

Chapter 4

Wetland Programs That Affect the Use of Wetlands



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Wetland Programs That Affect the Use of Wetlands

CHAPTER SUMMARY

At this time, Federal policies do not deal consistently with wetland use. In fact, they affect wetland use in opposing ways. On the one hand, some Federal policies encourage wetland conversion by reducing the cost of converting wetlands to other uses, especially agriculture. On the other hand, some wetland use is controlled or managed through acquisition, easements, leases, regulation, and policy guidance. The U.S. Army Corps of Engineers' program to implement section 404 of the Clean Water Act (CWA) provides the major avenue for Federal involvement in controlling the use of wetlands through regulation. However, the 404 program regulates only the discharge of dredged or fill material; excavation, drainage, clearing, and flooding of wetlands are not covered explicitly. State and local programs as well as private initiatives also directly or indirectly affect the use of wetlands in a variety of ways.

The present administration's goals with respect to wetlands are unclear. On the one hand, the U.S. Army Corps of Engineers (the Corps) has revised

its administrative procedures 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 Federal control over wetlands use, 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). This bill proposed eliminating some Federal expenditures for some wetland activities, increasing funding to States for wetland conservation, extending the Wetlands Loan Act (due to expire in September 1984) for 10 years, and increasing revenues for the Migratory Bird Conservation Fund through additional fees for duck stamps and wildlife refuge visitation permits.

FEDERAL PROGRAMS

The use of wetlands in the United States is affected either directly or indirectly by a large number of Federal, State, local, and private programs. This section briefly describes these programs, with emphasis on the more important Federal programs.

Regulatory Permitting Programs

Section 404

Section 404 of CWA, as amended in 1977 from the Federal Water Pollution Control Act (FWPCA), is the primary means of Federal involvement in con-

trolling the use of wetlands. In brief, persons seeking to conduct activities that would result in the discharge of dredged and fill material into 'waters of the United States' first must apply for and obtain a permit from the local district office of the Corps. Some activities are specifically exempted; others are covered by general permits that require no applications for individual permits.

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 main-

tain the chemical, physical, and biological integrity of the Nation's waters. The Corps views its primary function in carrying out the law as protecting the quality of *water*; habitat and other wetland values, although considered in Corps decisions about projects, are usually of secondary concern. In contrast, Federal resource agencies, such as the U.S. Fish and Wildlife Service (FWS), the Environmental Protection Agency (EPA), the National Marine Fisheries Service (NMFS), and environmental groups feel that the mandate of CWA obliges the Corps to protect the integrity of wetlands, including their habitat values.

The Corps uses three general criteria for evaluating permit applications in a "public interest review":

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

It is unclear what consideration would be given to cumulative impacts under new regulations promulgated in 1982, which still include language recognizing that such impacts often result in major impairments of wetland resources.²

Until the 1982 changes, regulations stated that no permit would be granted for activities that involved the alteration of wetlands identified as important "unless the benefits of the proposed alteration outweigh the damage to the wetlands resource and the proposed alteration is necessary to realize those benefits. The district engineer's determination of the necessity of the alteration must be based on whether the activity is "primarily dependent on being located in, or in close proximity to, the aquatic environment or whether practicable alternative sites' are available. Permit applicants must supply sufficient information on the need to locate the project in the wetland and on the availability of alternate sites.³ The 1982 revisions to the Corps

regulations eliminate the clause that the proposed alteration be necessary to realize benefits.

The assertion of regulatory jurisdiction of the Corps under the 404 program has changed over time, and further changes presently are being debated. Originally, jurisdiction was restricted to navigable waters, narrowly defined, and covered relatively few wetlands. A series of court decisions, especially the 1975 decision in *Natural Resources Defense Council v. Callaway*, expanded the scope of coverage to include virtually all waters of the United States, including most if not all wetlands. * However, congressional amendments to CWA and Corps regulations implementing the act have set limits to the jurisdiction of the 404 program.

The 404 program currently covers activities resulting in dredged and fill material discharges, with the following exemptions specified in the 1977 amendments to CWA:

- normal farming, silviculture, * * and ranching activities, such as plowing, seeding, and cultivating; minor drainage; harvesting for the production of food, fiber, and forest products; or upland soil- and water-conservation practices;
- maintenance, including emergency reconstruction of recently damaged parts of currently serviceable structures such as dikes, dams, levees, groins, riprap, * * * breakwaters, causeways, bridge abutments or approaches, and transportation structures;
- construction or maintenance of farm or stock ponds or irrigation ditches, or the maintenance of drainage ditches;
- construction of temporary sedimentation basins on a construction site, but excluding placement of fill material into navigable waters;

● On July 25, 1975, the Corps of Engineers published revised regulations redefining "navigable waters" to include: "coastal waters, wetlands, mudflats, swamps, and similar areas; freshwater lakes, rivers, and streams that are used, were used in the past, or are susceptible to use to transport interstate commerce, including all tributaries to these waters; interstate waters; certain specified intrastate waters, the pollution of which would affect interstate commerce; and freshwater wetlands, including marshes, shallows, swamps and similar areas that are contiguous or adjacent to the above described lakes, rivers and streams, and that are periodically inundated and normally characterized by the prevalence of vegetation that requires saturated soil conditions for growth and reproduction.

● *Tree farming.

● **Shoreline protection usually composed of broken stones.

¹Clean Water Act, sec. 101(a).

²Clean Water Act, sec. 320.4(b)(3).

³Clean Water Act, sec. 320.4(b)(4).

- construction or maintenance of farm or forest roads, or temporary roads for moving mining equipment, where such roads are constructed and maintained in accordance with best management practices to assure that flow and circulation patterns and chemical and biological characteristics of the navigable waters are not impaired, that the reach of the navigable waters is not reduced, and that any adverse effect on the aquatic environment will be otherwise minimized;⁴ and
- congressionally approved projects that have filed an environmental impact statement (EIS).⁵

In addition to these exemptions, a large number of activities fall under general permits. General permits are promulgated to increase the manageability of the 404 program at nationwide, regional, and State levels for activities deemed by the Corps to have minor impacts on waters of the United States. Persons conducting such activities need not apply for individual permits; however, in many cases, they are expected to follow specified practices to minimize further the impacts of their actions. As of late 1981, the Corps had issued 374 general permits, which has reduced the number of permit applications by an estimated 60,000 to 90,000 annually.

