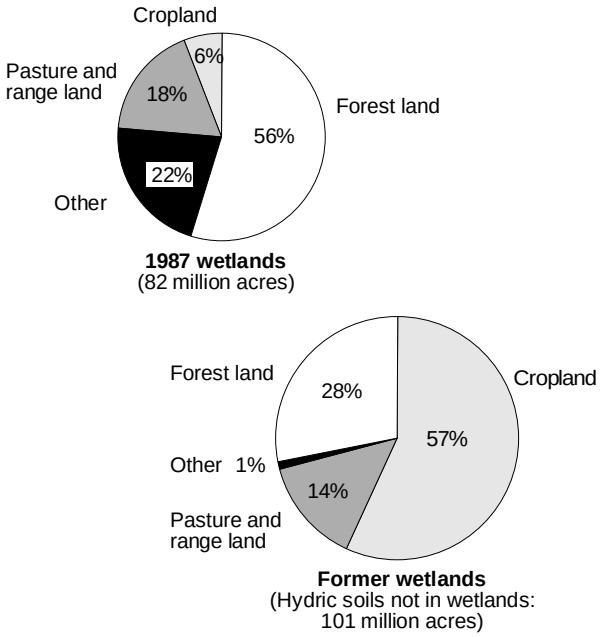
## 6.4 Wetlands Programs

***Remaining wetlands in the contiguous 48 States are less than half the wetlands that once existed. Wetlands were once viewed primarily as areas to be reclaimed for development, but are now valued for floodplain management, wildlife habitat, water quality improvements, and recreation. Many Federal agencies and programs seek to protect wetlands.***

Remaining wetlands in the contiguous 48 States are less than half the wetlands that once existed in the area (see module 1.1 for more on wetlands and conversion). Former wetlands have been mostly converted to crop, forest, and forage production (fig. 6.4.1). Once viewed as areas to be reclaimed for productive purposes, wetlands are now seen as valuable for floodplain management, wildife habitat, water quality improvement, recreation, and aesthetics. These values, the level of public interest in wetland conservation and restoration, and the very definition of wetlands are all being debated as wetlands programs are refined and funded.

Major Federal programs affecting wetlands include Section 404 of the Clean Water Act (CWA), requiring permits to dredge and fill U.S. waters; the so-called swampbuster provision of the 1985 Food Security Act, denying farm program payments to producers who convert wetlands for crop production; and various wetland restoration programs, including USDA's Wetlands Reserve Program (WRP, see box, "Wetlands Programs").

Figure 6.4.1
**Locations of 1987 wetlands and former wetlands on rural nonfederal lands**




Excludes Alaska.
Source: USDA, SCS , 1987.

### Clinton Plan, WRP Funding, Flood Affect Wetlands

The Clinton administration, in 1993, rapidly developed a plan to address key issues in wetlands policy (Heimlich and Gadsby, 1993). After a year's hiatus, the Wetlands Reserve Program received renewed funding to continue progress toward its goal of restoring nearly 1 million acres of cropped former wetlands. Unprecedented floods in the Midwest inundated millions of acres of agricultural land, re-emphasizing the value of wetlands for flood storage and the need for rational floodplain management. This attention resulted in funding for the Emergency Wetlands Reserve Program (EWRP) and may have influenced funding decisions for the WRP.

On August 24, 1993, the Clinton administration released a plan providing "a fair, flexible, and effective approach" to protecting wetlands, the latest in a series of administrative and legislative proposals to reform how the Federal Government regulates wetlands. What does the Clinton wetlands plan mean for farmers with wetlands?

- Farmers benefit from streamlined processing of CWA Section 404 dredge and fill permits that regulate wetlands, including a 90-day processing deadline for most routine permits, less vigorous review for projects with limited impacts, and an administrative appeals process for permits denied.

- USDA now has responsibility for all wetland delineation on agricultural lands (see box, "Wetland Delineation"). In a Memorandum of Agreement dated January 6, 1994, wetland agencies (U.S. Army Corps of Engineers, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, and USDA) agreed on USDA's new, expanded role in determining wetlands on farms. The Corps and EPA also formalized a rule exempting from Section 404 jurisdiction 53 million acres of wetlands converted to cropland prior to 1985.

## Wetlands Programs

### *USDA Programs*

**Water Bank—**Authorized in 1970 and amended a decade later, Water Bank makes annual per-acre payments to landowners who agree not to burn, drain, fill, or otherwise destroy the character of enrolled wetland areas. Additional cost-sharing payments are available for installation of conservation practices designed to maintain vegetative cover, control erosion, improve habitat, conserve surface water, or manage bottomland hardwoods. Agreements have been effected in 15 States, but the program has concentrated in the Prairie Pothole region of the Northern Plains. Some 6,031 agreements have been contracted covering 671,446 acres of land at an average rental cost of $15 per acre. Forty percent of the land under Water Bank agreements is wetland, while the remainder is adjacent upland area. Water Bank is administered by the Agricultural Stabilization and Conservation Service (ASCS). Congress abolished the Water Bank program in USDA's FY 1995 budget. Payments to farmers will end as their 10-year contracts expire, beginning in 1995. Water Bank wetlands will be considered for enrollment in the WRP, but may not be eligible if they were not used for crop production.

