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Iowa's Wetlands, Present and Future with a Focus on Prairie Potholes

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The vast prairie marsh-pothole complex that historically covered approximately 7.6 millions acres in Iowa was reduced to less than 30,000 acres by 1980 when it was estimated that only 5,000 acres of prairie marsh and pothole habitat remained in private ownership. A bleak outlook for the future of wetlands was presented by Bishop (1981). This outlook changed with the development of the North American Waterfowl Management Plan and the passage of two important pieces of legislation: the North American Wetlands Conservation Act and the Food Security Act of 1985. Protection of existing wetlands was afforded through the Swampbuster provision of the Food Security Act. The North American Wetlands Conservation Act and the Wetland Reserve Program offered through the Food Security Act provided needed funding for the protection and restoration of wetlands in Iowa. Since 1988, the Iowa Department of Natural Resources, the U.S. Fish and Wildlife Service, and various county conservation boards together with Pheasants Forever, Ducks Unlimited, and the Iowa Natural Heritage Foundation have purchased over 10,000 ha (25,000 ac) of wetlands and uplands in the Prairie Pothole Region of Iowa and restored over 24,240 ha (6,600 ac) of public and private wetlands. The United States Department of Agriculture, Natural Resources Conservation Service has enrolled approximately 24,240 ha (60,600 ac) of riparian floodplains and potholes into the Wetland Reserve Program and Emergency Wetland Reserve Program, affording them protection through permanent easements. Public support of wetland legislation will ensure that funding continues to be available to protect and restore Iowa's prairie wetlands.

INDEX DESCRIPTORS: wetlands, prairie potholes, wetland restoration

This paper presents an update to the wetlands paper presented at 1980 Iowa Academy of Science symposium on the state's declining flora and fauna (Bishop 1981). Since 1980 a slow but continual loss of palustrine and riverine wetlands has occurred mostly due to drainage and filling for agricultural purposes. Other wetlands such as lacustrine wetlands have increased by the addition of small man made lakes which were created for city water supplies and recreational purposes. Fens are often impacted or destroyed by encroaching agricultural practices, but more attention to fens has aided in the identification of new sites since 1980.

Wetlands in general have received increased attention on the national and state level as being valuable for improving water quality, reducing erosion, and providing wildlife habitat. This attention has centered around prairie pothole and riverine wetlands. Governmental programs accompanied by legal mandates and funding for wetland enhancement and protection has created the biggest change in Iowa's wetlands since 1980. These new programs are playing a major role in protecting and restoring thousand of acres of wetlands. This is a historic time and will be looked back upon as a major turning point in wetland protection and enhancement in Iowa. This paper focuses on changes in major wetland types.

HISTORICAL PERSPECTIVE

Of the 87 million ha (215 million ac) of wetlands that originally existed in the contiguous 48 states, less than half (about 38 million ha or 95 million ac) exist today, and in the early 1980s, wetland losses continued at 300-400,000 ac per year (Tiner 1984). In Iowa, these losses were even greater, and today, only about 11% of our original wetlands remain. The most extensive losses were in the glaciated pothole region of north-central Iowa; although estimates vary depending on the wetland classification used, it is generally agreed

that approximately 99 percent of the shallow prairie pothole wetlands have been converted to farmland and other uses. The primary reason for these wetland losses can be traced directly to federal, state, and local government programs which were enacted for the purpose of draining wetlands. These programs, such as the Swamp Land Acts of the 1850s, the Reclamation Act of the early 1900s, and several US Department of Agriculture (USDA) programs, offered cost-sharing or financial incentives to convert wetlands to productive agricultural land. The Flood Control Act of the 1940s authorized the U.S. Army Corps of Engineers to construct major drainage outlets and flood control channels which impacted riparian wetlands.

