

TABLES

FIGURES

Chapter 1
Summary

INTRODUCTION

The use of wetlands—the marshes, swamps, bogs, bottom lands, and tundra that comprise about 5 percent of the contiguous United States and about 60 percent of Alaska—is a source of controversy between those who want to convert these areas to other uses and those who want them left in their natural state. Some wetlands can provide natural ecological services such as floodwater storage, erosion control, improved water quality, habitat for fish and wildlife, and food chain support. In addition, many wetlands are esthetically pleasing and offer varied recreational and educational opportunities. At the same time, these wetlands may provide sites for housing, agriculture, or commercial development.

Wetlands are usually characterized by emergent plants growing in soils that are periodically or normally saturated with water. * They occur along gradually sloping areas between uplands and deepwater environments, such as rivers, or form in basins that are isolated from larger water bodies. Of the 90 million acres of vegetated wetlands in the lower 48 States, 95 percent are located in inland, freshwater areas; the rest are coastal, saltwater wetlands. In addition, it is estimated that nearly 60 percent of the State of Alaska-or over 200 million acres—is covered by wetlands.

Within the last 200 years, 30 to 50 percent of the wetlands in the lower 48 States have been converted to other uses by activities such as agriculture, mining, forestry, oil and gas extraction, and urbanization. According to the most recent Federal survey, a net amount of approximately 11 million acres of wetlands in the lower 48 States were converted to such other uses between the mid- 1950's and mid-1970' s." This amount was equivalent to a net loss each year of about 550,000 acres, or about 0.5 percent of remaining wetlands. The vast majority of actual losses—about 80 percent—involved draining and clearing of inland wetlands for agricultural purposes. Although some wetland losses were due to natural causes such as erosion, sedimentation, subsidence, and sea level rise, at least 95 percent of actual wetland losses over the last 25 years were due to man's activities. The best available information indicates that present national wetland-conversion rates are about half of those measured in the 1950's and 1960's or about 300,000 acres per year. This reduction is due primarily to declining rates of agricultural drainage, and secondarily to government programs that regulate wetlands use.

At this time, Federal policies and programs do not deal consistently with wetlands use. In fact, they affect wetland use in opposing ways. Some policies encourage conversions: tax deductions and credits can significantly reduce wetland conversion costs for farmers. On the other hand, regulatory and acquisition programs discourage conversions. The U.S. Army Corps of Engineers' regulatory program established by section 404 of the Clean Water Act, provides the major avenue of Federal involvement in controlling the use of wetlands by regulating discharges of dredged or fill material into wetlands.

For those activities that come under regulation by the Corps, annual conversions are reduced na-

● The Fish and Wildlife Service (FWS) used the term "wetland" in 1952 to describe a number of diverse environments that shared characteristics of both aquatic and terrestrial habitats—i .e., lands at least temporarily inundated, but with "emergent' vegetation adapted to saturated soil conditions. Presently, there are two major Federal definitions. One definition was established by FWS for purposes of mapping and classification of wetlands; the second, more restrictive, definition was developed by the U.S. Army Corps of Engineers and the Environmental Protection Agency for the purpose of regulation. As a result, FWS has estimated that in the mid- 1970's there were 99 million acres of vegetated and nonvegetated wetlands in the lower 48 States. In comparison, the Corps estimates that its jurisdiction extends over approximately 64 million acres of wetlands. The differences *in* the interpretation of what constitutes a wetland have led to considerable confusion and a great deal of controversy. Disagreement exists, for example, over whether parts of the Alaskan tundra and drier sections of bottom land hardwoods should be considered wetlands.

*The analyses presented in this study apply only to vegetated wetlands. If unvegetated habitats, such as mud flats, were included, the quantitative estimates describing wetland trends could change by as much as 10 to 20 percent. However, the overall wetland trends in the lower 48 States and the policy options discussed later are not significantly affected by differences in wetland definitions.

tionwide by about 50 percent, or 50,000 acres of wetlands per year, primarily through project modifications. Because most activities that occur in coastal wetlands are regulated by the Corps and/or State wetland programs, coastal wetlands are reasonably well protected. However, many activities, such as excavation and traditional clearing and drainage for farming and other uses, are not regulated by either the Corps or by most State wetland programs. These activities were responsible for the vast majority of past conversions, especially in inland areas, where 95 percent of the Nation's wetlands are located. Inland, freshwater wetlands are generally poorly protected.

The current rates of wetland loss are not likely to have catastrophic environmental impacts in the next few years, but the continued incremental conversion of wetlands, especially in certain inland regions of the country, could have significant adverse ecological effects over the next few decades. To address this situation, the Federal Government could play an important role in integrating ongoing efforts to manage the Nation's wetlands.

Over the next decade existing wetland programs can be integrated in a few successive steps. First, the Federal Government could complete its ongoing mapping of wetlands; high priority could be assigned to those areas where development pressures are high. Next, the wetlands in different regions of the country could be categorized according to their relative values. This would enable existing wetland programs to be tailored in a consistent and integrated manner to the broad categories of wetlands and to prospective development activities. If deemed necessary, the Government could broaden the scope of different wetland programs (e.g., regulation, acquisition, leasing, etc.) to include the full range of wetland values, rather than continuing to focus on individual values, such as wildlife habitat. By taking these steps, higher value wetlands would receive more protection than wetlands of lower value. Developers also would have prior knowledge about standards and requirements for converting specific wetland areas, thus simplifying the regulatory process.

For such an integrated approach to wetlands management, further efforts also would be needed to reduce uncertainties about: recent wetland trends, the ecological significance of additional wetland conversions, and the effect of major policies and programs on wetlands use. A detailed work plan developed by an interagency working group would help to ensure that all required activities are accomplished in a timely manner.

Finally, while this plan is being developed, Congress may wish to provide additional protection for wetlands, especially higher value wetlands that may be subject to agricultural conversion. This could be done through acquisition or easements from the Department of the Interior's Fish and Wildlife Service, or through leases from the Department of Agriculture's (USDA) Water Bank Program. All of these options can provide comparable levels of protection. For a given level of funding, many more wetlands can be protected with leases than with easements or acquisition; however, leases only provide short-term protection.

During the course of this study, data were collected from the scientific literature, Government reports, and responses to questionnaires about wetlands use from 37 out of 38 Corps districts, from 48 States, and from 11 out of 20 trade associations surveyed. The Office of Technology Assessment (OTA) also conducted case studies of wetland trends in 13 States and minor studies in 8 States, * and interviewed many Federal and State personnel and industry representatives. Because agricultural activities were responsible for the vast majority of past wetland conversions, agricultural policies were surveyed in somewhat greater detail than were most other Federal policies.

As a result of its studies, OTA has identified three issues related to wetlands management. First, should Federal involvement in protecting wetlands be increased or decreased? Second, should the Federal Government improve its policymaking capability through a systematic collection and analysis of additional information about wetlands? Finally, should the Federal Government develop a more integrated approach for managing the use of wetlands? More detailed analyses of the technical and institutional information that relates to these policy options are presented in later chapters of this report.

● Case studies were conducted for Alaska, California, Florida, Louisiana, Massachusetts, Minnesota, Nebraska, New Jersey, North Carolina, North Dakota, Rhode Island, South Carolina, and Washington. Minor studies were conducted in Connecticut, Maine, Maryland, Mississippi, New Hampshire, South Dakota, Texas, and Vermont.

The results of the study are presented in this summary in three sections: values and uses of wetlands, programs and policies affecting wetland use, and policy considerations and options.

