

## V. Federal Wetland Policies and National Trends

Federal wetland policy has evolved over our Nation's history. During the period of settlement and national expansion, incentives for converting wetlands to other uses hastened wetland loss. Direct incentives for conversion remained until late in this century. Gradually, direct and indirect incentives were eliminated and policies to conserve wetlands were adopted. With the adoption of the "no net loss" goal, efforts to conserve and restore wetlands accelerated.

### The Era of Wetland Exploitation

In the earliest stages of settlement, farmers bypassed wetlands in favor of dry land with good water and trees. Only toward the end of the 19th century, when easily accessible farmland grew scarce, did farmers turn to the previously bypassed wetlands in earnest.

By a strange quirk of fate those who blazed the first trails and developed the first farms in Iowa found [...] that their timber-prairie farms near the rivers were often less valuable than the farms developed by those who came much later and took the land they had avoided. To be sure, the wet lands required considerable drainage expense, but even so these wet lands were eventually a better bargain (Peterson, 1967, pp. 448-449).

To encourage farmers to convert wetlands, Congress gave 64.9 million acres of wetlands to 15 States in the Swampland Acts of 1849, 1850, and 1860. Congress wanted the States to reclaim wetlands by constructing levees and drains to reduce flooding and eliminate mosquito breeding areas. States transferred nearly all of the granted lands to private owners who converted large acreages to other uses (Shaw and Fredine, 1971). Since then, many Federal programs have provided incentives for wetland conversion, including those that subsidize agriculture, support reservoir construction for flood control, irrigation, and hydroelectric power, support highway projects, provide flood disaster relief and flood insurance, subsidize and provide tax incentives to forestry, and establish grazing policies on Federal land (USDI, 1994).

Agricultural subsidies are an indirect incentive that has accelerated wetland conversion over the past 60

years. Hoover questioned the expense and overall public efficiency of these subsidies (Hoover, 1969). The U.S. Department of the Interior conducted a series of studies that exhaustively explored the subsidies' role in wetland conversion, finding that the subsidies did promote wetland conversion (USDI, 1988 and 1994). The Swampbuster provisions of the 1985 Food Security Act and changes in the 1986 Tax Reform Act largely eliminated indirect government assistance in the form of farm program benefits and income tax deductions for wetland conversion (Heimlich and Langner, 1986; Heimlich, 1994).

### *Drainage and Flood Control*

Federal involvement in drainage programs dates back to 1902 when the Bureau of Reclamation was established to develop irrigation in the West. Drainage was required to fully use the new irrigation capacity, providing new Federal involvement in agricultural drainage programs (USDI, 1988). Farmers using Bureau irrigation encountered drainage problems while developing irrigation systems in such areas as the Newlands Project in Nevada, the Modesto Irrigation District in California, the Mesilla Valley of New Mexico, and the marsh lands of Western Oregon. Large-scale agricultural drainage solved irrigation problems in the Imperial Valley of California. Other drainage projects included the Columbia Basin (Washington), Grand Valley (Nebraska), Big Horn Basin (Montana and Wyoming), Oahe (South Dakota), Weber Basin (Utah), Garrison (North Dakota), and Big Thompson (Colorado).

The U.S. Army Corps of Engineers began rechanneling work on the Mississippi River in the 1870's (Beauchamp, 1987). Flooding in the 1940's motivated Congress to enact the Flood Control Act of 1944, which further authorized the Corps of Engineers to construct major drainage and flood control channels. Many dormant drainage districts in the Mississippi Valley were reactivated to exploit the benefits of the newly enhanced flood control infrastructure for agricultural drainage. Additional flood control work provided drainage outlets in response to floods in both the Mississippi and the Missouri Valleys in the early 1950's, and additional farm drainage exploited the new outlets. Between 1929 and 1974, Army Corps of Engineers flood control projects were authorized affecting 5.5 million acres in the Lower Mississippi alluvial plain. Construction was completed on 4.5 million acres (USDI, 1988).