**Swampbuster—**The so-called swampbuster provision of the Food Security Act of 1985 denies all farm program benefits to producers who convert wetlands to make possible production of an agricultural commodity after 1985. As of 1992, 686 producers had lost $7.5 million in commodity program payments because of wetland conversions. Swampbuster is administered by ASCS with technical assistance from Soil Conservation Service (SCS).

**Conservation Reserve Program (CRP)—**Authorized in the Food Security Act of 1985, CRP returns land to vegetative cover for 10 years in return for annual rental payments and cost-shares for cover establishment. Primarily focused on highly erodible cropland, CRP eligibility rules were changed in 1989 to include wetland areas. In 1989 and 1990, 410,053 wetland acres were enrolled, mostly in the Northern Plains States. CRP is administered by ASCS with technical assistance from SCS.

**Wetlands Reserve Program (WRP)—**Authorized in 1990, WRP provides easement payments and restoration cost-shares to landowners who permanently return prior converted or farmed wetlands to wetland condition. Easement payments cannot exceed the fair market value of the land, less the value of permitted uses, such as hunting or fishing leases or managed timber harvest. Some 50,000 acres have been enrolled and another 590,000 acres submitted against an enrollment goal of 975,000 acres by the year 2000. WRP is administered by ASCS with technical assistance from SCS.

**Emergency Wetlands Reserve Program (EWRP)—**Authorized in 1993 under emergency supplemental appropriations for the midwestern floods, EWRP provides easement payments and restoration cost shares to landowners who permanently restore wetlands on cropland for which the cost of cropland and levee restoration exceeds the fair market value of flood-affected cropland. EWRP operates in seven Midwestern States. In February 1994, 25,400 acres were accepted from the 43,680 acres offered. EWRP is administered by SCS as part of emergency watershed operations.

### *Other Federal Programs Affecting Wetlands*

**Section 404 Dredge and Fill Permits—**Part of the Clean Water Act since 1972, Section 404 regulates dredging, filling, and other alterations of U.S. waters, including wetlands. In 1990, of more than 15,000 individual permits, 67 percent were approved, 30 percent were withdrawn by applicants or processed as general permits, and only 3 percent, or 500 permits, were denied. An estimated 75,000 activities were also allowed under one of 37 Corps of Engineers regional or nationwide general permits, including most agricultural activities. Section 404 is administered by the Army Corps of Engineers under guidelines issued by EPA, but a recent change gives USDA authority to make wetland determinations on agricultural land.

**Small Wetland Acquisition Program (SWAP)—**Authorized under the Migratory Bird Conservation Act, SWAP purchases land or makes permanent easement agreements restricting activities permitted on wetlands and their surrounding upland, primarily for waterfowl nesting habitat. Permanent easements on about 126,000 acres of wetlands and adjacent areas included in National Waterfowl Production Areas and refuges between 1981 and 1988 averaged $279 per acre, while purchases averaged $800 per acre. SWAP is administered by the U.S. Fish and Wildlife Service.

**Other Programs—**The National Wetland Priority Conservation Plan, required by the Emergency Wetland Resources Act of 1986 (PL 99-645), and the U.S./Canadian North American Waterfowl Management Plan both call for increased acquisition and restoration of wetlands. Legislation in 1989 authorized $15 million per year from 1991 to 1994 for a Wetlands Trust Fund to acquire land and pay for some wetland restoration joint venture projects needed to meet the North American Plan's goals.

- The Corps and EPA agreed to remove from Section 404 jurisdiction certain manmade wetlands, such as upland drainage and irrigation ditches. A nationwide general permit exempting farmers' actions determined by USDA's Soil Conservation Service to have minimal effect on wetlands will ensure better consistency between swampbuster and Section 404 provisions.

- The Clinton plan supports wetland restoration efforts, including USDA's Wetlands Reserve Program, advanced wetland banking to replace wetlands destroyed under Section 404 permits, and other voluntary, cooperative programs such as the U.S. Fish and Wildlife Service's North American Waterfowl Plan joint ventures, Partners for Wildlife, and the Forest Service's Forestry Incentives and Stewardship Incentives programs. Voluntary programs to restore wetlands provide compensation to farm landowners, who own much of the current and former wetlands eligible for these programs (fig. 6.4.1, fig. 6.4.2, app. table 1.1.1).

Conflict over wetland regulation was responsible, in part, for postponing CWA reauthorization in the 102nd Congress. For more than 2 years, alternative positions regarding wetlands have been represented by two competing bills. H.R. 350 (Edwards, D-CA) champions environmental reform of wetland regulation, while H.R. 1330 (Hayes, D-LA) advances landowners' and development interests in wetland regulation. After the Clinton plan was announced, legislators introduced more moderate proposals in the hopes of breaking the legislative deadlock. Of the leading contenders for Clean Water Act reauthorization, Senate Bill 2093 (Baucus, D-MT) says nothing about wetland regulatory reform, and H.R. 3948 (Mineta, D-CA) offers limited reform provisions. Reauthorization itself awaits the 104th Congress.