VALUES AND USES OF WETLANDS

The Intrinsic Qualities and Ecological Services Associated With Wetlands

Some people value wetlands for their intrinsic qualities. Their primary motivation for protecting wetlands is simply a desire to preserve natural areas for future generations, or because they are often the last areas to be developed. Others value the varied and abundant flora and fauna found in wetlands and the opportunities for hunting, fishing, boating, and other recreational activities. While recreational benefits can be quantified to some extent, the other intrinsic values of wetlands are, for the most part, intangible. For this reason, the justification for protecting wetlands has often focused on the importance of the ecological services or resource values that wetlands provide, which are more scientifically and economically demonstrable than intrinsic qualities (box A).

The intrinsic qualities and ecological services provided by wetlands can vary significantly from one wetland to another and from one region of the country to another. For example, mangrove swamps, while only of marginal importance to waterfowl, are very important for erosion control along the Florida coast. Some wetlands provide benefits that are primarily local or regional *in* nature; other benefits may be national or even international in scope. Because of the many differences between individual wetlands, the significance of their ecological services and intrinsic qualities must be determined on an individual or regional basis.

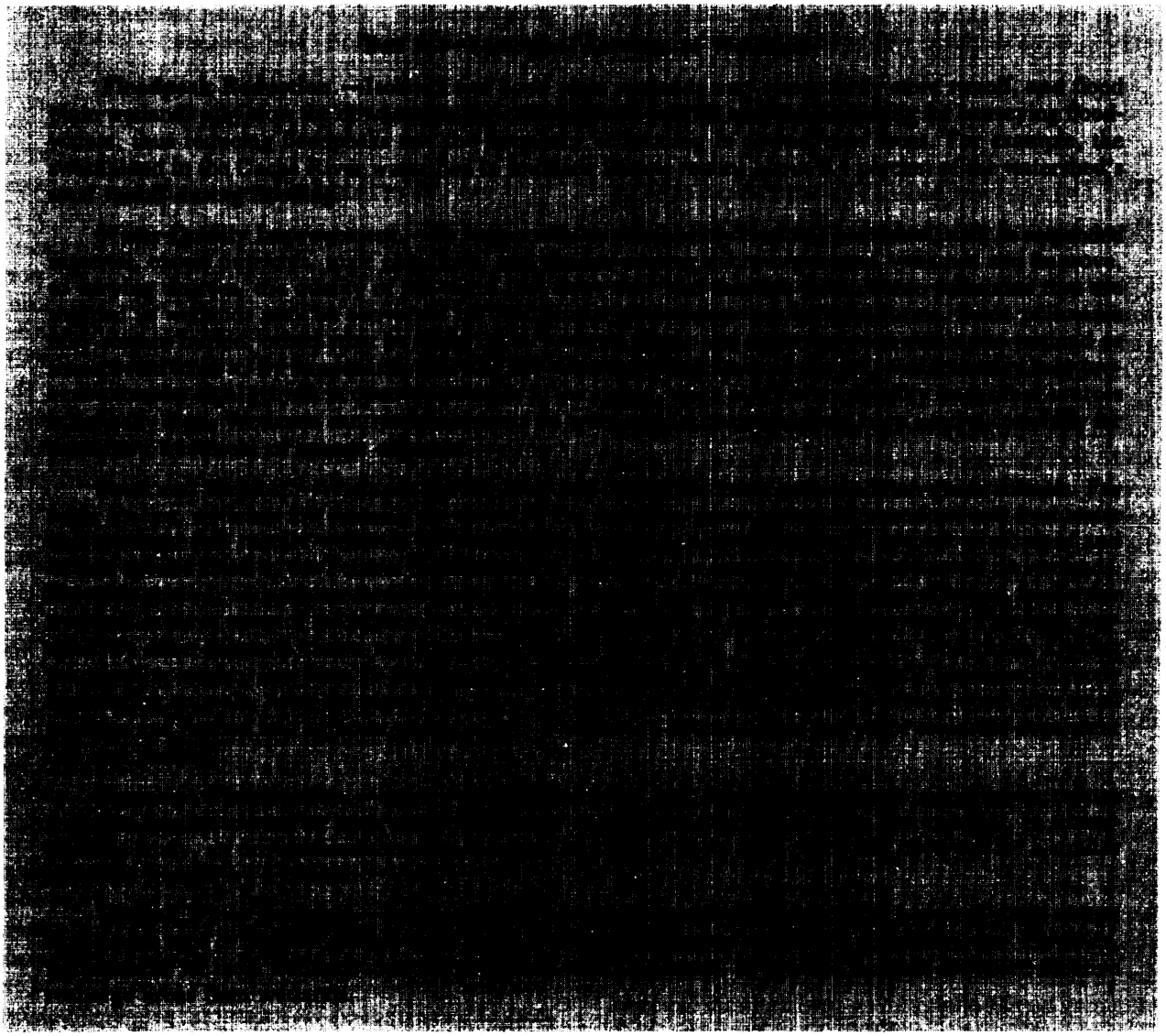
In making such a determination, the dollar value of the ecological services that wetlands provide can sometimes be quantified. The Corps, for instance, estimated that the loss of the entire 8,422 acres of wetlands within the Charles River Basin in Massachusetts would result in average annual flood damages of over $17 million. However, because the many intrinsic qualities of wetlands cannot be quantified, it is usually difficult to place generally accepted dollar values on wetlands.

Wetland Conversions

Wetlands can provide important sites for development activities such as agriculture, forestry, port and harbor development, oil and gas extraction, housing and urban growth, mining, and water resource development. Wetland drainage for agricultural purposes is particularly widespread in the Lower Mississippi River Valley and in some areas of the Southeast. Some activities, such as peat mining and cranberry production, can take place only in wetlands or in former wetlands; other activities may achieve cost savings by using wetlands rather than upland areas. Some wetlands lie over natural resources such as oil, gas, and phosphate ore deposits. For example, unprocessed phosphate ore underlying wetlands in coastal areas of North Carolina may be worth several hundred thousand dollars per acre. Although development activities that affect wetlands are probably worth billions of dollars annually, data were not available for OTA to estimate the total net monetary values of these activities as they relate to wetlands.

Development activities that involve excavation (or dredging), filling, clearing, draining, or flooding of wetlands generally have the most significant and permanent impacts on wetlands and the ecological services they provide. The extent of these impacts varies among projects, depending on the scale and timing of the project, the type of wetland affected, and many other variables. In many cases, project impacts can be reduced by redesigning the project or by modifying construction timetables.

The ability to restore significantly degraded wetlands or converted areas to their original condition depends on the type of wetland and on the degree to which it has been affected by natural processes or by particular development activities. For example, former San Francisco Bay wetlands that were formerly used for agriculture are now being restored by removing manmade dikes that once separated them from the Bay. It is also possible to create new



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Trends in Wetland Use

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photo credit: U.S. Fish and Wildlife Service

Wetlands provide food and habitat for many species of fish and wildlife. Waterfowl, in particular, often require wetland habitats for breeding and nesting.

Table 1.—Wetland Conversions From Mid-1950's to Mid-1970's

	Original acreage mid-1950's (million acres)	Net loss[a] Million acres	Conversion rate
Coastal. . .	4.8	0.4	8.30/o
Inland	100.0	11.0	11 .0 "/0

[a]Net losses are calculated by subtracting the gains in wetlands (from rnan induced and natural causes) from the actual losses of wetlands.

SOURCE: Original data from FWS National Wetland Trends Study, 1983.