The 404 program also regulates certain geographic areas with less stringency than other areas. Prior to the 1982 regulatory changes, activities in wetlands that are not linked to a tributary system, above the headwaters of tributary streams (above a point where the mean annual streamflow is less than 5 cubic feet per second (ft³/s)), or less than 10 acres in surface area did not require individual permits as long as certain environmental safeguards were complied with. The 1982 regulations expanded these exempted areas to include any isolated wetland regardless of size. Subsequent proposals published on May 12, 1983, reinstated this limitation.

Several Federal agencies besides the Corps have roles in the implementation of the 404 program. The Environmental Protection Agency (EPA), NMFS, and FWS review permit applications and

provide comments and recommendations on whether permits should be issued by the Corps. EPA has the authority to veto any application or overrule any disposal site designated on a permit reviewed by the Corps if it finds project impacts unacceptable. It also develops criteria for discharges and State assumption of the 404 program.

Under memoranda of agreement (MOA) formerly in effect between the Corps, FWS, and NMFS, either NMFS or FWS representatives could request "elevation" of a permit for review at upper levels in the agency if there is disagreement about whether or not a permit should be granted by a district engineer. Though only infrequently carried out, elevation could greatly lengthen the permitting process, and resource agencies could use the threat of elevation to gain concessions from permit applicants. New MOAs signed in mid-1982 greatly restrict the power of FWS and NMFS to elevate permits, in particular by making elevation subject to concurrence by the Assistant Secretary of the Army (Civil Works), the head of the Corps.

As discussed below, States also have a role in the 404 program. States veto permit applications by denying certification through section 401 of CWA and may administer portions of the 404 program if they meet criteria established by EPA. Twelve States are evaluating this possibility of assuming 404 responsibilities and four have assumed partial responsibility for the program on a trial basis. In general, most States neither have 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 resources.

In line with administration objectives to reduce the regulatory burden on industry and to increase the role of the States, the Corps revised many of its administrative procedures in 1982. Among other changes already mentioned, the normal permit-processing time was limited to 60 days for typical projects, 90 days for controversial projects. The use of general permits was expanded to include all (and not some) isolated waters and headwater areas. Statewide general permits are being used to transfer additional permitting responsibility to States. Sixteen environmental organizations sued the Corps in December 1982 on the basis of many of these

⁴Clean Water Act, sec.404(f)(1)(A)-(D).

⁵Clean Water Act, sec.404(r).

changes. Most issues of concern to environmentalists were settled out of court in February 1984.

On May 12, 1983, the Corps proposed additional changes to its 404 regulatory program. Many proposals simply formalize many of the administrative changes that already have been made to streamline the permitting process. Other provisions involve fairly major changes. Two provisions appear to increase the level of wetlands regulation. First, a limitation of the use of nationwide permits to isolated waters to water bodies smaller than 10 acres in size, which was removed on July 22, 1982, was reinstated. Second, the Corps' authority to condition permits using either onsite or offsite mitigation measures was expanded. Three provisions appear to decrease the level of wetlands regulation by using "letters of permission," rather than permits, for minor discharges; by explicitly shifting the "burden of proof" to the Federal Government by presuming that an applicant's proposal is acceptable unless demonstrated by the Government not to be; and by expanding the use of nationwide permits in lieu of a case-by-case project 404 review to all Federal projects and private projects that are adjacent to Corps civil works projects.

Section 10, Rivers and Harbors Act

Under the Rivers and Harbors Act of 1899, permits from the Corps are required for dredge, fill, and other activities that could obstruct navigable waterways, defined as those waters below the ordinary or mean high-water level or tide level. Prior to 1968, the Corps considered only potential impacts of such activities on navigation. In 1968, permit criteria were broadened to include evaluation of fish and wildlife, conservation, pollution, esthetics, ecology, and the general public interest, as well as navigation. These criteria have been broadened further to include additional factors, including economics, historical values, flood damage prevention, recreation, water supply, water quality, energy needs, and food production. Some of these criteria favor wetland protection, while others support development.

Often, section 10 and section 404 permitted activities are processed concurrently. Although wetlands covered by section 10 also are covered by section 404, and although wetland protection is not

a stated goal of section 10 permitting, section 10 has served to protect wetlands against some impacts that are not dealt with by section 404 permitting. Unlike section 404, section 10 does not exempt any activities from coverage.

Acquisition and Incentive Programs

As of September 30, 1981, FWS administered, through ownership, lease, or easement arrangements, close to 89 million acres of land in the National Wildlife Refuge System, Waterfowl Production Areas, and coordination areas. Of this total, FWS estimates that approximately 33.4 million acres are wetlands, 28.7 million acres of which are in Alaska. The National Forest Service is responsible for managing about 190 million acres of land in the National Forest System, a small percentage of which is wetland. Aside from some special appropriations, primary funding for the Nation's acquisition and incentive programs comes from four sources.

Migratory Bird Hunting and Conservation Stamps

Since 1934, FWS has sold Migratory Bird Hunting and Conservation Stamps, commonly known as "duck stamps," which must be purchased by waterfowl hunters aged 16 and older. Nonhunters may also purchase stamps. Since 1979, stamps have cost \$7.50 per year; about 2 million are sold annually. Proceeds are used to acquire habitat for migratory birds. From the inception of the program to June 1982, more than 83 million stamps were sold, worth over \$240 million and accounting for the purchase of more than 2.5 million acres of waterfowl habitat, a large portion of which is wetland.

Wetlands Loan Act

A related source of funding is the Wetlands Loan Act of 1961, which provides for interest-free loan advances toward wetland acquisition and easements. A total of \$200 million has been authorized by this program, out of which approximately \$147 million has been appropriated through fiscal year 1983. This program is due to expire September 30, 1984, after which appropriations from the loan fund



Photo credit: U.S. Fish and Wildlife Service, David B. Marshall

Over \$240 million worth of "duck stamps" have been sold to hunters since the program's inception in 1934, financing the purchase of more than 2.5 million acres of waterfowl habitat

are to be repaid with duck stamp receipts. Bills pending in Congress seek to extend this act.