### New Funding for Regular and Emergency Wetlands Reserve Programs

Nearly $1 billion was dedicated to wetlands programs in the President's 1995 budget, a 41-percent increase over 1994. This total included $708 million to implement the President's wetland plan and $283 million for the Wetlands Reserve Program (WRP). Congress appropriated $93.2 million to retire more

Figure 6.4.2
Distribution of hydric cropland on rural, nonfederal land

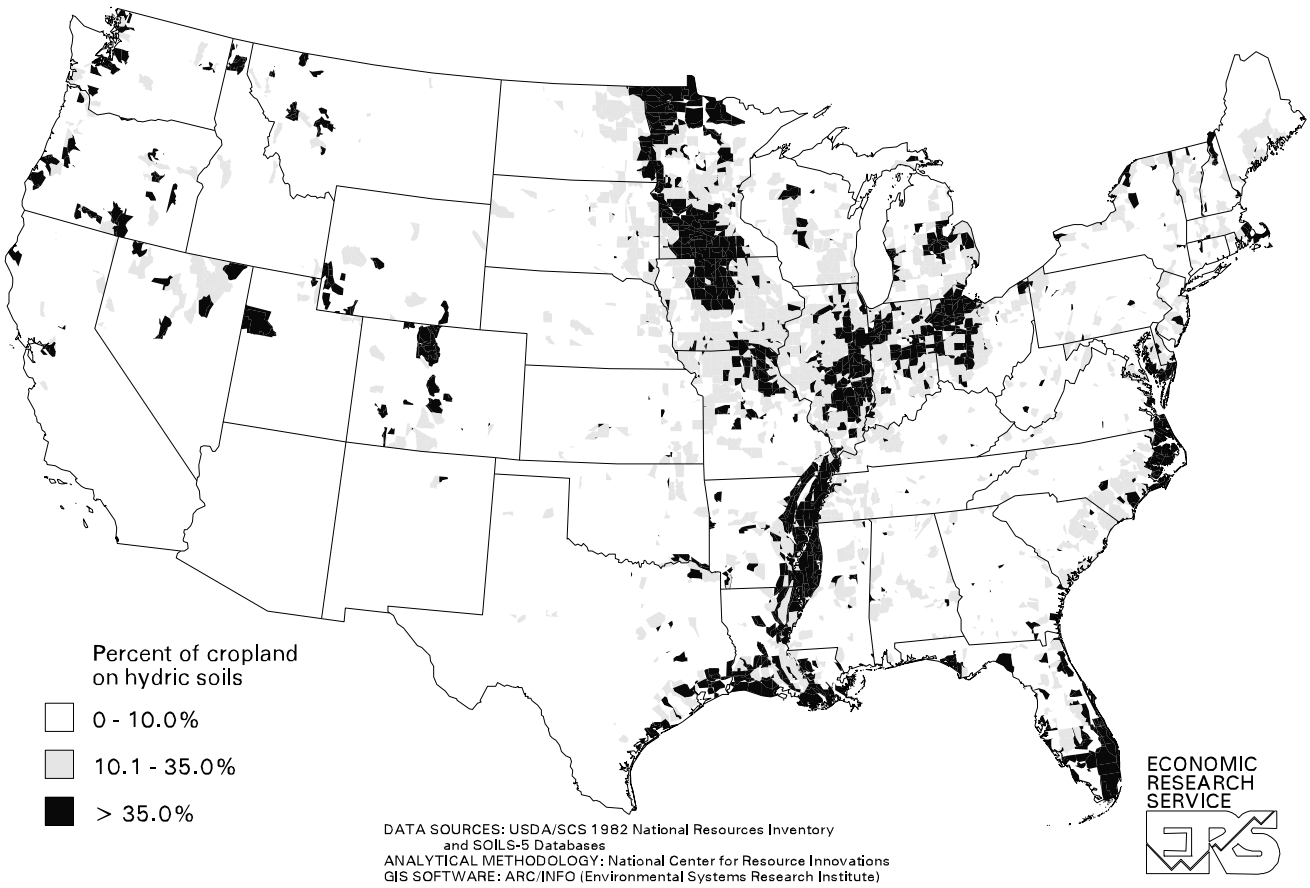


**Table 6.4.1—Wetlands Reserve Program results, by State, 1992**

| State | Intended for bidding | Offered | Accepted | Total cost | Cost per acre |
|---|---|---|---|---|---|
| | *-------Thousand acres------* | | | *Thousand dollars* | *Dollars* |
| California | 78.5 | 34.3 | 6.0 | 10,768 | 1,787 |
| Iowa | 45.1 | 27.9 | 5.1 | 5,951 | 1,168 |
| Louisiana | 119.3 | 69.9 | 14.1 | 9,882 | 702 |
| Minnesota | 33.3 | 13.1 | 0.7 | 764 | 1,082 |
| Mississippi | 115.7 | 65.0 | 14.9 | 10,764 | 723 |
| Missouri | 28.7 | 14.6 | 2.7 | 2,753 | 1,032 |
| New York | 3.0 | 0.5 | 0.1 | 212 | 2,934 |
| North Carolina | 25.6 | 15.3 | 4.7 | 3,675 | 780 |
| Wisconsin | 12.9 | 8.5 | 1.6 | 1,287 | 782 |
| Total | 462.0 | 249.1 | 49.9 | 46,057 | 923 |

Source: USDA, ASCS, 1993.

than 100,000 acres of former wetlands from agricultural production in the WRP. WRP was established in the 1990 Food, Agriculture, Conservation, and Trade Act (FACTA) and has an enrollment target of 330,000 acres by 1995 and 975,000 acres by 2000. The program requires a permanent or long-term easement to restrict agricultural use of the restored wetland. Economic uses of the restored wetland that may reduce the cost of the easement are allowed. These uses may include hunting, fishing, or other recreational activity, grazing during prescribed times, and selective timber harvesting. The landowner is also paid up to 75 percent of the cost of restoring the former wetland.