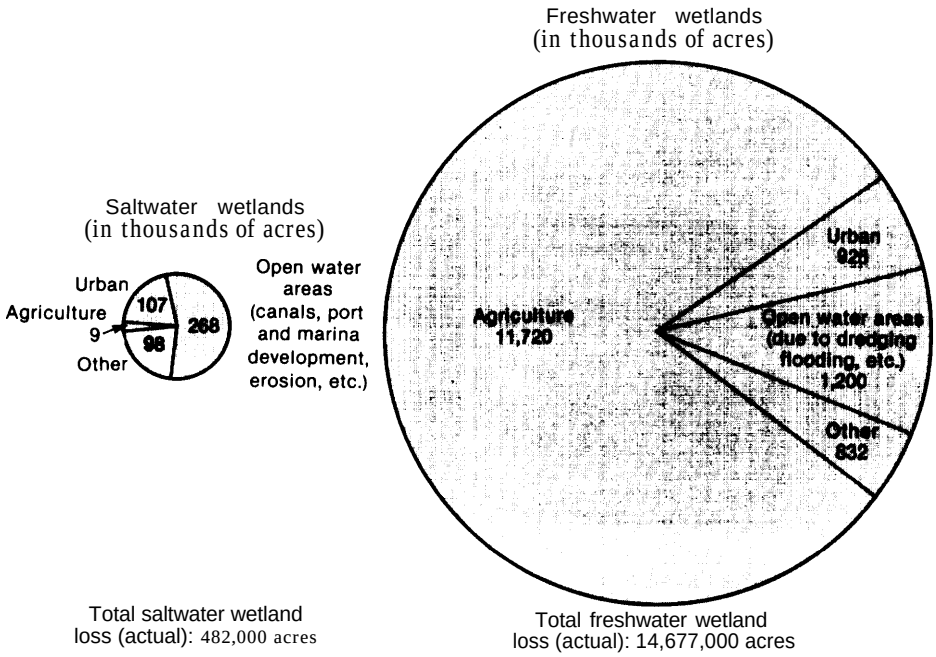
Ninety-seven percent of actual wetland losses (or conversions from wetland to nonwetland areas) occurred in inland, freshwater areas during this 20-year period (fig. A). Agricultural conversions involving drainage, clearing, land leveling, ground water pumping, and surface water diversion were responsible for 80 percent of these conversions. Of the remainder, 8 percent resulted from the construction of impoundments and large reservoirs, 6 percent from urbanization, and 6 percent from other causes, such as mining, forestry, and road construction. Fifty-three percent of these conversions occurred in forested areas, such as bottom lands. Of the actual losses of coastal wetlands, approximately 56 percent resulted from dredging for marinas, canals, and port development, and to a lesser extent from shoreline erosion; 22 percent resulted from urbanization; 14 percent from disposing of dredged material or from creating beaches; 6 percent from natural or man-induced transition of saltwater wetlands to freshwater wetlands; and 2 percent from agriculture.

Wetland conversions have adversely impacted the environment in some regions of the country. For example, reductions in Pacific-flyway migratory waterfowl have been directly correlated to the conversion of about 90 percent of California's wetlands. While the ecological significance for the Nation of wetland conversions over the last several decades is uncertain, the environment will undoubtedly be negatively affected if conversions continue.

PROGRAMS AND POLICIES AFFECTING WETLAND USE

Wetland use is directly and indirectly affected by a variety of Federal (table 2), State, local, and private programs that were developed, for the most part, during the past two decades. These programs affect wetland use through regulation, acquisition, leasing, easements, and general policy guidance.

Figure A.—Actual Wetland Conversions (mid-1950's to mid-1970's)



SOURCE: U S, Fish and Wildlife Service National Wetland Trends Study, 1982

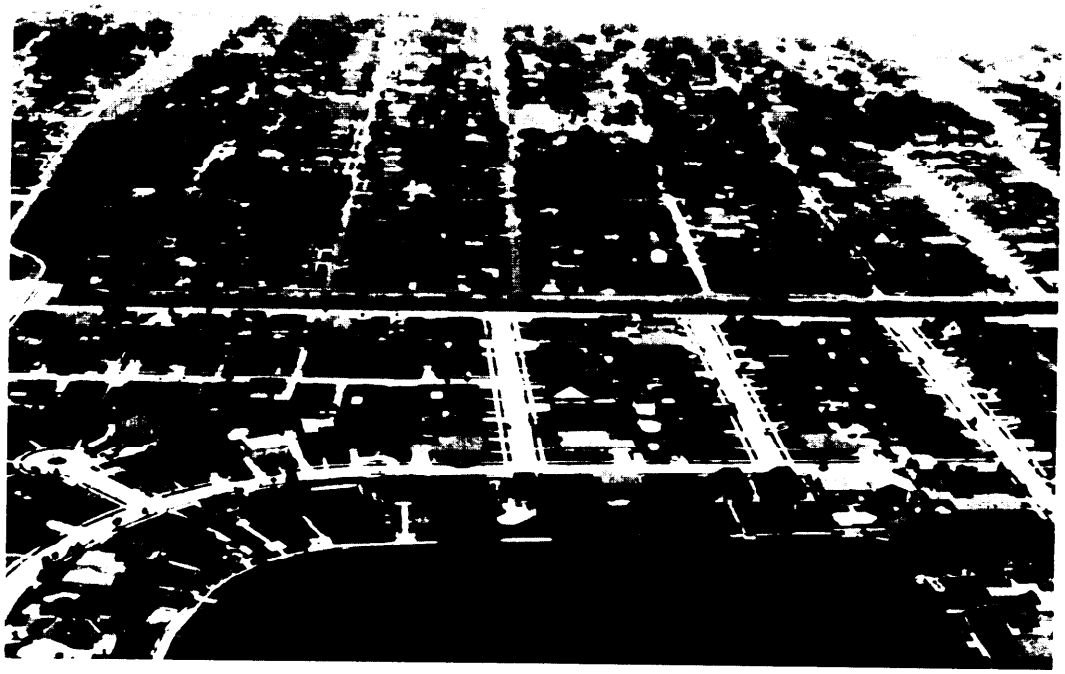


Photo Credit: OTA Staff

Wetlands are often attractive sites for real estate development because of their waterside location. This Louisiana housing development near New Orleans, for instance, is constructed on filled wetlands

Table 2.—Major Federal Programs Affecting the Use of Wetlands

Program or act	Primary implementing agency	Effect of program
I. Discouraging or Preventing Wetlands Conversions		
A. *Regulation:*		
Section 404 of the Clean Water Act (1972)	U.S. Army Corps of Engineers, Department of Defense	Regulates many activities that involve disposal of dredged or fill material in waters of the United States, including many wetlands
B. *Acquisition:*		
Migratory Bird Hunting and Conservation Stamps (1934)	Fish and Wildlife Service (FWS), Department of the Interior (DOI)	Acquires or purchases easements on wetlands from revenue from fees paid by hunters for duck stamps
Federal Aid to Wildlife Restoration Act (1937)	FWS	Provides grants to States for acquisition, restoration, and maintenance of wildlife areas
Wetlands Loan Act (1961)	FWS	Provides interest-free Federal loans for wetland acquisitions and easements
Land and Water Conservation Fund (1955)	FWS, National Park Service (DOI)	Acquires wildlife areas
Water Bank Program (1970)	Agriculture Stabilization and Conservation Service, Department of Agriculture (USDA)	Leases wetlands and adjacent upland habitat from farmers for waterfowl habitat over 10-year period
U.S. Tax Code	Internal Revenue Service (IRS)	Provides deductions for donors of wetlands and to some not-for-profit organizations
C. Other general policies or programs:		
Executive Order 11990, Protection of Wetlands (1977).	All Federal agencies	Minimizes impacts on wetlands from Federal activities
Coastal Zone Management Act (1972)	National Oceanic and Atmospheric Administration, Department of Commerce	Provides Federal funding for wetland programs in most coastal States
II. Encouraging Wetlands Conversion		
U.S. Tax Code	IRS	Encourages farmers to drain and clear wetlands by providing tax deductions and credits for all types of general development activities
Payment-in-Kind (PIK) Program.	USDA	Indirectly encourages farmers to place previously unfarmed areas, including wetlands, into production

SOURCE: Office of Technology Assessment, 1983.