The U.S. Department of Agriculture (USDA) helped farmers drain wetlands from an early date. Drainage inventories in 1906 and 1922 identified 75-79 million acres of wetlands with potential for drainage to accommodate agricultural production (Gray, and others, 1923; Wright, 1907). Beginning in 1936, USDA provided cost-sharing for wetland drainage, a practice that continued into the late 1970's (USDI, 1988 and 1994; Holmes, 1980; National Audubon Society, 1996). The Civilian Conservation Corps and other Federal relief agencies conducted drainage activities in the 1930's. In 1953, Congress explicitly linked flood control and agricultural drainage when the Federal Watershed Protection and Flood Prevention Act (P.L. 83-566) directed the Army Corps of Engineers and USDA to create a formal partnership for constructing drainage outlet channels in cooperation with State and local governments. The Army Corps worked primarily in main stems of major rivers, while USDA undertook upstream projects in tributaries.

P.L. 566 authorized USDA to plan and construct watershed improvements. USDA's Soil Conservation Service (now the Natural Resources Conservation Service) provided technical assistance and cost sharing for ditches, subsurface drains, conduits to convey water from fields without causing erosion, protection devices for tile outlets, and surface field drainage (Beauchamp, p. 19; Gadsby, and others, 1976). The Agricultural Stabilization and Conservation Service's (now the Farm Service Agency) role in financing new drainage on farms has been relatively minor and declined over time (Pavelis, 1987b, p. 161). By the mid-1980's, less than 10 percent of all existing surface or subsurface drainage improvements could be attributed to Federal financing provided under the Agricultural Conservation Program.

However, a major impact of small watershed programs under P.L. 566 was construction of outlet channels into which landowners could drain their wetlands (USDI, 1988, p. 19). Most channelizing work under P.L. 566 was in four Southeastern States: Georgia, Louisiana, Mississippi, and North Carolina. A 1972 study by Arthur D. Little concluded that, "On balance, the weight of evidence is marginally in favor of channeling both untouched natural streams and man-altered channels in terms of ...economic effects." Conflicts with environmentalists concerned about preservation of wetlands began when the Soil

Conservation Service began straightening stream channels to provide more efficient outlets for drainage and flood waters (Gillette, 1972).

### *Drainage and Cropland Expansion*

Cooperative efforts between farmers and Federal and State agencies expanded the supply of land for farming. Mattson concluded that in the Mississippi Delta "Land clearing was common and appeared to be linked to better control of water regimes and flooding. In these circumstances it would seem inevitable that improved drainage linked to an arterial channel system being installed by the Corps of Engineers and other projects, would hasten the conversion of remaining hardwood forests to highly productive, generally large, crop fields" (Mattson, 1975, p. 31).

Federal assistance to drain wetlands for production of subsidized crops expanded agricultural production in order to expand crop base acreage in high-price years. This often led to underuse or abandonment of cropland as long-term retirement and annual set-aside supply control measures focused on marginally productive land in low-price years. For example, the North Carolina Conservation Needs Committee in 1962 extrapolated a gain of over 45 percent (144,800 acres) of cropland for the nine major crops in the 10-county Albemarle area (Hoover, 1969). Large-scale conversion in the area in the 1970's affected thousands more acres as commodity prices rose (Carter, 1975). By the mid-1980's, however, problems with drainage permits, conversion feasibility, and commodity economics forced abandonment of large acreages of unconverted and partially converted land that were donated to the Fish and Wildlife Service to expand the existing Alligator River National Wildlife Refuge.

### **The Era of Policy Transition**

Even as the conversion of wetlands to other uses continued at a rapid pace throughout the early part of this century, scientists, conservationists, and the public were beginning to recognize the unique and important functions and values of wetlands. Gradually, the supply of remaining wetlands decreased (moving to the right in fig. 1) and wetland benefits became more widely known. Public attitudes and public policy began to shift from supporting and subsidizing wetland conversion to encouraging wetland conservation and restoration (Carey, and others, 1990; Dahl and Allord, 1996).