USDA signed up initial WRP enrollments in nine pilot States in 1992. Owners of more than 462,000 acres expressed interest in WRP and almost 250,000 acres were offered for enrollment by producers, from which USDA selected 49,888 acres at a cost of $46 million for easements and restoration (table 6.4.1). Pilot WRP States ranged from New York to California, but 58 percent of the acres enrolled were in Louisiana and Mississippi. Total Federal costs per acre averaged $923, varying from $2,934 in New York to $702 in Louisiana.

After a funding hiatus in 1993, WRP enrollment resumed in 20 States in 1994. Landowners submitted 5,775 intentions to bid, covering more than 590,000 acres (table 6.4.2). USDA has tentatively accepted 75,000 acres at a projected cost of $39 million, less than the $66.7-million funding approved for 1994. The largest acreages accepted were in Mississippi, Louisiana, and Arkansas, although large acreages bid from farmers in flood-wracked Cornbelt States such as Illinois, Iowa, Kansas, and Missouri were also accepted.

The Emergency Wetlands Reserve Program (EWRP) was established using funds from the Emergency Watershed Protection Program for cropland areas damaged by the midwestern floods of 1993. The voluntary program helps landowners convert flood-damaged cropland to wetlands if the cost of levee restoration and cropland renovation exceeds the value of the land. Some 25,400 acres will be restored to wetlands in seven Midwestern States (table 6.4.3). About half the 43,700 acres offered and half the 25,400 acres accepted were in Missouri. Costs per acre enrolled ranged from $1,200 in Minnesota to $419 in South Dakota. USDA encouraged landowners who did not meet the criteria for EWRP to offer their land for regular WRP signups in early 1994. Supplemental funds made available in the California earthquake

**Table 6.4.2—Wetlands Reserve Program offerings, by State, 1994**

| State | Bids | Intended for bidding | Estimated accepted | Projected total cost |
|---|---|---|---|---|
| | *Number* | *Thousand acres* | | *$ million* |
| Arkansas | 462 | 71.5 | 10.3 | 4.6 |
| California | 141 | 48.5 | 3.6 | 3.8 |
| Illinois | 374 | 24.0 | 2.8 | 1.2 |
| Indiana | 405 | 14.3 | 1.8 | 1.0 |
| Iowa | 1,069 | 58.1 | 5.8 | 3.9 |
| Kansas | 273 | 13.7 | 2.6 | 1.0 |
| Louisiana | 328 | 84.0 | 12.0 | 5.3 |
| Minnesota | 390 | 31.3 | 3.4 | 1.1 |
| Mississippi | 370 | 91.6 | 13.6 | 5.6 |
| Missouri | 443 | 28.4 | 3.5 | 1.8 |
| Nebraska | 148 | 6.6 | 1.5 | 1.0 |
| New York | 63 | 2.7 | 0.7 | 0.6 |
| North Carolina | 19 | 3.1 | 1.1 | 1.0 |
| Oregon | 62 | 15.8 | 2.0 | 1.0 |
| South Dakota | 509 | 39.9 | 2.6 | 1.1 |
| Tennessee | 118 | 11.5 | 1.8 | 1.0 |
| Texas | 37 | 9.5 | 2.1 | 1.0 |
| Virginia | 110 | 10.5 | 0.8 | 0.9 |
| Washington | 42 | 3.1 | 0.7 | 1.0 |
| Wisconsin | 412 | 22.1 | 2.3 | 1.3 |
| Total | 5,775 | 590.0 | 75.0 | 39.0 |

Source: USDA, Office of Public Affairs, 1994c; USDA, Office of Communications (1994d).

disaster legislation will be used to enroll the remaining acreage offered under the first EWRP signup. The second EWRP signup extended to December 30, 1994.

### Midwestern Floods Prompt Floodplain Management Review

The midwestern floods of 1993 caused extensive damage in the floodplains of the upper Mississippi and lower Missouri River basins (see box, "Flood Aftermath"). As of June 10, 1994, USDA had paid out nearly $2.9 billion in emergency assistance to floodplain and saturated upland areas in the nine hardest-hit States, primarily in the form of disaster assistance ($1.6 billion) and crop insurance indemnities ($1 billion) (USDA, 1994a). The 1993 floods raised important questions about flood control and the appropriate balance of urban, agricultural, and other uses of land in floodplains and associated watersheds nationwide.