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Federal Programs Discouraging Wetland Conversions

Federal Regulation-The 404 Program

Under the River and Harbor Act of 1899, the Corps regulates all activities that could directly affect the navigability of rivers and coastal waters used for interstate commerce. In 1972, Congress gave the Corps the responsibility of regulating the discharge of dredged or fill material in the Nation's waters under section 404 of the Clean Water Act (CWA). Through this program, the Corps evaluates the impacts of proposed development projects on wetlands in light of its review and comments from the Environmental Protection Agency (EPA), the Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and the States. If a project's impact on the environment is judged to be significant, the permit application can be denied, the project can be modified to minimize impacts, or the permit applicant can purchase or restore other wetlands to compensate for project impacts. EPA also has veto authority over any proposed sites for disposing of dredged or fill material. In this way, the 404 program provides broad regulatory authority over wetland use by many types of development activities.

The Corps initially interpreted the geographic scope of its new authority to include only traditionally navigable waters. However, after a 1975 decision by the District Court for the District of Columbia in ***National Resources Defense Council, Inc. v. Cal/away,*** the scope of the 404 program was expanded to encompass "all waters of the United States. " The issue of the Corps' expanded jurisdiction was hotly debated, but left unchanged in a close vote, when CWA was amended in 1977. Many view this broad authority as a significant extension of the Federal Government's constitutional powers that borders on land-use control; others view it as necessary to protect the public's interests in the quality of the Nation's waters.

There are fundamental differences in the way Federal agencies and various special interest groups interpret the intent of section 404, which, as stated in the preface to CWA, is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" (sec. 101[a]). The Corps views its primary function in carrying out the law as protecting the quality of water. Although wetland values are considered in project reviews, the Corps does not feel that section 404 was designed specifically to protect wetlands. FWS, EPA, NMFS, and environmental groups feel that the mandate of CWA obliges the Corps to protect the integrity of wetlands, including their habitat values.

LIMITATIONS OF THE 404 PROGRAM

The Corps' 404 program now provides the major avenue for Federal involvement in regulating activities that use wetlands; however, in terms of comprehensive wetland management, it has major limitations.

First, in accordance with CWA, the 404 program regulates only the discharge of dredged or fill material onto wetlands. Projects involving excavation, drainage, clearing, and flooding of wetlands are not explicitly covered by section 404 and are not usually regulated by the Corps. * Yet such activities were responsible for the vast majority of inland wetland conversions between the mid-1950's and the mid-1970's. Rarely have these activities been halted or slowed because of Federal, State, or local wetland regulations. Without more direct government involvement, the conversion of most inland wetlands is likely to continue unabated.

Second, the Corps does not have adequate resources to regulate activities effectively in all waters of the United States. Instead of case-by-case review, it uses general permits for isolated waters and head-

● The regulation of wetland draining and/or clearing operations for agricultural purposes is highly contentious and variable among Corps districts. Some conversions involving the discharge of fill material from ditching operations onto wetlands are regulated either individually or under general permits. Individual permits are usually issued with few modifications because of difficulties in demonstrating adverse water quality and/or cumulative impacts. Some conversions do not involve the discharge of fill material onto wetlands. Others are not regulated due to failure of the Corps' administration and lax enforcement or because the Corps and EPA may use a narrower definition of wetlands than scientists or environmental groups. Alternatively, farmers may convert potential ' 'wetlands' in dry years when wetland vegetation is not present or they may drain wetlands through ditches on non-wetland areas. In accordance with present Corps policy, the clearing of bottom lands is not generally regulated by most districts, except in a portion of Louisiana as a direct result of a ruling by the Fifth Circuit Court. However, one Corps district has significantly slowed some large-scale clearing operations, although the extent of its jurisdiction is controversial.

water areas. Because there are few application or reporting requirements for activities within areas covered by general permits, the Corps has limited regulatory control over these areas.

Third, several administrative problems presently limit the program's effectiveness, including significant variations in the way different districts implement key elements of the 404 program, the lack of coordination between some districts and other Federal and State agencies, inadequate public awareness efforts, and the low priority given monitoring and enforcement.

EFFECTS OF THE 404 PROGRAM ON WETLANDS

Estimates made by OTA based on the best available information suggest that present conversion rates are probably about 300,000 acres per year. * Approximately 250,000 acres per year result from the unregulated conversion of inland wetlands, primarily for agricultural use, while 50,000 acres per year result from conversions regulated by the 404 program and State regulatory programs. Of this latter figure, about 5,000 acres are located in coastal areas.

According to their own estimates for 1980-81, the Corps authorized projects that, if completed in accordance with the conditions of the permits, resulted in the conversion of about 50 percent of the acreage applied for. Data from NMFS for the coastal wetlands (in the lower 48 States) indicate that the 404 program, in combination with State regulatory programs, reduced the conversion of coastal saltwater wetlands by 70 to 85 percent in 1981. In addition, some conversions maybe deterred simply by the existence of the regulatory programs, and other conversions may be avoided through preapplication consultations with the Corps.

Finally, each year about 5,000 acres of vegetated wetlands are either created or restored for mitigation purposes as a direct result of the "conditioning' of 404 permits.

● Because of uncertainties and variability associated with available data and the extrapolations that were made from these data, these estimates may be off by 10 to 20 percent.

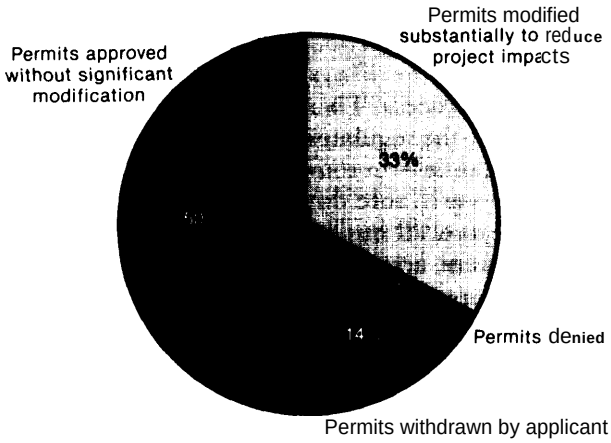
EFFECTS OF THE 404 PROGRAM ON DEVELOPMENT ACTIVITIES

Developers' objections to the 404 program focus mainly on the delays and costs imposed by the regulatory process. There are probably numerous cases where the regulatory costs to developers have been substantial-in some cases, millions of dollars. But little verifiable data are available to document the overall impacts of the 404 program on development activities, especially as they relate to costs imposed by other programs and policies (e. g., sec. 10 of the River and Harbor Act, National Environmental Policy Act requirements, State programs, and local ordinances) and general economic conditions.