Part of the persistence of wetlands in the landscape traces back to a public regard for them as something beyond crop fields and building sites. This regard grew from the perceptions of early naturalists like William Bartram and John James Audubon, the activism of conservationists from Teddy Roosevelt to J.N. "Ding" Darling, and the ordinary appreciation of millions of hunters, anglers, and birdwatchers (Wallace, 1985). Economic measures of this regard are reflected in the willingness-to-pay measures for use, nonuse, and amenity values reported in the literature (see Appendix I). Public opinion polls have found that 58 percent of respondents thought the government was not doing enough to protect wetlands, and 59 percent stated a willingness to pay additional taxes to protect them (EOS, 1991; NWF, 1989). Public policy on wetlands has responded to the changing values and views, moving from whether they should be protected, to how best to protect them.

### *Early Wetland Preservation Efforts*

Wetland preservation efforts began early this century out of concern for waterfowl habitat. President Theodore Roosevelt established the first National Wildlife Refuge in 1903 to protect Pelican Island, Florida, a nesting site for colonial nesting water birds. The Migratory Bird Hunting Stamp Act of 1934 established a special fund to finance wetland acquisitions for duck habitat. In 1961, the Wetlands Loan Act allowed advance appropriations for the purchase of wildlife refuges and waterfowl production areas (National Audubon Society, 1996). Today, the National Wildlife Refuge system contains over 500 refuges and nearly 200 Waterfowl Protection Acres, the latter primarily in the Prairie Pothole region (Stewart, 1996).

In 1970, the Water Bank program created the first agricultural program to temporarily protect wetlands. Water Bank provided annual per acre payments to the owners of eligible wetlands and adjacent uplands who agreed not to burn, drain, fill, or otherwise destroy the character of enrolled areas for the life of the contract. Ten-year contracts provided cost-sharing to install conservation practices designed to maintain vegetative cover, control erosion, improve wildlife habitat, conserve surface water, or manage bottomland hardwoods (USDA-ASCS, 1988; Heimlich, and others, 1989; Higgins and Woodward, 1986). At the program's peak in 1993, more than 1,000 Water Bank contracts in 11 States covered 73,831 acres of wetlands and

46,121 acres of associated upland at an average rental cost of \$12.28 per acre per year (USDA-ASCS, 1994). The last Water Bank contracts will expire when their 10-year terms run out, but the land is eligible to compete for enrollment in the more recent Wetlands Reserve Program.

However, early wetland preservation efforts were at cross-purposes with continuing Federal policies that directly or indirectly subsidized wetland conversion. Farm commodity program benefits were available for crops grown on converted wetland acres. Tax breaks allowed significant writeoff of conversion costs and opportunities to shelter income from taxation through wetland conversion for agriculture (Whitaker, 1976, p. 172). Nearly \$170 million in deductions for conservation and land clearing, including wetlands and non-wetlands, were claimed on 4 percent of returns in 1982, reducing farmers' taxes by an estimated \$27-\$37 million (Daugherty, 1987).

### *Recent Wetland Preservation Efforts*

In the 1970's and 1980's, a shift from conversion to conservation policies became clearer. The first changes eliminated economic incentives for wetland conversion and provided a public review process for private wetland conversion decisions. Section 404 of the Federal Water Pollution Control Act Amendments of 1972 established a permit program regulating discharges of dredged and fill materials. Although initial rules limited the scope of regulation to navigable waterways, a Federal district court directed the Army Corps of Engineers to include "isolated waters," consistent with what Congress intended in the law. Final rules, issued in 1977, explicitly included "isolated wetlands and lakes, intermittent streams, prairie potholes, and other waters...." Attempts to narrow the scope of regulation were rejected in the debate over the Clean Water Act of 1977 (USEPA, 1993). Executive Order 11990, issued by President Carter in May 1977, directed Federal agencies to minimize destruction, loss or degradation of wetlands and to preserve and enhance the natural beneficial values of wetlands in all actions involving Federal lands, federally financed or assisted construction projects, and other Federal activities affecting land use.

The succeeding wave of wetland policies was voluntary programs providing incentives to landowners to conserve and restore wetlands. Under the Small Wetland Acquisition Program, the Fish and Wildlife

Service can either purchase a wetland and surrounding upland acreage outright or enter into a permanent easement agreement restricting wetland use.