The Land and Water Conservation Fund Act

The Land and Water Conservation Fund Act (LWCF) of 1965 funds the purchase of natural areas, including wetlands. FWS has used this source of funding to protect endangered species and important natural resource areas and to extend the National Wildlife Refuge System. From fiscal years 1967 through 1982, FWS used approximately \$182 million of LWCF money to acquire some 221,000 acres of land, an unknown portion of which are wetlands. The National Park Service also has used this source of funding for land purchases: from fiscal

years 1965 through 1982, a total of \$1.7 billion in outlays for 1.4 million acres were made. As with FWS outlays, information is not available on what proportions of these outlays and acreage pertain to wetlands.

Water Bank Program

The Agriculture Stabilization and Conservation Service of the U.S. Department of Agriculture (USDA) administers the Water Bank Program. Authorized by the Water Bank Act of 1970, the objectives of the program are:

To preserve, restore, and improve the wetlands of the Nation, and thereby (1) conserve surface waters, (2) preserve and improve habitat for migratory waterfowl and other wildlife resources, (3) reduce runoff, soil, and wind erosion, (4) contribute to flood control, (5) contribute to improved water quality and reduce stream sedimentation, (6) contribute to improved subsurface moisture, (7) reduce acres of new land coming into production and to retire lands now in agricultural production, (8) enhance the natural beauty of the landscape, and (9) promote comprehensive and total water management planning.

While agreements have been in effect in 15 States, the program is concentrated in the prairie-pothole region of Minnesota, North Dakota, and South Dakota. Through the Water Bank Program, private landowners or operators receive annual payments in exchange for agreeing not to drain, fill, level, burn, or otherwise destroy wetlands and to maintain grassy cover on adjacent upland.

With technical assistance from USDA's Soil Conservation Service (SCS) landowners and operators enter into 10-year agreements with the Secretary of Agriculture specifying requirements placed on land use and rates of compensation. Compensation varies with geographic area. Payments for wetlands usually range from \$5 to \$10/acre; such payments in California can range up to \$22/acre. Payments for adjacent cropland generally range from \$14 to \$55/acre.

Payment rates are subject to review after 4 years and at the time agreements are renewed. For the first group of contracts coming up for renewal, the rate of renewal has been 50 to 60 percent. Agreements are transferable when land is sold and may

be canceled by returning all previous payments. To be eligible for the program, land must be privately owned inland-wetland areas of a certain type and size that "in the absence of inclusion in the program, a change in use could reasonably be expected which would destroy its wetland character. Other eligible land includes privately owned land, adjacent to eligible wetlands, which is essential for the nesting, breeding, or feeding of migratory waterfowl. Normally, in order to be eligible for participation, landowners must agree to designate a total of at least 10 acres in a conservation plan developed in cooperation with the soil and water conservation district in which the farm is located. Acreage can be less than 10 acres upon recommendation from SCS. The designated acreage must contain sufficient adjacent land for protecting the wetland and must provide essential habitat for the nesting, breeding, or feeding of migratory waterfowl.

From program inception in 1972 through 1982, congressional appropriations totaled over \$100 million, with a little over 185,000 acres of wetlands and 480,000 acres of adjacent lands being covered by the 6,000 plus agreements that have been signed. Appropriations in 1982 were \$8.8 million.

Other Environmental Programs and Policies

Executive Order 11990

Promulgated in May 1977, Executive Order 11990, Protection of Wetlands, mandates that each Federal agency in carrying out its individual responsibilities take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. This order specifically requires that agencies avoid undertaking or assisting new construction in wetlands unless no practicable alternative exists, that all practical measures to minimize harm to wetlands are included in the action, and that agencies consider a proposal's effect on the survival and quality of wetlands. The examples that follow, while not directed at wetlands per se, have had some effect in protecting wetlands.

Executive Order 11988

Promulgated in May 1977, Executive Order 11988, Flood Plain Management, requires each Federal agency to avoid direct or indirect support of flood plain development wherever there is a practical alternative. Agencies are charged with the responsibility of providing leadership in restoring and preserving the beneficial values of flood plains and in reducing the risk of flood loss and the impact of floods on human welfare. Insofar as many wetlands are located in flood plains, this order could influence much wetland development.

Executive Orders 11990 and 11988 apply to such Federal activities as construction projects, acquisition and disposal of lands, and grants in aid and technical assistance to States and localities for such activities as land and water planning and the building of roads, sewers, and water supply systems. They do not apply to federally permitted or licensed activities on private property. Most Federal agencies have issued regulations to implement the orders in interim or final form; however, several sources believe that they have had little impact on wetland losses. However, by helping to educate people to the values of wetlands, these Executive orders may indirectly have influenced Federal Government decisions about wetlands use.

Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act, as amended in 1958, requires that wildlife conservation be given consideration equal to the concern for other aspects of the water resource development projects of the Corps, Bureau of Reclamation, and other Federal agencies. This act has empowered FWS and the NMFS to evaluate the impact on fish and wildlife of all new Federal projects and federally permitted projects, including projects permitted under section 404. FWS and NMFS have used their authority under this act to attempt to limit adverse impacts of projects on wetlands.

Endangered Species Act

The Endangered Species Act of 1972 prohibits any Federal agency from undertaking or funding a project that will threaten a rare or endangered

species. As many such species depend on various wetlands, some wetland development is restricted de facto by this statute.

National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 provides that EISs be prepared for Federal activities and federally permitted activities that would have significant environmental impacts. EISs must address such things as the environmental impact of the proposed action, any adverse environmental effects that cannot be avoided if the action is implemented, and alternatives to the proposed action. While NEPA does not prohibit or otherwise constrain Federal actions once an EIS has been prepared, the process of EIS preparation makes it more likely that project impacts and ways of lessening impacts will be considered. NEPA reviews have been applied to many projects suspected of posing substantial impacts to wetlands.

National Pollution Discharge Elimination System (NPDES)

Section 402 of CWA authorizes a national system for the regulation of point sources of pollutants into the waters of the United States, with regulation by either EPA or through approved State programs. Some discharges into wetlands have been controlled through NPDES permitting.

Assistance to States and Localities

Development and Operation of Regulatory Programs

Several sources of Federal funding have been available to assist States, and in some cases localities, to develop and administer regulatory programs that may include wetland protection features.