Floodplains are lowlands adjoining river channels and other bodies of water, and are vulnerable to periodic inundation by flood water (fig. 6.4.3). A 10-year floodplain is an area estimated to have at least a 10-percent probability of inundation in any given year, while a 100-year floodplain is an area estimated to have at least a 1-percent probability of inundation in any given year. The actual extent and frequency of floodplain inundation depend on many factors, including the nature of flood-control measures as well as land use in tributary watersheds.

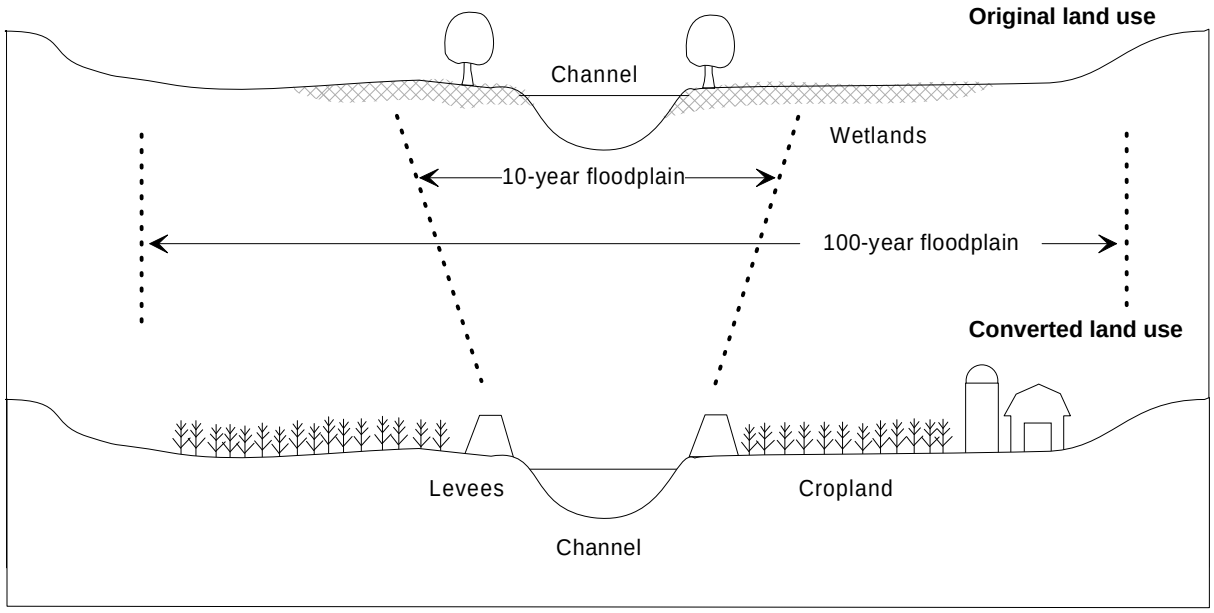
**Table 6.4.3—Emergency Wetlands Reserve Program results, by State, 1993**

| State | Offered | Accepted | Total cost | Cost per acre |
|---|---|---|---|---|
| | *--Thousand acres--* | | *Thousand dollars* | *Dollars* |
| Illinois | 1.7 | 1.3 | 1,500 | 1,154 |
| Iowa | 13.1 | 5.6 | 4,230 | 755 |
| Kansas | 1.7 | 1.2 | 1,100 | 917 |
| Minnesota | 0.6 | 0.5 | 600 | 1,200 |
| Missouri | 21.6 | 12.3 | 5,570 | 453 |
| Nebraska | 0.2 | 0.2 | 200 | 1,000 |
| South Dakota | 4.7 | 4.3 | 1,800 | 419 |
| Total | 43.7 | 25.4 | 15,000 | 591 |

Source: USDA, Office of Public Affairs, 1994b.

Floodplain settlement and use have long been shaped by a tradeoff between benefits, such as cheap transportation and fertile soils, and costs of flood prevention. Government policies play an important role in modifying these benefits and costs. Commodity price-support programs increase returns to agricultural production, for example, while federally subsidized levee construction, flood insurance, and disaster assistance reduce the costs associated with many floodplain uses. Together, such policies have favored urban and agricultural use at the expense of alternative uses, such as retention of natural riparian wetlands.