Compensation is made on a one-time basis, with the payment varying according to land values in the immediate area and the development potential of the wetland. The Small Wetland Acquisition Program currently has 1.2 million acres of wetlands under perpetual easement in Montana, Nebraska, North Dakota, and South Dakota, at a cost of \$46.7 million, or \$38 per acre. The program also holds an additional 76,300 acres in associated grassland easements at \$4.9 million or \$64 per acre (Hartmann, 1993).

### *The Section 404 Permit Program*

Section 404 of the Clean Water Act directs the Army Corps of Engineers and the Environmental Protection Agency to regulate discharge of dredged and fill material into "waters of the United States," which are defined to include wetlands, even when they are isolated from navigable bodies of water. A landowner must obtain a permit from the Army Corps of Engineers before beginning work in wetlands, which almost always involves discharging dredged or fill materials into U.S. waters. Section 404 regulation is not a narrow, technical regulatory process, but a public review procedure that allows all interested parties to comment on potential adverse impacts from the proposed wetland conversion (Alvayay and Baen, 1990). In this regard, the Section 404 process acknowledges the public-good aspects of wetlands and allows the affected public to weigh potential negative effects against the private (or competing public) interests of the permit seeker.

Regulated activities cannot be permitted if a practical alternative is less damaging to the aquatic environment, or if the Nation's waters would be significantly degraded. Permit applicants must show that a sequence of all practical steps has been taken to avoid, minimize, and as a last resort, compensate for unavoidable losses by restoring or creating replacement wetlands. The Army Corps of Engineers has authority to issue general nationwide permits for any category of activities involving discharges of dredged or fill material if the activities are similar in nature and will impose minimal individual and cumulative effects. If an activity fits into the category of activities authorized under a nationwide general permit, it does not require a case-specific review; it is automatically authorized. Some nationwide general permits

are being phased out, to be replaced with activity-specific permits.

In recent years, relatively few permits for agricultural conversion have been requested. In fiscal year (FY) 1994, for example, agricultural activities accounted for only 7.1 percent (3,430) of total Section 404 permit applications (USACE, 1995). Moreover, most agricultural permit applications (87.5 percent) were approved under nationwide general permits. A wide variety of agricultural activities are either covered by nationwide general permits or entirely exempted from regulation under Section 404(f). Specific agricultural activities covered by nationwide general permits include cranberry production, discharges due to construction of farm building foundations, and federally approved or funded wetland restoration or creation activities. Agriculture-related exemptions include normal farming, silviculture, or ranching activities, such as tillage, seeding, and harvesting; and constructing or maintaining farm ponds, irrigation ditches and drainage ditches, and farm or forest roads, as long as wetland hydrology is not further impaired.

Finally, the role of Section 404 as a deterrent to wetland conversion is often asserted but difficult to assess. In FY 1994, the Army Corps of Engineers received 48,292 permit applications. Of these, 43,753 (91 percent, affecting 17,200 acres) were approved through general permits, standard permits (which require case-by-case review), or letters of permission. Another 4,184 (9 percent) were withdrawn, about half of which qualified for general permits and administrative adjustments, or did not require permits. Only 358 permits applied for (less than 1 percent) were denied, including only 30 agricultural permits (0.9 percent). The Army Corps of Engineers estimates that an additional 50,000 activities each year are authorized under nationwide general permits that do not require the public to notify the Army Corps of Engineers (USACE, 1995). Converted wetland acreage permitted rose from 11,600 in FY 1993 to 24,987 in FY 1996 (USACE, 1995; Robertson, 1997).

Although permit denials are few, denials are a function of both Army Corps of Engineers policy in assessing applications and private decisions to submit permit applications. The Swampbuster provisions, discussed in the next section, and State wetland regulations discourage wetland conversion, thus reducing Section 404 permit applications over what they would have been in the absence of these policies (Zinn and

Copeland, 1996). Moreover, evidence suggests that as the requirements of the permit process itself have become widely known, they have deterred individuals from applying under conditions which are not likely to pass Army Corps of Engineers review without substantial and costly revision (Albrecht and Goode, 1994; Alvayay and Baen, 1990).