Some developers question the need for a Federal program to protect all wetlands; the congressional intent of section 404 relative to wetland protection; inadequate consideration by regulatory agencies of the value of development activities; inconsistencies in the program implementation by Corps districts; and possible inefficiencies or inequities in program administration, including duplication of State wetland programs. Many also believe that the market value of wetland areas decreases when they fall within the jurisdiction of the Corps' regulatory program.

All permit applicants bear at least some 404-related costs resulting from permit denials, modifications of projects, permit processing, and processing delays. Of approximately 11,000 project applications per year, slightly less than 3 percent are denied; about one-third are significantly modified; and about 14 percent are withdrawn by applicants (fig. B). About half are approved without significant modifications. In 1980 approximately one-third of all issued permits took longer than 120 days to process; in 1983 the average processing time was about 70 days. Less than 1 percent of all permitted projects require an Environmental Impact Statement (EIS), which may take several years to complete. Delays in processing permit applications for a relatively few large-scale projects (that represent the bulk of the economic value of all proposed development activities) probably account for a substantial portion of the total costs to industry associated with the 404 program.

Figure B.–404 Permit Statistics, 1981



Total number of permit applications: 11,000/year

SOURCES: U.S. Army Corps of Engineers and Office of Technology Assessment.

Federal Economic Measures

Since Federal outlays for wetland acquisitions, easements, and leases total only a few million dollars a year, economic measures can be used to protect wetlands only on a highly selective basis. An estimated 10 million acres of wetlands in the lower 48 States are protected through Federal ownership, easements, and leases. Federal wildlife refuges also protect about 29 million acres of wetlands in Alaska.

Full ownership or easements provide the Government with the most effective mechanism for directly controlling the use of wetlands. Full ownership is probably most suited for situations where management of a wetland as part of the system of national refuges, parks, and forests is desired or where the goal is to preserve the wetland in perpetuity, regardless of the benefits of potential development activities. Perpetual easements provide almost the same level of control as full ownership, while the wetlands remain in private hands. Recent Federal costs of wetland purchases by FWS range from $600 to as much as $1,200/acre for some bottom lands. Easements typically cost the Government about $200/acre. Federal funding for wetland acquisition and easements is provided through sale of Migratory Bird Hunting and Conservation Stamps (duck stamps) and through the Wetlands Loan Act of 1961 and the Land and Water Conservation Act of 1965,

Leases can provide a high degree of Federal control for the period of the lease. Through the Department of Agriculture (USDA) Water Bank Program, authorized by the Water Bank Act of 1970, private landowners or operators generally receive, through 10-year leases, annual payments of $5 to $10/acre for most designated wetlands and up to $55/acre for adjacent upland areas.

Tax writeoffs are given to owners who donate wetlands to Government or conservation agencies.

Federal Programs Encouraging Wetland Conversions

Tax deductions and credits for all types of general development activities provide the most significant Federal incentive for farmers to clear and drain wetlands. They also shift a significant portion of the conversion costs to the general taxpayer. The dollar value of these tax incentives is greater at higher income levels. They include:

- first-year tax deductions of up to 25 percent of gross farm income for draining expenses (expenses in excess of this limit may be deducted in subsequent years);
- tax deductions for depreciation on all capital investments necessary for draining or clearing activities;
- tax deductions for interest payments related to draining and clearing activities; and
- investment tax credits equal to 10 percent of the installation cost of the drainage tile.

Price supports and target prices for commodities may have encouraged some wetland conversion by setting guaranteed floor prices for some crops grown on converted wetlands, but few farmers have been enrolled in these programs over the past decade. Other USDA policies that may provide assistance for wetland conversions take the form of technical assistance and cost-sharing for the construction of a wide variety of conservation projects, loans from the Farmers Home Administration to finance conversions, and Federal compensation through crop insurance for crop losses from flooding in wetland areas. These forms of assistance are probably of limited significance in influencing a farmer's decision to convert wetlands to cropland.

Administration Policies

The administration's goals with respect to wetlands are unclear. On the one hand, the Corps has revised its administrative procedures for the 404 program to reduce the regulatory burden on industry and to increase the role of the States. Some of these changes may have reduced the level of wetlands protection provided by 404, although there will never be quantitative data to support this or any other statement made about the effects of these programmatic changes on wetlands. Administration support for State coastal management programs also has been reduced significantly, and no funds have been requested in the past 3 years for wetland acquisition. On the other hand, the Department of the Interior proposed a bill, Protect Our Wetlands and Duck Resources Act (POWDR), to eliminate some Federal expenditures for some wetland activities, increase funding to States for wetland conservation, extend the Wetlands Loan Act for 10 years, and increase revenues for wetland acquisition through additional fees for duck stamps and wildlife refuge visitation permits.

State Wetland Programs

Almost all 30 coastal States (including those bordering the Great Lakes) have programs that directly or indirectly regulate the use of their coastal wetlands. Most inland States do not have specific wetland programs. Through a combination of the 404 program and State programs, most coastal wetlands are regulated reasonably well; inland wetlands, which comprise 95 percent of the Nation's wetlands, generally are not regulated by States.

Developers often object to the apparent duplication between the 404 program and State regulatory programs. However, representatives from most States with wetland programs believe that the 404 program and State regulatory programs complement one another. Corps districts often let State agencies take the lead in protecting wetlands, using the 404 program to support their efforts. If certain EPA requirements are met, States can assume the legal responsibility for administering that portion of the 404 program covering waters that are not traditionally navigable. Twelve States have evaluated or are evaluating this possibility, and four are administering pilot programs to gain practical experience prior to possible program assumption. Michigan is the only State that has applied for 404 program assumption. In general, most States have neither the capability nor the desire to assume sole responsibility for regulating wetland use without additional resources from the Federal Government; some States would be reluctant to do so even with government support.

Local Wetland Programs

In some areas of the country, the principal means of wetland protection outside of the 404 program comes from local regulations (including zoning controls) and acquisition programs.

Private Initiatives

Private organizations, such as the Nature Conservancy, the Audubon Society, and Ducks Unlimited, have protected thousands of acres of wetlands through direct acquisition, partial interest, and other means. For example, the Richard King Mellon Foundation recently gave the Nature Conservancy a $25 million grant toward its efforts to conserve wetland ecosystems in the United States. Other national environmental organizations and hundreds of local or regional organizations, including fish and game clubs, have also been active in protecting wetlands.

POLICY CONSIDERATIONS AND OPTIONS

Policy Considerations

Controversy over the 404 program has led to much discussion of different ways of changing the Federal involvement in controlling the use of wetlands. Decisions about the use of wetlands are not usually simple and straightforward, but involve judgments about:

- the importance of wetlands to society relative to the benefits associated with wetland development;
- the relative significance of current rates of wetland conversion;
- the desirability of temporarily deferring the immediate benefits from wetland conversion to avoid the loss of potentially valuable resources;
- the adequacy of existing programs and the costs imposed by these programs on Government, development activities, and society at large; and
- the appropriate role of the Federal Government relative to the role of other levels of government and of private organizations.

In general, the greater the Federal involvement in controlling the use of wetlands, the greater the costs for wetland programs and for developers.

Policy Issues

OTA has identified three issues related to wetlands management:

1. Should Federal involvement in protecting wetlands be increased or decreased?
2. Should the Federal Government improve its policymaking capability through a systematic collection and analysis of additional information about wetlands?
3. Should the Federal Government develop a more integrated approach for managing the use of wetlands?