Figure 6.4.3
**Floodplain profiles under alternative uses**

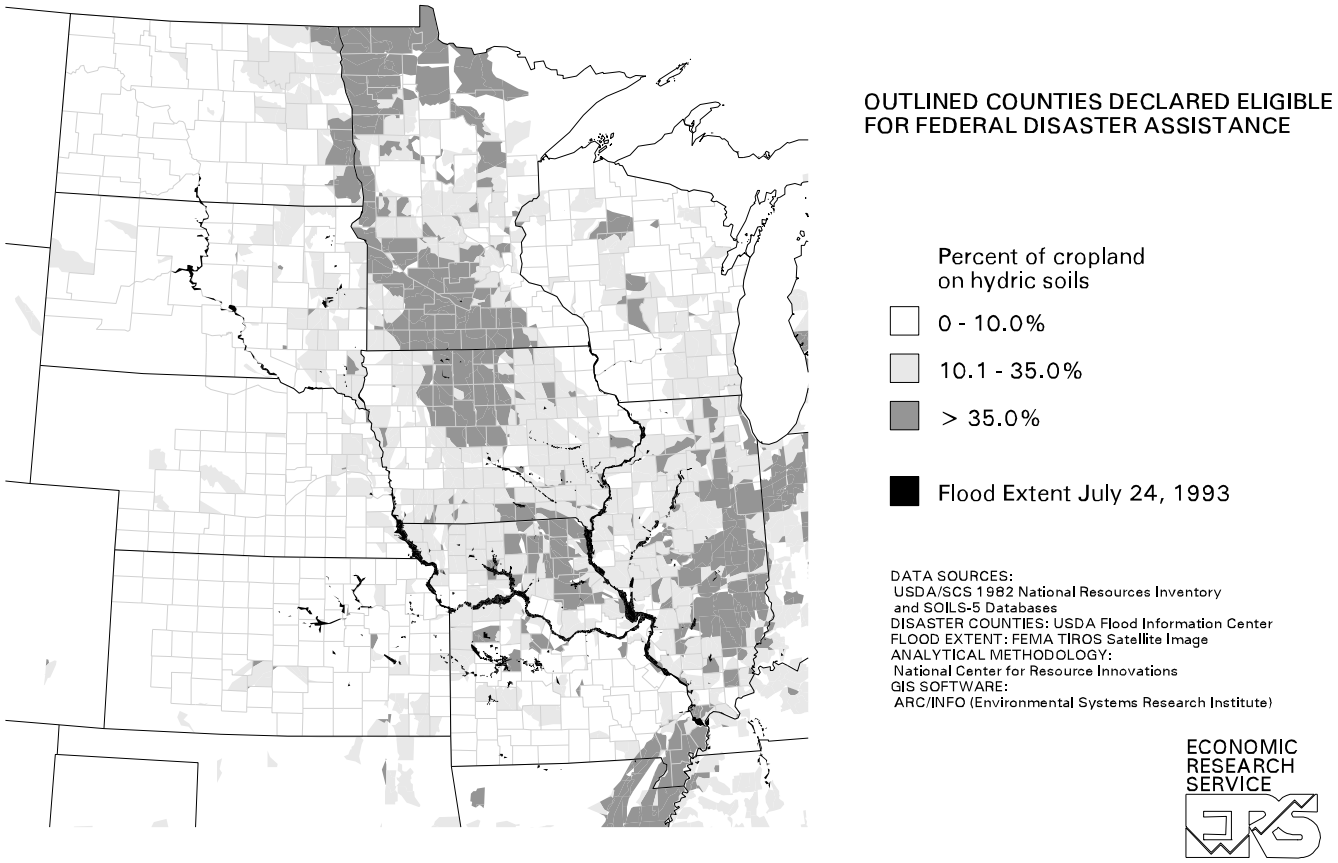


By slowing and absorbing runoff from surrounding uplands, wetlands moderate the flow of water into and along river channels and floodplains, thereby reducing peak flood levels, velocities, and damage. Hydric soils, which develop under wet conditions, provide evidence of the extent of wetlands in the past. As such, they indicate the potential for restoration of flood retention and other wetland functions on land subsequently converted to other uses. The nine States hardest hit in the floods of 1993 (Illinois, Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, and Wisconsin) have 49 million acres of rural, nonfederal land with hydric soils, of which 20 million acres remain as wetlands and 29 million acres have been converted to cropland (app. table 1.1.1). Much of this hydric cropland is eligible for enrollment in the Wetlands Reserve Program. Cropland damaged in the floods of 1993 is also eligible for the Emergency Wetlands Reserve Program.

Despite the role of wetlands in flood moderation, much of 1993's damage may have been unavoidable. About 6.6 million acres of land were actually inundated at the peak of the floods, about two-thirds of the floodplain (fig. 6.4.4). However, this actual flooding covered less than 2 percent of the 334 million acres of land in the disaster counties, and more than 70 percent of the crop disaster assistance payments were made to counties in upland areas, not in mainstem river floodplains. Furthermore, while more than half of the cropland in the upper Des Moines and lower Minnesota River watersheds occurs on hydric soils (indicating wetland conversion), the proportion is less than 25 percent throughout most of the rest of the upper Mississippi and lower Missouri River basins (fig. 6.4.4). Little of the region's hydric cropland was inundated directly by floodwaters.

To consider these issues, the White House assembled an Interagency Floodplain Management Review Committee (IFMRC), composed of staff detailed from USDA, the U.S. Army Corps of Engineers, the U.S. Fish and Wildlife Service, the Federal Emergency Management Agency, and the Environmental Protection Agency. The committee reviewed long-range Federal policy options

Figure 6.4.4
1993 Midwest flood: extent, disaster counties, and hydric cropland



regarding riverine floodplain management in the upper Mississippi and Missouri Rivers. The IFMRC found that:

- Wetland loss dramatically increased runoff, but it is probable that wetland restoration would have had only a minimal effect on a flood of 1993's magnitude.
- 1993's floods would have covered much of the floodplain whether the levees were there or not.
- Damages were estimated at $12-16 billion, over half from agriculture.
- However, more than 70 percent of agricultural damages occurred in upland areas as a result of ground saturation rather than inundation.
- Flood damage reduction projects worked essentially as designed, preventing almost $20 billion in potential damages.