### ***Swampbuster and Tax Reform***

Conflicts between Federal farm policy and wetland protection were eliminated with passage of the wetland conservation provisions (popularly known as the "Swampbuster" provisions) of the 1985 Food Security Act. Although not specifically directed at wetland conservation, provisions of the Tax Reform Act of 1986 also eliminated preferential tax treatment of conversion costs and preferential capital gains treatment from selling land that had appreciated in value due to drainage.

The Swampbuster provision directs the Secretary of Agriculture to deny farm program benefits to farmers or landowners who drain protected wetlands. Benefits at risk include direct payments (for example, production flexibility contract payments), price support loans, agricultural disaster payments, loans for farm storage facilities, and certain federally insured or guaranteed loans. Benefits may be denied on all fields and all farms in which the violator has a financial interest (16 U.S.C. 3801 *et seq*; 7 C.F.R. Part 12).

The 1985 Food Security Act also shifted emphasis from price support to income support in commodity subsidy programs. Price support programs, operated through nonrecourse commodity loans, are designed to bolster market prices. Price support programs tend to encourage "free riding," because all producers benefit from higher prices caused by acreage reductions and government purchase of commodity stocks from participating farmers. Income support is paid directly to participants as deficiency payments, discouraging free riders and significantly increasing the potential Swampbuster penalty during periods of low market returns and high support payments.

The Swampbuster provision, like the Section 404 permit program, deters wetland conversion beyond the actual violations processed. USDA's Farm Service Agency reports that over \$11 million in benefits were denied to producers on 351 tracts representing over 15,000 acres between 1987 through 1996. There is

debate about whether the small number of violations indicates a successful deterrent or inadequate enforcement of the Swampbuster provisions (USGAO, 1994b; EWG, 1995). According to simulation studies, wetland acreage not converted during this period because of potential loss of farm program benefits is likely large, although estimating it in aggregate is impossible (Heimlich and Langner, 1986; Kramer and Shabman, 1993; see next section). Dependence on farm program payments during the latter half of the 1980's and low agricultural conversion rates in the 1982-92 National Resources Inventory support this conclusion (Carey, and others, 1990).

The Tax Reform Act eliminated provisions allowing capital investment in drainage and land clearing to be treated as annual expenses and preferential tax treatment for capital gains. Although the value of tax incentives varies significantly with producers' incomes, these changes significantly increased the after-tax cost of wetland conversion for agriculture and largely eliminated opportunities to shelter non-farm income from taxation through investment in wetland conversion for agriculture in some areas of the country (Heimlich and Langner, 1986; USDI, 1994).

Prior to the Tax Reform Act, drainage costs were treated as conservation expenses and could be immediately deducted, up to 25 percent of *gross* farm income. Land clearing expenses were deductible up to the lesser of \$5,000 or 25 percent of net farm income. Any unused deductions could be carried forward to subsequent years. For farmers and landowners with income that could be offset, deductibility amounted to a Federal Government cost share on wetland conversion activity.

Investment in wetland conversion for agriculture provided an opportunity to shelter regular income from taxation by converting it to a capital gain, reducing the tax rate, and delaying taxation until the land was sold. The increase in the value of the land due to drainage and clearing (the capital gain) was taxed only when the land was sold and only 40 percent of the gain was taxed at the rate of regular income (if the land was held for at least 10 years following conversion). For example, \$20,000 in conservation expenses to drain 100 acres of bottomland hardwood wetlands for cropland use could offset other income in the year in which drainage was done. If the undrained land cost \$400 per acre and sold for \$1,000 after drainage, only \$16,000 of \$40,000 in total capital gains (40 per-

cent x [\$100,000 - \$40,000 - \$20,000]) in the year the land was sold would be taxed at ordinary income tax rates. The economic context of the 1970's was particularly conducive to the use of these tax mechanisms. Agricultural returns were relatively high (including capital gains through land value inflation) and real interest rates were low, holding down the *annualized* cost of conversion. Favorable tax treatment further enhanced the value of investing in the conversion of wetland for agricultural production (Ward, and others, 1989; Daugherty, 1987; Heimlich, 1986).