These issues are interrelated. For example, if Congress determines that the existing data are adequate to resolve issue 1, it would not be necessary to pursue any policy options addressing issue 2. On the other hand, Congress may decide to adopt options under issue 2 before attempting to make any changes in the level of Federal involvement as discussed under issue 1. Developing an integrated system for managing wetlands use, as described under issue 3, would require collecting more data about wetlands, as outlined in options under issue 2.

Policy Options

Issue 1: Should Federal involvement in protecting wetlands be increased or decreased?

Arguments about the desired degree of Federal involvement in managing the use of wetlands can be made from three different positions. First, in favor of increasing the level of Federal involvement, it can be argued that wetlands provide many valuable natural benefits to the public. Yet, from 30 to 50 percent of this resource has been converted to other uses, and conversions continue. Because most States generally do not seem inclined to fill any gaps in the current Federal regulatory program, a stronger Federal presence at least in those States with weak programs may be indicated.

Others argue that wetlands have been converted to other uses at rates of only 0.5 percent a year, while present rates are probably even lower. Considering the great benefits that can derive from wetland conversions, regulatory costs stemming from delays and permit denials are a high price to pay for preserving a small percentage of the Nation's wetlands. Thus, the level of Federal involvement should be reduced even though wetland conversions might increase as a result of decreased regulation.

Third, it could be argued that existing Federal programs, including the 404 program, provide the appropriate level of wetlands management and protection overall. To some, existing data might not indicate an urgency to halt all wetland conversions, but wetlands (especially high-value wetlands) deserve some protection to avoid possible incremental losses over the long term. In addition, the scanty data on recent trends may provide little basis for changing existing policies until more information has been collected. Court decisions about the scope of the 404 program and its implementation by the Corps are also pending.

The use of privately owned wetlands is now controlled, to varying degrees, through a mix of economic measures and regulation. Numerous options exist for modifying policy to increase or decrease the present level of Federal involvement in managing and protecting wetlands.

Issue 1A: Options to *increase* Federal involvement in managing wetlands

Federal involvement could be increased by adopting any or all of the following options, which are listed roughly in order of decreasing Federal control over wetlands use, program costs, and costs to developers. How significant these changes would be is unknown. A single new wetlands statute could be developed to combine existing policies with any of the following options; however, if changes are desired, it would likely be easier to modify existing statutes individually.

Option 1: Broaden the scope of section 404 through legislation.

Increase the types of activities covered by section 404. —Projects responsible for the vast majority of past wetland conversions (excavation, drainage, clearing, and flooding of wetlands) are not explicitly covered by section 404 or regulated by most Corps districts. Increasing the types of activities covered by section 404 could reduce wetland conversions resulting from nonagricultural activities. Agricultural activities are so numerous that it would be impractical to regulate all of them; however, it is probably possible to regulate large-scale conversions. At present, not all clearing operations are regulated and few modifications or denials are made, even on those that are.

Explicitly address wetland values in section 404. —Because the term ' 'wetland' is used only once in section 404 and is not defined, the objectives of CWA with regard to wetlands are open to interpretation. The regulation of wetland-clearing operations, particularly in bottom land areas, has been the subject of constant controversy. If wetland values were addressed explicitly in section 404, the Corps would have a clear mandate to consider and protect the integrity of wetlands (including habitat values) as well as water quality. If this were done, many wetland-clearing operations falling within the Corps' jurisdiction could be controlled.

Option 2: Remove the incentive for agricultural conversions.

Eliminate tax incentives for agricultural conversions. —The cost of agricultural conversions to a farmer can be reduced through tax credits and deductions for costs associated with clearing and draining activities. Tax incentives could be reduced or eliminated for these activities if they occurred on wetlands. However, the effect of this change on wetland use would probably vary. In some areas of the country, wetland conversions could become unprofitable; in other areas, conversions probably would still be profitable even without Federal tax incentives.

The effects of eliminating these tax incentives would be insignificant to the vast majority of farmers and on the farm economy. For example, deductions for wetland conversions were less than 0.3 percent of all farming deductions in 1980. In addition, because of the relatively large acreage of available cropland (i. e., 365 million acres), neither commodity prices nor farm production as a whole would be noticeably affected over the near term if agricultural conversion of wetlands were curtailed or eliminated. Nonetheless, eliminating tax benefits to farmers for wetland conversions will never be popular.

Increase appropriations for the Water Bank Program. —The Water Bank Program, funded at $8.8 million in 1982 and 1983, preserves wetlands and adjacent uplands covered by the program for 10-year lease periods. Because the program is apparently popular with the agricultural community, additional appropriations would allow increased enrollment and greater coverage of wetlands in agricultural areas. The program might also be more attractive if payments were increased or adjusted annually in response to changing pressures to convert wetlands rather than every 5 years, as it is now.

Encourage wetland preservation through the Payment-in-Kind Program.—In 1983, USDA instituted its Payment-in-Kind (PIK) Program, wherein farmers withdrew cropland from production in exchange for commodities that would have been produced on the cropland. In fiscal year 1983, approximately 82 million acres of cropland were taken out of production as a result of the PIK Program. However, many farmers are apparently simultaneously putting other land, which could include wetlands, into production. If the PIK Program is used in future years, it may be possible to include special provisions that would encourage the preservation of wetlands.

Option 3: Increase appropriations for acquisition and easement programs.

The National Wildlife Refuge System contains over 33 million wetland acres: 4 million are in the lower 48 States and 29 million are in Alaska. The National Park System contains untabulated but substantial wetland acreage. Federal funding for these programs could be increased, and greater priority could be given to wetlands in purchasing decisions. Federal wetland-related income, such as the fee charged for duck stamps, could be increased to support these programs.

Option 4: Increase tax benefits for wetland preservation through legislation.

Congress could alter Federal taxation policies to increase the attractiveness of donating wetlands or of selling conservation easements to Government agencies or to private conservation groups for the purpose of preservation. While the acreage of wetlands being protected might increase, the ecological value of the wetlands donated would probably vary.

Option 5: Reverse the Corps' 1982 administrative changes to the 404 program.

The Corps' recent administrative changes to the 404 program have been designed to streamline the permit process. For example, average processing time for individual permits has been reduced from over 120 to about 70 days. Although the Army contends that the level of wetlands protection actually achieved has been unchanged by the administrative measures, anecdotal and qualitative evidence suggests that these changes, such as the expanded use of general permits, have generally reduced the amount of potential control over wetland use. However, existing data do not allow quantification of the effects of these administrative changes on wetland trends. Reversing these changes would reestablish the administrative framework for regulating wetland use at levels that existed before the administration's 1982 regulatory reform initiatives.

Option 6: Improve the Corps' administration of the existing 404 program.

The efficiency and effectiveness of the 404 program could be improved by implementing the following measures, which may require modest increases in program funding and personnel. Congressional oversight may also be required to determine the extent to which these options are implemented by the Corps.

Standardize Corps' district procedures.—The Corps' 404 program is implemented by 38 semiautonomous district offices that often differ greatly in how they interpret and implement the 404 program. Some inconsistencies could be avoided through continued and increased use of regulatory-guidance letters on presently vague policies, such as those on the mitigation of project impacts. Districts also could exchange information about successful solutions to common problems.

Improve coordination among Federal agencies and between the 404 and State regulatory programs. -Improved coordination, increased use of single public notices, and joint processing of permit applications could provide ' 'one-stop shopping" for permit applicants and reduce procedural duplication and delays. Procedures of this sort already have been successfully implemented in a few Corps districts.