The IFMRC recommended the following administrative and legislative initiatives in a June 1994 report:

- Refocus of floodplain management from structural solutions to a sequential strategy of avoiding, minimizing, and mitigating damages.
- Enactment of a Floodplain Management Act recognizing States as the Nation's principal floodplain managers and providing fiscal support for State and local floodplain management activities.
- Revision of Executive Order 11988 to clearly define federal agencies' responsibilities regarding floodplain activities
- Revitalization of the Water Resources Council and reestablishment of river basin commissions.
- Increased acquisition of environmentally related land interests from willing sellers.
- Enforcement of National Flood Insurance Program lender compliance rules and reduction of post-disaster assistance to those eligible but choosing not to buy flood insurance.

**Table 6.4.4—Swampbuster provision violations, 1987-92**

| Year | Producers in violation | Land in violation | Benefits denied |
|---|---|---|---|
| | *Number* | *Acres* | *Thousand dollars* |
| 1987 | 12 | 100 | 96.2 |
| 1988 | 127 | 1,490 | 1,186.4 |
| 1989 | 121 | 693 | 1,097.5 |
| 1990 | 105 | 560 | 1,341.0 |
| 1991 | 165 | 1,428 | 1,952.9 |
| 1992 | 156 | 3,221 | 1,591.6 |
| Total | 686 | 7,492 | 7,265.6 |

Source: USDA, ASCS, 1993.

## Swampbuster Provisions

Indirect Federal assistance for wetland conversion was eliminated by the so-called "swampbuster" provision (Title XII C, P.L. 99-198) of the Food Security Act of 1985. The original swampbuster provision made a farm operator ineligible for price support payments, farm storage facility loans, crop insurance, disaster payments, and insured or guaranteed loans for any year in which an annual crop was planted on converted wetlands. Swampbuster violations increased from only 12 in 1987 to 165 in 1991 (table 6.4.4). In the 1990 FACTA, Congress amended the swampbuster provision in several ways. The first amendment changed the "trigger" activating loss of program benefits.

Previously, loss of program benefits did not occur unless a converted wetland was planted to an agricultural commodity. Environmentalists were concerned because eligibility for benefits was restored if no crop was planted the following year, even though the wetland had been destroyed. An amendment closed this loophole; converting a wetland to make production possible now invokes loss of benefits, regardless of whether production occurs in the year benefits are being claimed. Benefits cannot be restored until the converted wetland is restored.

Changes were also made regarding penalties. The "drop-dead" penalty meant that a farmer could lose all farm program benefits for small wetland conversions, even those that occurred unintentionally. The new, graduated penalty provision allows an operator to violate the swampbuster provision once in 10 years if the wetland is restored and if the conversion occurred unintentionally in good faith. The penalty ranges from $750 to $10,000, depending on the severity of

wetland destruction. While large, these fines are less than farm program benefits, which may run to several hundred thousand dollars. The operator remains ineligible for farm program benefits until the converted wetland is either restored or replaced by another wetland.

Farmers were also concerned that the swampbuster provision reduced their ability to make better use of their land. The minimal effect clause, which exempts conversions that are determined to have minimal effect on the hydrological and biological properties of the wetland, has been expanded to allow wetland restoration to "mitigate" wetland losses. Mitigation means restoring or creating one wetland to replace another wetland lost to development. Now, a farmer can drain a wetland without losing farm program benefits if another wetland converted before 1985 is restored to wetland condition.

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### Wetland Delineation: Drawing a Line

Farmland does not correspond with the general public's image of wetlands, but may be treated as wetlands by the two programs that most directly affect private landowners: The Clean Water Act's (CWA) Section 404 permit program and the Food Security Act's (FSA) swampbuster provision. In 1987, USDA, the U.S. Army Corps of Engineers, and the Environmental Protection Agency developed manuals using a three-part wetland definition that considered soils, vegetation, and hydrology for their programs.

Concern that important wetlands were not covered under Section 404 and that all four Federal agencies with wetland programs were using different wetland definitions led to development of the Federal Interagency Manual for Identification and Delineation of Wetlands in 1989. Before 1989, the Corps did not consider areas previously cleared for crop production as wetlands subject to permit requirements. The 1989 manual included situations where wetland vegetation, including trees, had been cleared for agricultural production. It also delineated as wetlands land on which soils are saturated within 18 inches of the surface for only 7 days during the growing season. These interpretations created problems with a variety of drier altered, artificial, or managed wetlands.

Concerns about the 1989 manual developed as areas previously not considered wetlands became subject to permit requirements, resulting in legislation introduced in the House to reform wetlands regulation by changing the 1989 definition. A revised wetland delineation manual was proposed in August 1991. The 1991 manual requires that all three soils, vegetation, and hydrology criteria be present at least some time in the year in order for a site to be a wetland. How many days and to what degree a site must be flooded to be a wetland are particular points of difference between the 1989 and 1991 manuals. In the 1991 manual, indicators of wetland hydrology are restricted and secondary indicators require corroborating evidence. There are differences in the way the growing season is defined in the two manuals, as well as differences in the methods that can be used to determine presence of hydrophytic vegetation. Special procedures are outlined in the 1991 manual for sites that have been disturbed, including farmed wetlands. Other procedures are used for "difficult-to-identify" wetlands that focus on which of the three criteria is difficult to determine.