### *Wetland Economics and Policy Effectiveness*

Have wetland policy changes slowed the rate of wetland conversion for agriculture? Although Swampbuster reduces returns to conversion, is the reduction large enough to make the difference between conversion and conservation of wetlands? How important are regional differences in the kinds of crops grown, size and structure of farms, and prevailing economic conditions over time as factors affecting the importance of Swampbuster's sanction? As noted in Chapter III, inventories of wetland acreage conducted over the past 40 years show that the rate of wetland conversion has slowed and that wetland conversion for agriculture has been reduced. Although Federal wetland policies likely played a role in reducing the rate of wetland conversion for agriculture, their enactment in the mid-1980's coincided with a deep recession in the agricultural economy, which also reduced economic incentives for wetland conversion (Heimlich and Melanson, 1995). Moreover, inventory data show that the downward trend in wetland conversion began before wetland conservation and restoration policies were implemented. In the sections that follow, we review previous research and other evidence on the effectiveness of these policies.

The bulk of previous research assessing the role of Swampbuster and the Tax Reform Act in changing economic incentives for wetland conversion employed simulation models developed for specific locations. For example, models for both the Delta and Prairie Pothole regions, using 1975-84 as a baseline for prices and yields, are reported in *The Impact of Federal Programs on Wetlands, Volume I* (USDI, 1988). In the Prairie Pothole region, six representative farms were simulated. Results indicate that ending tax breaks on wetland conversion would have virtually no impact on the (whole farm) net present value (NPV) of returns to farms that drain wetlands

(McColloch and Wissman, 1985). The withdrawal of other Federal benefits, including price and income support, was simulated to reduce NPV by 6 to 66 percent, with an average reduction of 14 percent for the six representative farms studied. Even so, NPV of the "drained without price and income supports" scenario exceeded that of the "undrained with price and income supports" scenario for all six representative farms. The authors conclude that farm program payments were not important in inducing drainage, but stopped short of concluding that Swampbuster provisions would be ineffective at retarding drainage.

In the Delta region, loss of tax benefits and farm program support was more significant. Eliminating tax breaks would reduce the per acre NPV of wetland conversion by between 6 and 46 percent, averaging 14 percent over the four representative farms simulated. Withdrawal of farm program benefits would reduce NPV of wetland conversion by between 17 and 35 percent, averaging 26 percent. Although the authors of the Delta study conclude that Swampbuster and tax reform have significant potential to reduce returns to wetland conversion, they also argue that including additional, per acre general farm overhead costs would render wetland conversion only marginally profitable in any case (Kramer and Shabman, 1986).

Danielson (1989) simulated wetland conversion economics in the pocosin wetlands of eastern North Carolina, also using data from 1975-85. His work showed that removing tax breaks and agricultural support programs would reduce returns attributable to overhead, management, risk, and land from 22.4 percent to 17.2 percent. He concluded that estimated returns would not be sufficient to prompt large-scale conversion of pocosin wetlands.

Heimlich and Langner (1986) simulated representative farms in North Carolina and North Dakota for economic and policy conditions projected to exist in 1986-91. They found that Swampbuster sanctions would reduce the net cash income in both cases, by 26 percent for the North Carolina farm and by 145 percent for the North Dakota farm. Tax incentives reduced taxes by 36 percent for the North Carolina farm, but with conversion, taxes increased 6 percent for the North Dakota farm.

Kramer and Shabman (1993) simulated per acre returns to wetland conversion for representative counties in Louisiana, Arkansas, and Mississippi for 1985

(before Swampbuster or tax reform) and 1987 (after implementation of Swampbuster and tax reform). Under 1987 conditions, in two of the three counties, returns to wetland conversion were positive, but low, even without the loss of farm program benefits on nonwetland acres. In the third county (Arkansas), wetland conversion could be profitable, but the loss of program benefits on as little as 1.03 nonwetland acres would fully offset returns to wetland conversion. That is, wetland conversion without program benefits would net \$266 per wetland acre, but Swampbuster provisions would deny \$264 in program benefits on all nonwetland acres. In each of the three counties, loss of farm program payments due to Swampbuster—not counting the nonwetlands penalty—was 150 to 275 percent greater than the increase in tax liability due to tax reform.