The ***Coastal Zone Management*** (CZM) program is an example of a program not directed primarily at wetlands in which the Federal Government and the States mutually influence one another's wetland-related activities. Pursuant to the Coastal Zone Management Act of 1972, the Federal Office of Coastal Zone Management (OCZM) sets guidelines and provides funding for States to prepare CZM programs. Approval of a State CZM program after review by OCZM enables a State to re-

ceive further funding for program implementation. States have used such funding to hire personnel, monitor and enforce CZM regulations, and provide technical assistance to localities, among other purposes. Federal guidelines for State programs include provisions that impacts on wetlands be considered. Annual reviews of State programs are carried out by OCZM and include review of how wetlands are being treated in programs. Federal influence is exercised through the granting or withholding of program approval and the concomitant disbursement of funds. States, of course, may forego Federal guidelines, review, and funding and design and/or implement their own CZM programs. State influence through CZM programs over Federal activities, such as the granting of 404 permits, is discussed later in this section.

Technical Assistance and Grants in Aid

Federal funding and technical assistance to States and localities may be used for purposes directly protecting wetlands. Conditions attached to Federal aid used for other purposes may indirectly support wetlands protection. For example, through the ***Federal Aid to Wildlife Restoration*** Act of 1937 (Pittman-Robertson Act), FWS provides grants to States for up to 75 percent of the cost of projects for the acquisition, restoration, and maintenance of wildlife areas, including wetlands. Grants are drawn from an 11-percent Federal excise tax on the sale of firearms and ammunition. Close to \$1 billion has been given to States, which have acquired over 3.5 million acres, over 1.5 million of which are waterfowl areas.

The Federal Aid in Fish Restoration Act (1950) commonly known as the Dingell-Johnson Act, provides Federal assistance to States for projects pertaining to fish. The provisions of the Dingell-Johnson Act are parallel to those of the Pittman-Robertson Act. Funds derived from the Federal excise tax on fishing equipment and bait are apportioned annually among the States—40 percent on the basis of geographical area and 60 percent on the basis of the number of persons holding paid licenses to fish for sport or recreation. Funds so apportioned to the States are available for use by them for “fish restoration and management projects” or, since 1970, “comprehensive fish and wildlife resource management plans. The Federal share in the cost of such projects or plans is not to exceed 75 percent.

Through the **Land and Water Conservation Fund**, matching grants are given to States, counties, and localities for outdoor recreation purchases. From 1965 through the end of 1982, 137 projects involving 61,585 acres of wetlands were given \$40.7 million from this funding source.

Other Federal Assistance

The **National Flood Insurance Program** (NFIP) has indirectly encouraged the destruction or degradation of wetlands, especially in the past, by partially underwriting the risks of building in flood-prone areas, some of which may also be wetlands. However, this program now has rules in force that discourage building in areas of known flood risk and that lessen the impacts of development that does take place. For example, communities with mangroves that act as coastal flood-protective barriers must adopt regulations protecting the mangroves in order to qualify for insurance under the program. Fills are prohibited in some settings, and the use of piles or columns where the elevation of structures is necessary is encouraged. Although the Federal Emergency Management Agency does not itself regulate flood plain use, localities wishing to qualify for federally subsidized flood insurance must agree to adopt regulations meeting Federal standards. More than 17,000 communities have adopted or have indicated an intent to adopt flood plain regulations, and more than \$35 billion in policies have been issued. Many communities now regulating wetland development do so through flood plain regulations designed not only to reduce flood problems but also to protect wetland functions. The NFIP very recently has begun acquiring areas that frequently are flooded.

Wetland Research Programs*

While NMFS, EPA, FWS, the National Science Foundation (NSF), and other Federal agencies con-

duct wetlands research that is related directly to their respective missions, the Corps is the only Federal agency that has a program set up specifically for wetlands research. The Corps' wetland-research program is carried out primarily by the Waterways Experiment Station (WES).

A 5-year wetland research program was set up by the Corps to begin in 1982. Three research priorities are established for this program: 1) to develop improved and standardized techniques to assist Corps personnel in the field identification and delineation of wetlands, 2) to assess and quantify wetland values for use in evaluating permit activities, and 3) to develop techniques for wetland restoration in permafrost, freshwater interior, and coastal environment. Little research has been focused on evaluating the impacts of wetland loss.

Research on the field identification and delineation (mapping) of wetlands presently is being conducted, and the Corps expects to complete this phase of its research by 1985. The next focus for the research program is the quantification of the functional values of wetlands. Part of this research is underway. WES, for instance, already has completed an evaluation of techniques for assessment of wetland values, and they are currently in the process of assembling a data base of regional literature on wetland values. This data base will be combined with a similar base developed by FWS and then computerized to provide easy access to field personnel. In November 1983, the Corps conducted a workshop to discuss the future direction for research to quantify wetland values. The workshop was attended by Corps personnel at the district level as well as those at the Washington level. For fiscal year 1983, \$620,000 was allocated to the Corps' wetland-research program.

While research that may pertain to wetlands may be conducted under FWS programs on endangered species, fisheries, and wildlife, the central research program at FWS—the Office of Biological Services (OBS)—allocates \$400,000, or approximately 5 to 7 percent of its total funding, for wetland research. These funds are allocated to four research projects: 1) a computerized bibliography of literature on wetland values; 2) a list of wetland plants and soils (to aid in delineation); 3) a nearly completed assessment of the ecological impacts of dis-

*Information for this section of the report was collected through personal communication with:

1. Ted Laroe—FWS Office of Biological Services (Mar. 23, 1983);
2. Herb Quinn—EPA's Office of Research and Development (Mar. 23, 1983);
3. Dr. Dean Parsons—National Marine Fisheries Service (Mar. 23, 1983);
4. Dr. Gary Barret—NSF's Biotic Systems Program (Mar. 25, 1983); and
5. Bill Kleshe—COE (Mar. 28, 1983).

posing of wastewater on wetlands; and 4) an evaluation of mapping-display technology.

At NMFS, approximately \$6 million is slated now for “habitat research. About one-half of that amount is devoted to estuarine habitats, which would include all the NMFS research on wetlands. Half of the estuarine-related research is spent on ecological studies; the other half is spent on pollution-related studies. The research findings from both types of studies have a bearing on wetlands. Such research is carried out by regional centers, whose focus on wetland research depends on the priority of wetlands in the region. The Southeast Center probably conducts the most research on wetlands and at present is investigating the importance of wetland detrital flow into estuarine waters.