Increase program publicity.—Many people planning development activities on wetlands are unaware of the 404 program and its permit requirements. Greater public understanding could lead to better planning and result in fewer violations, less damage to wetlands, and reduced costs to developers stemming from delays and fines.

Improve monitoring and enforcement. — Many districts make inadequate efforts to monitor for permit violations, particularly in inland wetland areas. Action is often taken only in response to reported violations. This situation could be improved by increasing district funding, using personnel specifically for this purpose, and by providing equipment (e. g., observation planes) as needed. A congressional mandate may also be required.

Establish reporting requirements for general permits. —The Corps does not monitor activities covered by general permits or the impacts of such activities on wetlands. More complete reporting could be required so that individual and cumulative impacts associated with individual projects could be assessed. If reports indicated unacceptable impacts, permit requirements could be strengthened.

Issue 1B: Options to ***decrease*** Federal involvement in managing wetlands

If Federal involvement in protecting wetlands appears to Congress to be too great, a number of options could be adopted. Some options reduce funding for Federal programs; others reduce the scope of the 404 program. Legislative action is desired by some who favor extensive and permanent reforms in the program. The following options for decreasing the level of Federal involvement will also decrease wetlands protection, costs for the Federal Government, and regulatory costs to developers. How great these decreases will be is unknown.

Option 1: Amend section 404.

In a February 10, 1983, letter to EPA, the Assistant Secretary of the Army (Civil Works) outlined several possible legislative changes to section 404, including the options below. OTA analysis indicates that any combination of these options that includes either of the first two changes probably would provide a level of Federal wetland regulation and 404-related costs to industry similar to those that existed prior to full implementation of the 404 program.

Transfer the 404 program to the States.—Most coastal wetlands are reasonably well regulated by 404 and State programs; most inland wetlands are not. In those coastal States with strong wetland programs, transfer of the 404 program to the States probably would not affect wetland use in a major way. In States with relatively weak or no programs, such an option would reduce control over wetlands, especially inland wetlands, unless the Federal Government provided large amounts of financial and technical assistance to strengthen State programs. Even with assistance, some States still might not effectively regulate wetland use.

Expand the use of general permits to include all projects other than those occurring in traditionally navigable waters.—Since monitoring and enforcement requirements for general permits are usually not a high priority in most Corps districts, development of most wetlands would, for all practical purposes, be uncontrolled by the Federal Government. Instead, States would have primary responsibility for regulating the use of most wetlands.

Eliminate permitting requirements for any incidental discharges.—If section 404(f)2 were eliminated, it would be very unclear whether or not the Corps would be required to regulate discharges of dredged or fill material that are incidental to activities that convert waters of the United States to a new use. Thus, the clearing of wetlands, such as the bottom land hardwoods, would probably become less stringently regulated than it is at present.

Make 404(b)1 guidelines only advisory in nature.— Section 404(b)1 guidelines are developed by EPA in conjunction with the Corps. Through this change, EPA's role in the 404 program would be significantly reduced and nonenvironmental factors could be used by the Corps to override environmental concerns.

Give the Corps sole authority to define "dredged material" and "fill material' and activities that constitute a discharge.—This provision would eliminate EPA's current legal involvement in Corps decisions about what activities and types of fill material, such as garbage, would be regulated.

Option 2: Decrease appropriations for acquisition, easement, and leasing programs.

The Federal Government spends several million dollars each year for wetland acquisition, easements, or leases. Federal funding for these programs could be decreased; similarly, lower priority could be given to wetland purchases. Either action would have little effect on industry.

Option 3: Rescind Executive Order 11990.

Regulations developed by many Federal agencies in response to Executive Order 11990, Protection of Wetlands, could be rescinded. This would allow, for instance, Federal assistance to farmers for wetland drainage.

Issue 2: Should the Federal Government improve its policymaking capability through a systematic collection and analysis of additional information about wetlands?

At this time there is uncertainty about current trends in wetland use, the environmental significance of further wetland conversions, and

the current effects of major policies and programs on wetlands, Whether or not additional information should be collected depends on a judgment about its potential contribution to Congress' policymaking capability and its value to Federal program administrators. For some people, the available information may be adequate for setting present and future wetland policy. Further information, while perhaps useful in fine-tuning policies, may seem unwarranted given the cost. In this case, option 1 might be selected. On the other hand, existing uncertainties may make it difficult to isolate realistic policy choices and to determine the effect of these options. For instance, it may be difficult for some to decide what changes, if any, should be made to section 404 without better knowing how the current program has affected trends in wetland use. In this latter case, option 2 could be selected.

Option 1: No, current information is adequate.

For some policymakers, existing information may be adequate to make present and future decisions about wetland policies and programs. Some new information will be collected as the result of existing Federal programs. In particular, FWS is planning to update its analysis of national trends to cover the 10-year period following the mid-1970's. Also, EPA, FWS, NMFS, and the Corps will continue to conduct research on wetland values.

Option 2: Yes, collect additional information.

For other policymakers, making decisions about wetland policies and programs may be difficult at this time because of major gaps in technical information. Past efforts have primarily supported the missions of the agencies conducting the research, rather than the policymaking process. Congress' policymaking capability could be significantly improved if the three concurrent research elements described below were undertaken. To ensure that the results produced by these efforts are brought to bear on the overall policymaking process, an integrated plan (with budgets and schedules) for conducting and coordinating all these policy-related activities could be developed by an interagency working group headed by a Federal agency. This information would not necessarily be available unless Congress takes steps to ensure its collection.

Element 1: Determine recent trends of wetland use.—The FWS's recently completed statistical analysis of wetland trends provides information on wetland use only between the mid-1950's and the mid-1970's. As currently planned, FWS will update its analysis of national trends to cover the 10-year period following the mid-1970's. However, better information on regional trends could be collected to determine where wetland-conversion rates are most critical and where development pressures are greatest. Such regional analyses would entail an increase in the number of sites surveyed.

Element 2: Evaluate the significance of additional wetland conversions.—The extent to which the environment will be degraded by additional conversions of wetlands is known only in a few cases. For example, if all the prairie potholes in the upper Midwest were lost, we know that North American duck populations would decrease by about half. On the other hand, we do not know the importance of wetland-derived detritus for estuarine fish and shellfish populations relative to other sources of food, such as algae and detritus from upland areas. Yet this type of information provides a technical basis for changing levels of protection for specific types of wetlands. A detailed understanding of all wetland systems in the United States is not necessary; much could be learned from a small number of long-term studies of wetland systems within specific physiographic regions, river basins, or estuaries.

Element 3: Further analyze the effect of major policies and programs on wetlands use.—Additional analysis by an interagency working group on the effects of Federal and State wetland programs on wetland trends could provide a basis for modifying existing programs, especially in light of the results of the two options just discussed. For example, the Corps could compile more thorough information on project acreages and types of wetlands impacted. In addition, a detailed evaluation of the capabilities and limitations of State programs, individually and in combination with the 404 program, could indicate possible ways of improving the efficency and effectiveness of different programs that have a major effect on wetlands.

Issue 3: Should the Federal Government develop a more integrated approach for managing wetlands?

About 5 percent of the lower 48 States, or about 90 million acres, is covered by wetlands. These wetlands are geographically dispersed and their relative abundance varies from region to region. In some regions, wetlands provide important ecological services; in other regions, their values are primarily intrinsic (e. g., wilderness, esthetic, recreation, etc.). Wetlands of widely different value can be found in the same regions. Due to the inherent variability among wetland values, their wide and variable distribution, and the large number of conversion activities (i. e., a few tens of thousands) that are proposed each year, the use of wetlands is difficult to manage.