The simulation studies provide estimates of the effect of Swampbuster on returns to wetland conversion over a range of economic, policy, and geographic circumstances and configurations. Based on the results from these studies, Swampbuster significantly reduced returns to wetland conversion after 1985. A more difficult question is whether Swampbuster makes the critical difference between conversion and conservation of wetlands with agricultural potential, especially when commodity prices rise above prices seen in the latter half of the 1980's.

U.S. Department of Interior studies, using data from 1975-84, when market returns to crop production were relatively high and farm program benefits were a smaller share of farm income, show that Swampbuster would not have been effective, particularly for the Prairie Pothole region. Changes in economic conditions by the late 1980's led Heimlich and Langner to conclude that Swampbuster would significantly deter wetland conversion, especially in the Prairie Pothole region. Kramer and Shabman (1993) argued that, by the late 1980's, returns were unfavorable to wetland conversion, even without Swampbuster and the Tax Reform Act. However, their results suggest that Swampbuster penalties were severe. Even if returns to wetland conversion were high, Swampbuster sanctions easily drove returns to negative levels, indicating that the deterrent potential of Swampbuster was high.

Finally, the Tax Reform Act had a smaller overall impact on returns to wetland conversion than did Swampbuster provisions. Simulation studies of the Prairie Pothole region, carried out for different time

periods and circumstances, show that tax incentives were never an important factor in wetland conversion. For other regions, however, tax reform may have reduced overall incentives for wetland conversion. Differences between States in the value of tax breaks in wetland conversion are due at least in part to variation in the capital intensity of conversion activities (Heimlich, 1986). In the Prairie Pothole region, conversion costs are low and conversion can often be accomplished using farm machinery during slack seasons. Differences in the level and composition of farm operators' incomes are also important in understanding the effects of tax reform on wetlands.

Army Corps of Engineers officials argue that the Swampbuster provisions have significantly reduced agriculture-related Section 404 permit applications (Zinn and Copeland, 1996). However, the extent to which Swampbuster or unfavorable economic conditions for wetland conversion contributed to the slowdown in permit activity cannot be decisively determined. Whether or not Swampbuster has slowed agriculture-related permit applications, its enactment may also have served to focus greater Army Corps of Engineers attention on agricultural wetlands because producer actions that may have escaped Army Corps of Engineers notice prior to Swampbuster were now identified by USDA officials as wetland conversions.

By the latter half of the 1980's, policies and programs were enacted to conserve existing wetland resources. Policies in place included eliminating direct and indirect incentives for conversion in Federal programs, directly regulating dredge and fill activity under Section 404, and increasing the number of State and local wetland regulation and conservation laws. A broader vision of wetland conservation, including an overall goal and interest in restoring former wetlands, was the next step in the evolution of wetland policy.

### **The Era of "No Net Loss"**

"No net loss" was adopted as a policy goal of both the Bush and Clinton administrations (White House, 1991; 1993). As the discussions of the National Wetland Policy Forum reveal, achieving "no net loss" was never envisioned solely as a matter of conservation; wetland restoration was a necessary tool to enable land use adjustments needed with growth (The Conservation Foundation, 1988). The "no net loss" goal can be pursued by conserving existing wetlands,

restoring former wetlands that were converted, or by some combination. Should we put relatively more effort into conserving our existing wetland resources than restoring wetlands that have previously been converted? Conservation avoids adding the cost of restoration to the original costs of converting wetlands that ultimately prove marginal in their converted use. Critics of wetland restoration argue that the functions and values of wetlands lost are never totally recovered in restorations (Steinhart, 1987; NRC, 1992, p. 316; Kentula, 1996; Hunt, 1996). The policy response embodied in the "no net loss" goal is that conservation alone will not be enough (White House, 1991; 1993; Gore, 1997). In many areas, wetland conversion has destroyed so much of the original wetland base that restoration is required for functioning wetland ecosystems. Future wetland conversion where public and private benefits exceed costs is unavoidable. Wetland restoration is the only way to make up for truly unavoidable losses.