At EPA, the Office of Research and Development (ORD) is responsible for wetland research. ORD has a separate work unit setup for wetlands, but it is not funded at present. The approximately \$300,000 allocated for water research by ORD includes wetland research.

NSF conducts basic research on wetlands through four different NSF programs, though primarily by the Biotic Systems Program, which conducts community-level studies (e. g., population studies), and the Ecosystem Studies Program, which is responsible for large ecosystem studies (e. g., an integrated analysis of the Okefenokee Swamp). It is not possible to identify the funds spent on wetlands as opposed to other research areas. In 1978, NSF sponsored a workshop on research priorities for wetland-ecosystem analysis; the proceedings of this workshop were published and are available through the Environmental Law Institute.

The foregoing agencies all appear to have some more or less formal means of establishing *intra-agency* research priorities. NMFS, for instance, develops a strategic plan; FWS programs go through what they call a “research-needs identification process. However, there is no formal mechanism to provide for *interagency* coordination of research. All the agency representatives contacted said that there is a great deal of informal communication between agencies. In addition, in 1981, the agencies met in Kearneysville, W. Va., to discuss their respective plans for wetland research. Proceedings of this symposium were not published. Though co-

ordination of research plans between the agencies is informal, research projects have been sponsored jointly. Current joint studies are being conducted between NMFS and the Corps, between FWS and EPA, and between the Corps and FWS.

Federal Programs That Affect Agricultural Conversions *

In the past, Federal programs encouraged the direct conversion of wetlands to agricultural use. Although funding of this type has been eliminated and policies to prevent alteration of wetlands have been established in some agencies, implementation of such policies has not been entirely effective. The other programs that still reduce the costs and risks associated with conversion include: income tax provisions, and to a limited extent, cost-sharing and technical-assistance programs for conservation practices sponsored by USDA's Agricultural Stabilization and Conservation Service (ASCS) and SCS, loan programs of the Farmers Home Administration, disaster payments, and crop insurance and commodity programs. In some regions, these policies add to the clear profitability of wetland conversion only if crop prices are sufficiently high. In other regions, wetland conversions may be unprofitable even with direct or indirect Federal assistance.

Past Policies Encouraging Wetland Drainage

Between 1940 and 1977, USDA was authorized to assist landowners in draining their wetlands by providing both technical information and cost-sharing under the Agricultural Conservation Program (ACP). Between 1942 and 1980 nearly 57 million acres of wet farmland, including some wetlands, were drained under this program; most of this drainage occurred in the 1940's and 1950's. Minnesota had more land drained than any other State (over 5 million acres).

In 1962, Congress enacted Public Law 87-732 forbidding USDA from providing financial or technical assistance for wetland drainage in Minnesota, North Dakota, and South Dakota if the Secretary of the Interior found that wildlife preservation

*Discussion based on information gathered in OTA case studies and an OTA working paper on agricultural policies prepared by Ken Cook.

would be materially harmed by the drainage.⁶ These findings were to be made on a farm-by-farm basis and to continue for 1 year unless a Government agency offered to purchase or lease the wetland. If such an offer was made but rejected by the landowner, the prohibition was to terminate 5 years after the Secretary of the Interior's finding.

In 1977 President Carter issued Executive Order 11990 requiring all Federal agencies to minimize loss of all types of wetlands. As a result, ASCS cost-sharing for draining wetlands was eliminated in 1978. Also, SCS employees were limited officially in the technical information they could provide about wetland drainage.⁷ More recent regulatory changes have been made that give SCS "additional flexibility in providing technical assistance to alter wetlands when denial of assistance could lead to detrimental consequences on soil and water resources or on human welfare and safety. The rules strengthen the requirements to utilize all practicable measures to minimize impacts on wetlands resulting from SCS-assisted projects."⁸

When private drainage occurs, information by SCS may improve the efficiency of drainage. In addition, if SCS designs the drain, there is an opportunity that the constructed drain will affect only part of the wetlands while preserving the remainder. Technical information could aid in protecting wetlands in this way. Regardless of stated policy, however, it will continue to be difficult to control effectively the distribution of technical information about drainage.

Comments about the impacts of USDA cost-sharing on drainage varied. Those feeling that the impact was substantial cited the subsidy, stating that its elimination has to have an impact. Others feel that Federal and State governments still support drainage only in attitude. Information collected from OTA case studies suggests that Executive Order 11990 has probably not had a significant affect on drainage (2).

⁶16 U.S. C. S.590, p. 1.

⁷7 CFR, pt. 650.26.

⁸7 CFR, pt. 650-Summary.

⁹*Federal Register*, vol. 44, No. 147, July 30, 1979—650.26(c) (2) (i) (B) and (C).

Present Policies That Reduce Costs of Wetland Conversion

Federal Income Tax.—Numerous studies have pointed to Federal income tax writeoffs for all types of development activities as an important incentive to farmers to clear and drain wetlands for agricultural use. These provisions enable farmers to shift a portion of the investment costs of wetlands conversion to the general taxpayer. The incentives include:

- tax deductions from taxable income for land-clearing costs of up to \$5,000 or 25 percent of taxable income (whichever is less);
- tax deductions of up to 25 percent of gross farm income for drainage expenses (expenses in excess of this allowable limit may be deducted in subsequent years);
- investment tax credit equal to 10 percent of the installation cost for drainage tile. This is a direct reduction of tax liability;
- tax deductions for depreciation on all capital investments necessary for any type of farming, including draining and clearing for bottom land farming, up to 5.5¢ per dollar invested if the investments have an expected life of 7 years or more; and
- deductions for interest payments.

Several researchers have provided examples of how these tax provisions can lower the cost of wetland conversion to farmers. Using 1978 cost estimates developed by Shulstad and May (5), Shabman (4) has calculated that the application of tax provisions could lower the cost of bottom land clearing in east Arkansas by about 30 percent (e. g., from \$311.67 to \$218. 17/acre). Shabman further calculated in a hypothetical example that a farmer in a 30-percent tax bracket, who financed this conversion with a 20-year loan at a 10-percent interest rate effectively could reduce that interest rate to 7 percent and his annual loan payments from \$36.60 to \$20.59 over the period of the loan, "a significant (44 percent) reduction in cash-flow needs. "

Barrows, et al. (1), performed a similar analysis of the effects of some tax policies on drainage costs in Wisconsin and came to similar conclusions. Without the tax incentives—the soil- and water-

conservation deduction for drainage costs, the depreciation for drainage tile, and the investment tax credit for the tile—the increment to income for each drained acre would be considerably lower for farms with taxable household incomes in the \$12,000 to \$20,000 range. The value of the tax incentives increases as income rises, up to a certain level that easily is exceeded by large farming enterprises.