Because of the growing controversy, the 1991 manual got greater public notice and public comment than the 1989 manual. By January 1992, the 1991 delineation manual had received more than 80,000 formal comments. Attempts to revise the manual to account for the diverging views bogged down. Funding for a National Academy of Science (NAS) study of the delineation question, included in EPA appropriations for 1993, delayed any decision on delineation for 18 months. In the interim, the Corps and EPA have returned to use of the 1987 delineation manual. President Clinton's August 1993 wetland policy statement affirmed use of the 1987 delineation manual pending completion of the NAS study.

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## Flood Aftermath

### *Levee Repairs and Land Restoration*

The U.S. Army Corps of Engineers is authorized under PL 84-99 to repair publicly sponsored levees that are constructed to specifications and are properly and regularly maintained. The Corps determined that, in their Kansas City District on the Missouri River, only 110 of 465 damaged levees were eligible for cost-share funds (Midwest Flood Recovery Interagency Task Force, 1994). Many of the ineligible levees were privately built and maintained and were not enrolled in a Federal program.

In the fall of 1993, the Corps predicted that repairs would take 1 year because of widespread damage, unfavorable weather, and adverse ground conditions. As of April 1994, the Corps reported 107 of 200 levees repaired or under construction. Another 75 levees were under construction by mid-June. Corps repairs require 20 percent cost-share by local partners. Borrow sites, rights-of-way, easements, and lands for construction take additional time to acquire. In many locations, repair crews were prevented from reaching levee repair sites by high water. As floodwaters receded, cold weather and wet spring soil conditions further delayed repairs. Despite these obstacles, most Federal levee system repairs were successfully completed, protecting life and property in the Midwest. These locations included water, power, and sewer systems, as well as other critical public facilities. Special consideration for repairs was given to levees protecting major agricultural areas.

SCS's Emergency Watershed Protection Program received $60 million in the 1993 Emergency Supplemental Appropriation for erosion control and debris and sediment removal in the nine States affected by the Midwest flood. Additional funds were included in 1994 supplemental appropriations. As of April 1994, SCS had received 3,867 damage survey reports, of which 2,358 were determined eligible for assistance. Half were for erosion control, a third for debris removal, and 15 percent for upstream levee repair. Some 255 of 363 upstream levee repairs, costing $12 million, were completed or under contract by April 1. In 1994 appropriations, SCS was given responsibility for repairing agricultural levees on mainstems that protect more than 400 square miles of drainage area. Conditions include the following:

- The levee owner or district does not currently participate in Corps levee rehabilitation programs;
- The owner agrees to enter a Corps rehabilitation program after repairs and to meet Corps operation and maintenance requirements within 2 years;
- The owner provides 25 percent of repair costs, 5 percent in cash;
- Repairs are not allowed for levees on the river side of primary levees;
- Repairs are economically and environmentally defensible. The Emergency Wetlands Reserve Program will be offered as an option, where eligibility is met.

SCS estimates that in the Missouri River floodplain, 60 percent (455,171 acres) of the cropland was covered by sand. Half of this land was covered to a depth of 9 inches, and 91,000 acres covered to an average depth of 24 inches. Costs of sand removal are estimated at $3,200 per acre/foot. Deep plowing, to a depth of 60 inches by large plows pulled by bulldozers, costs about $600 per acre (Cassidy and Althaus, 1994).

### *Flooding and Agricultural Chemicals*

Rising floodwaters usually cause an increase in the concentration of dissolved water quality constituents. As the flood crest is reached, concentrations begin to decrease because of dilution by large volumes of floodwaters. After the crest, concentrations continue to decrease, finally returning to preflood levels. The U.S. Geological Survey collected water samples during the peak and recession stages of flooding from July to September 1993 at Thebes, Illinois, and compared these with 1991 data (Taylor and others, 1994). Discharge was 5 times greater than in July 1991, and instantaneous daily nutrient loads were proportional, except for suspended sediment, which was 65 times greater.

Pesticide concentrations were thought to be diluted by large floodflows. However, sampling on the mainstem (near the mouths of the Illinois, Missouri, and Ohio rivers, and at Baton Rouge, Louisiana) in 1993 showed that concentrations of herbicides such as atrazine, alachlor, cyanazine, and metolachlor were similar to maximum concentrations recorded in the spring of 1991 and 1992, even though record high streamflows were recorded (Goolsby and others, 1993). Instead of diluting concentrations, greater amounts of herbicides were flushed from fields into streams by the record runoff. The maximum daily load of atrazine transported by the Mississippi at Thebes, Illinois, was 70 times greater than in 1991. The total load of atrazine discharged to the Gulf of Mexico between April and August 1993 was 539,000 kilograms, 80 percent larger than in 1991 and 235 percent larger than in 1992. High pesticide and nutrient loads to the Gulf of Mexico, along with massive amounts of freshwater, could have increased algal growth in late summer 1993 and affected the ecosystem of the Louisiana and Mississippi coast.