Although wetland conservation programs, including Section 404 permits, Small Wetland Acquisition Program, Water Bank, and the Swampbuster provisions, were in place by the mid-1980's, Federal programs for wetland restoration were just emerging. Some restoration developments preceded the formal statement of the "no net loss" goal. The National Wetland Priority Conservation Plan, required under the Emergency Wetland Resources Act of 1986 (P.L. 99-645 100 Stat. 3582), emphasized conserving and restoring wetlands, required States to include wetlands in their Comprehensive Outdoor Recreation Plans, and transferred to the Migratory Bird Conservation Fund amounts equal to the import duties on arms and ammunition for acquisition and restoration work. The Emergency Wetland Resources Act extended the Wetlands Loan Act authorization through 1988, and forgave previous advances under the Act and authorized purchase and restoration of wetlands from Land and Water Conservation Fund moneys, removing a prior prohibition on such acquisitions. Other provisions included establishing entrance fees at National Wildlife Refuges, with fee receipts to be allocated 70 percent into the Migratory Bird Conservation Fund for acquisition and restoration and 30 percent for operations and maintenance at the refuges, and increasing the price of duck stamps funding restoration work from \$7.50 to \$15.00, to be phased in through 1991.

The North American Waterfowl Management Plan, a joint agreement and treaty between the United States, Canada, and Mexico, also called for restoring former waterfowl habitat. The North American Wetlands Conservation Act (P.L. 101-233 103 Stat. 1968; 16 U.S.C. 4401-4412) established a Wetland Trust Fund in 1989, and established the North American Wetlands Conservation Council to approve wetland restoration projects. The Act identified several sources of Federal revenue for the fund, including sums received under section 6 of the Migratory Bird Treaty Act of 1918 from fines, penalties, and forfeitures of property, interest accrued on the fund established under section 3 of the Federal Aid in Wildlife Restoration Act of 1937, and Congressional appropriations. In 1990, amendments to the Federal Aid in Sport Fish Restoration Act directed that a portion of the moneys collected from Federal fuel excise taxes on small gasoline engines be allocated for use under the Act for coastal wetlands projects. In October 1994, Federal appropriations under the North American Wetlands Conservation Act were reauthorized for FY's 1995 through 1998. Up to \$20 million was authorized in FY's 1995 and 1996, of which Congress appropriated \$9 million in 1995 and \$6.75 million in 1996. Up to \$30 million was authorized in each of FY's 1997 and 1998. In 1991-97, 544 projects in Canada, Mexico, and the United States, involving over 700 partners, received \$233 million under the Act, while partners have contributed \$487 million. Approximately 3.7 million acres of wetlands and associated uplands have been acquired, restored, or enhanced in the United States and Canada, while conservation education and management plan projects in Mexico affected nearly 20 million acres.

Two agricultural programs have demonstrably affected wetland restoration more than any other. The Conservation Reserve Program, enacted in the 1985 Food Security Act, made cropped wetlands eligible to be retired from crop production for 10 years. Beginning in 1989, 410,053 acres of wetlands were enrolled, mostly in the Northern Plains and Delta States (Osborn, and others, 1995). In the 1990 Food, Agriculture, Conservation, and Trade Act, Congress created the Wetlands Reserve Program to purchase permanent easements on former wetlands that had been converted to crop production and restore them as wetlands (Carey, and others, 1990; USDA-ERS, 1994). Beginning in 1992 as a pilot program in nine States, the Wetlands Reserve Program expanded to include the entire Nation. In 1993, the Emergency



Wetlands Reserve Program, authorized in emergency supplemental appropriations (P.L. 103-75, 107 Stat. 739), was added to the existing Wetlands Reserve Program in order to buy out flood-damaged croplands converted from wetlands that would be too expensive to protect through levee repairs.

Other programs contributing to wetland restoration include the Fish and Wildlife Service Partners for Wildlife Program, joint venture projects between public and private organizations under the North

American Waterfowl Management Plan, onsite mitigation for wetland impacts under Section 404, and wetland mitigation banks being developed to offset future permits, for which data are presented in the next chapter. Data covering many of these activities are difficult to interpret because how many acres of existing wetlands are being conserved and how many are being created or restored is not clear. Also, most projects include upland buffers around conserved or restored wetlands that, while critical to wetland function, do not offset wetland conversion.