Partial budgets were used in a detailed study of drainage costs in Minnesota (6). The budgets included gross returns, production costs, and amortized drainage costs. Drainage costs ranged from \$35 to \$260/acre, depending on the size of the wetland and topography. Annual net returns in the prairie-pothole region varied considerably, with a high of \$29 to a loss of \$10/drainage acre. Inclusion of property-tax effects (including Minnesota's tax credit) and State and Federal income taxes were occasionally large enough to offset a before-tax loss on the drainage investment. In the prairie-pothole region, net returns per year after taxes generally ranged from \$0 to \$20/acre. Income tax generally had the effect of reducing losses where before-tax returns were negative, and decreasing gains in areas where before-tax returns were positive. Deductions for drainage costs are taken prior to the returns from future commodities grown on the drained area, thereby resulting in a positive effect in early years (2).

Cost-Sharing and Technical Assistance.—The USDA ACP provides payments to farmers of up to 80 percent of the cost of construction of a wide variety of conservation practices. Practices for which cost-sharing is offered are developed by farmer-elected committees at the county level in consultation with county program development groups and are subject to the approval of a State committee. Other Federal programs such as the Great Plains Program provide similar assistance on a regional basis. Many States also have programs that may cover a portion of the non-Federal costs for projects supported by Federal cost-sharing programs.

Although direct drainage of wetlands is not funded under ACP, eligible practices for funding by these programs include actions that can lead to wetland drainage and filling. For example, in Nebraska, eligible practices for irrigation water con-

servation include dugouts, reuse pits, land leveling, irrigation ditch lining, and underground piping. Restrictions on the use of these Federal funds for wetland conversion include prohibitions on funding activities with the primary purpose of bringing new lands under irrigation, such as changing the surface area or depth of some types of wetlands and installing systems where the bottom of the pit is below the ground water surface. However, implementation of these provisions is difficult.

Administering agencies and their local agents have considerable discretion in interpreting and applying these restrictions. Program restrictions are particularly difficult to implement in areas such as the Rainwater Basin where the condition of wetlands varies from year to year, depending on seasonal and annual precipitation. Decisionmakers may be under considerable pressure from their neighbors to approve a project and to determine that an area is not a wetland. Available evidence and discussions with many people indicate that some cost-sharing still is used for wetland drainage. However, it generally is agreed that the implementation of the cost-sharing programs are increasingly responsive to policies to protect remaining wetlands (3). In fact, many thousands of acres of wetlands have been created or improved with technical assistance from SGS.

The importance of cost-sharing assistance in a farmer's decision to convert wetlands was analyzed in OTA's Nebraska case study (3). It provided an analysis of the profitability of the different conversion activities in Nebraska and concluded that most conversions have questionable profitability. Government cost-sharing of \$19.86/acre/yr for producing irrigated corn on wetlands drained with the installation of a reuse-pit system resulted in a 16-year average annual net revenue per acre of \$30.32, versus \$10.46 without Government cost-sharing. Production of irrigated corn on smaller, shallower wetlands that could be filled by leveling was the most profitable at \$57.24 for the same period of time with Government cost-sharing assistance of \$5.88/acre/yr. These returns were considered to be modest. However, even with the Government cost-sharing, a farmer would have lost money in 2 of the 16 years investigated, and profits would have been less than \$10/acre in 3 additional years. Without Govern-

ment assistance, the farmer would have lost money in 5 of the 16 years investigated, and profits would have been less than \$10/acre in 4 additional years.

Using economic multiplier analysis, the Nebraska study then estimated the impact on the State economy of investment expenditures made to drain and convert wetlands for expanded agricultural use and of new crop production resulting from this conversion. Based on estimates of the annual wetland acreage lost each year and on the types of profitable conversions that occurred in the Rainwater Basin, the study concluded that the income resulting from converting wetlands in the Rainwater Basin to irrigated corn is less than 0.000072 percent of State personal income and around 0.000056 percent of the personal income in the 17-county Rainwater Basin area.

Other examples of converting Rainwater Basin wetlands to irrigated alfalfa with reuse systems and to dryland wheat farming resulted in losses in net annual revenue per acre over the 16-year average, regardless of Federal cost-sharing assistance.

Farmers Home Administration Loans.—Programs administered by the Farmers Home Administration (FmHA) have been noted as having a potentially adverse effect on wetlands. For example, FmHA personnel stated in interviews with an OTA contractor that FmHA operating loans have been used for wetland conversion even in the recent past. FmHA agrees that wetland conversions should not be financed through FmHA, but there are practical problems in implementing such a policy. FmHA published draft regulations to comply with Executive Order 11990 and other environmental laws in 1982. These regulations, when finalized, will disallow approval or funding of any proposals that would directly or indirectly result in conversions of wetlands. Implementation is expected to vary between States and counties, since decisionmakers at the State and local levels have broad discretion in making a loan decision. Although loan applicants may be required to have SC S farm-conservation plans that would provide for the protection of wetlands, it is not clear to what extent the farm plans will have to be implemented to receive FmHA assistance.

Federal Disaster Payments and Crop insurance.—Recent congressional and USDA policy changes exclude high-risk areas from disaster payments and subsidized crop insurance. Specific areas that are excluded from coverage are being mapped in each county. Although wetlands are not specifically excluded from coverage under the program (the Federal Crop Insurance Agency that administers the program hasn't issued regulations for complying with Executive Order 11990), areas such as wetlands that are subject to unacceptably high risks from flooding or excess moisture generally are excluded. If an area is subject to flooding as frequently as every 4 to 5 years, it is unlikely to receive either disaster payments or subsidized crop insurance. In some areas of the country, for instance, especially the Missouri and Mississippi River Basins, certain flood plain and wetland areas are excluded from coverage because of the high risk of crop loss to flooding. Also, some wetlands in Minnesota are excluded because of the high risk of summer flooding.