Federal wetland programs generally deal with wetlands in a piecemeal manner; that is, each program generally focuses on certain ecological services, wetland types, and/or geographic areas. For example, FWS acquisition and easement programs focus mainly on protecting wetlands (and upland areas) that are important for wildlife. However, many wetlands that provide other ecological services, such as flood control, might also warrant acquisition. USDA's Water Bank Program leases valuable waterfowl nesting and breeding habitat in prime agricultural areas of the country. Leasing of nonagricultural areas to protect other ecological sex-vices is not within the scope of this program.

An integrated approach for managing wetlands could be considered.

Option 1: Yes, an integrated approach for managing wetlands use should be developed.

This integrated approach would involve "tailoring' or adjusting existing acquisition, leasing, or regulatory policies on a regional basis to wetlands of different values and to different development activities prior to possible wetland conversion.

Developing an integrated approach to wetlands management would involve four sequential steps. First, the FWS's ongoing inventory of wetlands would be continued or accelerated, Second, the wetlands in an inventoried region would be categorized according to their relative values. Third, existing wetland policies and programs would be "tailored' or adjusted according to their category and specific characteristics. For example, higher value wetlands covered by 404 could be stringently regulated through individual permits; lower value wetlands could be covered by less stringent general permits. Fourth, different Federal, State, or local programs could be applied to different wetland categories and types of development activities in a more integrated fashion.

This approach has several advantages. High-value wetlands with different ecological services could be given an appropriate level of protection. Agency funding and personnel could be focused on high-value wetlands in different regions of the country rather than all wetlands in general or wetlands that provide a single ecological service. Regulators, developers, and the public would be aware of the status of the wetlands in their particular areas prior to any proposals to convert them to other uses. Developers also would have prior knowledge about standards and requirements for converting specific wetland areas. The time required for processing most 404 permits would be significantly reduced. Finally, decisions about wetland use would be more predictable and consistent.

The four steps involved in this approach are described in more detail in the following discussion.

Step 1: Continue or accelerate the ongoing mapping of wetlands by FWS.—At this time, a detailed inventory of 30 percent of the wetlands in the lower 48 States and 4 percent in Alaska has been completed. An additional 5 percent of the lower 48 States and 2 percent of Alaska can be mapped each year at an annual cost of $3.5 million per year. With greater funding, this inventory effort could be accelerated.

Step 2: Categorize wetlands.—Once inventoried, wetlands would then be placed in three to five broad categories based on the combined importance of their ecological services and intrinsic values. In about a dozen areas in the United States, wetlands have been inventoried and broadly categorized in this manner. One case, the Anchorage (Alaska) Wetland Plan, places wetlands in four categories: preservation, which precludes any development activities; conservation, which allows limited conversions with measures to mitigate impacts; developable, which allows complete draining and filling without a permit; and special study, which requires collecting additional environmental data to

determine wetland status. Local authorities use this plan to control the conversion of wetlands under a general permit from the Corps,

Categorizing wetlands would involve weighing and integrating the values of different ecological services within a political rather than strictly scientific framework. Therefore, categorization could best be accomplished by Federal policymakers from an interagency working group in cooperation with regional groups composed of State and local officials, wetland scientists, developers, and the general public who would be familiar with wetland values in their respective physiographic regions or river basins. This process also would involve regional public hearings.

Step 3: Tailor existing policies and programs. —After categorizing the wetlands in a certain region, Federal, State, or local wetland policies and programs would then be selectively applied by program administrators according to the relative values of different wetlands, as well as the values and impacts of potential development activities. For example, wetlands covered by the 404 program, depending on their natural values, could be individually regulated, covered by general permits, or left unregulated. For wetlands that are individually regulated, the procedures used to review permits and mitigate impacts could reflect the relative values of the wetlands, as well as the type, size, and benefits associated with development activities. Acquisition and leasing programs could be easily focused on high-value wetlands identfied by the inventory.

The tailoring process would not be designed to disallow all further wetland conversions. Instead, the inventory and categorization of wetlands would provide a management tool for program administrators, developers, and policymakers in making decisions about the use of wetlands based on their relative values. All wetlands in the United States would not have to be mapped prior to the tailoring of policies; tailoring would be accomplished as the different regions are mapped. The highest priority could be placed on those areas where many important wetlands are located and/or where conversion pressures are greatest.

Step 4: Integrate wetland policies and programs. —Step four would first involve increasing the scope of existing wetland policies and programs to include the full range of natural wetland values. For example, acquisition and leasing programs, which now focus primarily on protecting habitats with high wildlife values, could be given programmatic flexibility by Congress to consider all wetland values. USDA's Water Bank Program for leasing waterfowl habitat in agricultural regions could be broadened to allow leasing of inland wetlands with a range of ecological values in both agricultural and nonagricultural areas.

If Congress increased the scope of different wetland programs, the interagency and regional groups organized in step 2 could select the most appropriate policies or programs for managing different wetland areas—whether through acquisition, easements, or regulation. For example, undegraded, high-value wetlands could be given a higher level of protection than they now have through direct acquisition or easements rather than regulation. Combinations of different policies might also be used for some wetlands. For example, if certain kinds of development activities on a privately owned wetland were prohibited within the framework of Federal or State regulations, the owner might be given the option to sell the wetland or an easement to the Federal or State Government.

If Congress wished to develop such an integrated approach, the gaps in policy-related information (discussed under issue 2) must be filled. Also, to ensure that all ongoing activities are relevant both to the missions of the involved Federal agencies and to the policymaking process in general, an integrated and detailed work plan could be developed by the interagency working group. In this way, the Federal Government could take advantage of the collective expertise and interests of the different Federal agencies that deal with wetlands. This plan should include a description of ongoing and planned activities, agency responsibilities, coordination procedures, funding requirements, and opportunities for congressional oversight. Above all, the plan would describe in detail the processes that would be used to tailor and integrate wetland policies and programs. This plan, which could be developed over a 2-year period at a cost this study estimates to be about $1 million, could provide an overall framework for wetland policymaking that would be stable over several administrations. The development and implementation of such a plan would re-

quire a congressional mandate with accompanying appropriations.

Option 2: No. The existing approach for managing wetlands is adequate.

Some wetland scientists and many environmentalists have serious reservations about this integrated approach. While they agree that some wetlands are more valuable than others, they believe that all wetlands should be stringently protected; tailoring would only weaken the protection that wetlands now have. There is also concern about yet-to-be-developed procedures for implementing the concept. For example, wetlands can be ranked according to their relative importance for single ecological services; however, it is not clear how the multiple ecological services and intrinsic values of each wetland would be considered and weighed during the categorization process. Important or yet-to-be-discovered services could be overlooked. Also, the relative values of wetlands may change over time. Therefore, some wetlands, especially those that fall outside the framework of State and Federal regulations, might not receive an adequate level of protection. Other institutional concerns focus on the uncertainties about the administration of the tailoring process, the potential for controversy and for the use of political influence, and the possible high costs associated with implementing such an approach.

OTA recognizes that there are uncertainties about developing an integrated approach for managing wetlands. However, if the tailoring concept is politically acceptable, it should be possible to establish acceptable procedures for implementing the tailoring process effectively. In light of existing uncertainties and concerns about tailoring, it may be desirable first to test the viability of procedures in several regions of the country on a pilot scale prior to making a decision about the desirability of full-scale implementation.