Commodity Programs.—While the actual impact of price supports and target prices have probably not been significant in encouraging wetland conversions, they have been criticized for the following four reasons.

1. Commodity programs have the potential to increase crop prices above the level that would prevail without the programs. These artificially high prices might encourage farmers to increase their amount of land in crops by converting wetlands. However, these artificially high prices still are relatively low and only go into effect when market prices drop to the average cost of production. Even with the artificially higher price, a farmer with average production costs is unlikely to be in a financial position to undertake costly conversions. However, because larger farmers may have production costs lower than the national average and are more likely to participate in the commodity programs, commodity programs may aid some larger farmers in their conversion efforts.

2. Commodity programs reduce the risk associated with growing certain crops. Guaranteed floor prices may improve the long-term financial feasibility of converting wetlands and make agricultural lenders more willing to finance conversion operations. In the case of soybeans, which have only a floor price and not the other features of commodity programs for other crops, market prices have until very recently remained well above the floor price, and the program hardly has been used.
3. Commodity programs for most crops (not soybeans) set restrictions on the acreage that a participating farmer can plant in a particular crop each year. Usually the farmer must not plant about 10 percent of his 'normal crop acreage' (NCA). However, NCA can be increased by draining wetlands, allowing the farmer to plant more acreage in the future. Although a farmer who planted more than the allowable acreage in a particular year would not be eligible for commodity payments that year (e. g., by converting wetlands), his NCA would be increased in subsequent years. However, for the 1983 farm program the Congress mandated that commodity payments would generally be based on the acreage planted in the preceding year. Therefore, no lands that were added to production in 1982 are included in NCA this year. It is expected that farmers will be able to increase their acreages sometime in the future.
4. Commodity programs (at least in the past) encouraged land management practices that may have adverse impacts on wetlands. For example, summer fallow for wheat can result in erosion that fills in surrounding wetlands. In 1977, Congress required proper soil conservation measures on summer-fallow acreage eligible for the wheat program. However, as with other commodity programs, few farmers participated until recently, when crop prices dropped. Thus, many farmers may not be following conservation practices on summer fallow.

STATE PROGRAMS

States vary greatly in their approaches and attitudes toward wetland protection. Even within States, different agencies may take different positions on wetland protection and development—e. g., as with Federal entities, State environmental agencies and State transportation and water-resource agencies often find themselves in disagreement. The direction of State programs is open to change by reason of changes in political leadership and changes in State fiscal health, among others. Despite these caveats, a number of observations may be made about State wetland protection efforts.

Wetland Regulation

More than a dozen States have permitting programs specifically directed at controlling the use of wetlands. Most of these programs are administered directly by State agencies, although local governments may be given the authority to veto approval of some projects. A few States have State standard-

setting for regulation. Local governments formulate, administer, and enforce regulations meeting or exceeding wetland protection set by the State. In States where local programs dominate, the States may retain the authority to review local decisions or to intervene only where localities fail to create adequate controls. States also may provide technical assistance to local program administrators.

A few States have established innovative regulatory programs for wetland protection that differ from the more typical permit or zoning approaches. For example, in Massachusetts, the Coastal and Inland Wetland Restriction Acts place deed restrictions on wetland property to limit use to water-related uses such as docks, recreation, farming, and driveways into unrestricted land. Thus far, over 40,000 of the estimated 60,000 acres of coastal wetlands have been subjected to the law and only 5,000 acres of inland wetlands have been restricted. Another example of an innovative program is the Minnesota Protected Waters Program and its relation-

ship with the Minnesota Water Bank Program. Permits for drainage are required but automatically are denied for wetlands identified as protected waters (i. e., wetland types 3, 4, and 5, greater than 10 acres and 2.5 acres in unincorporated and incorporated areas, respectively). The landowner will be able to drain legally if within 60 days the State fails to offer some type of compensation. Without this offer, Minnesota case law would declare the rejection an illegal taking because the owner was not justly compensated. Acceptable offers, according to the statute, include State Water Bank payments, purchase, or indemnification by other means such as conservation restrictions, easements, leases, or any applicable Federal program. As discussed in more detail in chapter 9, State regulation of coastal wetlands is far more common than that of inland wetlands.

Acquisition

Several States have programs that give priority to the acquisition of wetlands.

Incentives to Landowners

Some States authorize tax relief for landowners to preserve wetland and other open-space areas. At least one State has a program resembling the Federal Water Bank Program. Under the Minnesota Water Bank Program, requirements for participation are more stringent than those for the Federal program (i. e., wetlands must be of such a nature that drainage would be lawful, feasible, and practical, that drainage would provide high-quality cropland, and that cropland is its projected use). Payment rates also are much higher under this State program than under the Federal program. In 1981, annual payments ranged from \$85 to \$125/acre.

Other Programs

Many States control wetlands use through programs whose primary purpose is not wetlands protection. Types of programs include:

- coastal zone management,
- flood plain management,
- shoreline zoning,
- scenic and wild rivers protection,

- critical or natural areas protection,
- dredge and fill acts,
- wildlife and waterfowl protection,
- public lands management,
- public education,
- stream alteration requirements, and
- site location of developments.

State Influence on Federal Activities

The Corps seeks good relations with State governments and usually will defer to strongly expressed State wishes concerning particular projects. In several Corps districts, the Corps will not act on a permit prior to a State decision about a project. In addition to these informal mechanisms, several legal requirements establish State influence in Federal wetland-permitting decisions.

The Clean Water Act and Corps Regulations

Section 404(t) of CWA requires that each Federal agency comply with State requirements to control the discharge of dredged or fill material as long as such requirements do not affect or impair the authority of the Secretary of the Army (i. e., the Corps) to maintain navigation.

Section 320.4(j)(l) of the Corps regulations implementing section 404 states that the processing of applications for Corps permits normally will proceed concurrently with the processing of other required Federal, State, or local authorizations or certifications. If any of these other authorizations are denied, the permit application to the Corps also will be denied. * Even if such certification or authorization is not required by the governmental units concerned, the Corps will give due consideration to the comments and views of the State, regional, or local agency having jurisdiction or interest over the particular activity in question.¹⁰ Similarly, the officially adopted State, regional, or local land use classifications, determinations, or policies that are applicable to the areas under consideration shall be considered by the Corps as part of the public interest review.¹¹

● Prior to the July 1982 changes, this was stated directly at a different point: "Permits will not be issued where certification or authorization of the proposed work is required by Federal, State, and/or local law and that certification or authorization has been denied." (§320.4(j)[5]). This section was eliminated by the 1982 revisions.

¹⁰Clean Water Act, sec. 320.4(j)(l).

¹¹Clean Water Act, sec. 325(j)(2).

In cases where several agencies within a State comment on an application and conflict, and no agency has been designated to provide a single State position, the Corps will ask the State's Governor to designate such an agency to provide his/her views directly.¹² Finally, division engineers will refer permit applications to the Chief of Engineers in cases where the recommended decision is contrary to the stated (1982 revisions: written) position of the Governor of the State in which the work is to be performed.¹³ The Corps generally will issue a permit following receipt of a favorable State determination unless it finds "overriding national factors of the public interest" that cause it to overrule the State permit decision.¹⁴

Section 401 of CWA provides that no Federal license or permit for an activity that may result in a discharge into navigable waters shall be issued unless the State in which the discharge originates certifies that such a discharge will comply with the provisions of CWA. The main application of this section is to 404-permit requests. Generally, the State agency responsible for water quality decides on certification. A few States use this section as their chief means of regulating wetland development.

Coastal Zone Management Act

Section 307(c) of the Coastal Zone Management Act (CZMA) of 1972 requires that all Federal ac-

tivities significantly affecting the coastal zones of States with CZM plans approved by the Secretary of Commerce be conducted in a manner consistent with such State CZM plans. In States with approved CZM programs, applicants for 404 permits must include in their application to the Corps a certification that the proposed activity complies with the State's program. If within a 6-month period the State agency responsible for coastal zone management informs the Corps that it does not concur in the applicant's certification of consistency, the Corps may not issue the permit, unless the Secretary of Commerce overrides that State's objection on grounds that the activity is consistent with the purposes of CZMA or is necessary in the interests of national security.

Fish and Wildlife Coordination Act

Under the Fish and Wildlife Coordination Act and the Reorganization Plan No. 4 of 1970, any Federal agency that proposes to control or modify any body of water must first consult with FWS, NMFS, and the head of the appropriate State agency administering the wildlife resources of the State concerned. While the Act does not give State agencies a concrete power to veto or modify Federal proposals, it does mandate a certain level of State involvement in the consideration of many projects potentially affecting wetlands.

¹²Clean Water Act, sec. 320.4(j)(3).

¹³Clean Water Act, sec. 325.8(b)(2).

¹⁴Clean Water Act, sec. 320.4(j)(4).

LOCAL PROGRAMS

In some areas of the country, the principal means of wetland protection outside of the 404 program come from local programs. Some localities have acquired wetlands directly or have included wetland parcels along with other land acquisitions for parks

and other protected areas. In addition, some protection is afforded by local implementation of State or Federal regulations. For instance, State shoreland zoning administered by localities in several States (e. g., Wisconsin) has provisions that protect

wetlands. The National Flood Insurance Program, implemented in localities, has several features that have the effect of protecting wetlands.

Moreover, local building, sanitary, and other types of codes have had the effect of protecting wetlands in many localities. For example, wetlands are often poor locations for siting septic tanks or above-

ground structures, and such uses may be prohibited by local codes. Several States have State standard-setting for local regulation (e. g., Virginia, Massachusetts, and Connecticut). Local zoning power also has been used to protect wetlands by providing for adequate open space and recreational areas.

PRIVATE INITIATIVES

Many private organizations are involved in wetland protection. Private efforts such as those of the Nature Conservancy, Ducks Unlimited, and the Audubon Society, which have protected many thousands of acres of wetlands along with other types of natural areas through direct acquisition, partial interest, and other means. For example, the Richard King Mellon Foundation recently gave the Nature Conservancy a \$25 million grant towards its efforts to conserve wetland ecosystems in the United States. Ducks Unlimited is another private organization interested in preserving wetlands for duck habitat. Many other national environmental organizations, while not directly managing wetland areas, carry out various activities (e. g., education) that help protect wetlands. Hundreds of other organizations on a local or regional level have been active in wetland protection, including fish and

wildlife clubs, hunting organizations, and general or special purpose environmental organizations.

Recognizing that Federal acquisition of land or easements to meet FWS goals exceeds the Federal Government's fiscal capability at this time, POWDR group was formed by the Department of the Interior's former Secretary James Watt. It is composed of representatives from sportsmen's organizations, such as Ducks Unlimited and Bass Angler's Sportsmen's Society, and from corporations such as DuPont and Olin. The aim of the group is to advise public and private officials on wetlands protection and to encourage owners of wetlands, duck hunting clubs, and others to make gifts of their land or development rights on their land to private conservation groups, State agencies, or FWS.

CHAPTER 4 REFERENCES

1. Barrows, R., Henneberry, D., and Schwartz, s., "Individual Economic Incentives, The Tax System and Wetland Protection Policy: A Study of Returns to Wetlands Drainage in Southeastern Wisconsin, American Society of Agricultural Engineers, summer meeting, 1982, p. 26.
2. Department of Agricultural Economics, "Wetlands in the Prairie Pothole Region of Minnesota, North Dakota, and South Dakota—Trends and Issues, " North Dakota State University, contract study for OTA, August 1982, pp. 56-60.
3. Great Plains Office of Policy Studies, "Wetland Trends and Protection Programs in Nebraska, " University of Nebraska, contract study for OTA, September 1982, pp. 49-55.
4. Shabman, L., "Economic Incentives for Bottomland Conversion: The Role of Public Policy and Programs, " *Proceedings of Forty-Fifth North American Wildlife Conference, 1980*, pp. 402-12.
5. Shulstad, R. N., and May, R. D., "Cropland Conversion Study for the Mississippi Delta Region, report to Resources for the Future, Department of Agriculture Economics and Rural Sociology, University of Arkansas, Fayetteville, 1979, p. 181.
6. U.S Army Corps of Engineers, "The Economics of Wetlands Drainage in Agricultural Minnesota, " St. Paul District, St. Paul, Minn., 1981.