Mississippi River wetlands have suffered similar historical degradation. Broad floodplain wetlands were diked and drained. By the 1940s, locks and dams gave a temporary boost to some riparian aquatic habitats, but in later years, accelerated sedimentation filled wetlands and water control structures prevented cycling and creation of new deep wetlands.

Similar degradation of Missouri River wetlands occurred early in this century. Channel degradation resulting from the straightening of the once-meandering river resulted in gradual drainage of most oxbow wetlands along the river.

As greater knowledge of wetland types and locations was gained, the full extent of our wetland losses was realized. Abernethy and Turner (1987) estimated that forested palustrine wetlands were being lost at up to five times the rate of upland forests. Pearson and Leoschke (1992) estimated that nearly 40% of all potential fen sites have been destroyed by cultivation or drainage, and of those remaining, most were negatively affected by grazing, cropfield edge effects, expansion of woody plants, drainage tiles or ditches, and excavation or mining.

During the 1920s and 1930s some attempts were made to curb

Table 1. Wetland types and area in Iowa.

WETLAND TYPE	1980	1997
Natural Marsh	10,717 ha (26,470 ac)	14,922 ha (36,857 ac)
Artificial Marsh	4,049 ha (10,000 ac)	5,431 ha (13,414 ac)
Natural Lakes	13,314 ha (32,886 ac)	13,314 ha (32,886 ac)
Small Manmade Lakes and Reservoirs	7,009 ha (17,312 ac)	7,317 ha (18,074 ac)
Large Manmade Reservoirs	12,147 ha (30,250 ac)	16,478 ha (40,700 ac)
River Oxbows and Overflow Wetlands	16,194 ha (40,000 ac)	30,317 ha (74,884 ac)
Farm Ponds	19,838 ha (49,000 ac)	32,389 ha (80,000 ac)

wetland losses that were beginning to impact wildlife populations and habitat conditions in several states. Some of the first of those who today may be termed "environmentalists," were hunters concerned over decreasing waterfowl populations. As a result of their efforts, Congress enacted the Migratory Bird Conservation Act (1929) and the Migratory Bird Hunting Stamp Act (1934) which established a special fund for the acquisition and protection of wetlands. Although important pieces of legislation, these acts did little to slow wetland losses that by the 1930s were averaging hundreds of thousands of acres annually (Bishop 1981, Table 1).

A NEW ERA BEGINS

Starting in the late 1970s, state and federal government agencies began taking a different view of wetlands and their value to our landscape. Passage of the Federal Water Pollution Control Act (later amended as the Clean Water Act of 1977) allowed the federal government to assume a greater responsibility for protecting wetlands. Section 404 of the Clean Water Act regulated the discharge of dredged and fill material into wetlands. This act exempted normal farming practices from regulation. Wetland conversion to farmland was still taking place, but the rate of conversion had slowed to about 40,000 ha (100,000 ac) per year nationwide as a result of this regulation.

The most significant modern legislation to protect Iowa's wetlands was passage of the Food Security Act of 1985. This act, known as the Farm Bill, sought to bring farm policy more in line with national wetland protection policies. The "Swampbuster" provision of the 1985 Farm Bill made farmers who drained wetlands to produce commodity crops ineligible for support payments. This attempt to control wetland drainage on agricultural land still allowed wetlands to be drained, provided that commodity crops were not grown. The 1990 Farm Bill went one step further by identifying the act of conversion as the trigger mechanism for Swampbuster violations. This act was important because it was passed to coincide with President George Bush's policy of no net loss of wetlands as a national goal. Although Swampbuster allowed for mitigation and minimal effect exemptions, it is significant because it places United States Department of Agriculture in a role of wetland protection rather than wetland drainage.

In the late 1980s, the U.S. Environmental Protection Agency (EPA) became more active in protecting our nation's wetlands. In 1986, it adopted a Wetlands Research Plan (Zedler and Kentula 1986) to assist in implementing wetland protection.

A CHANGING TIDE—RESURGING WETLANDS

The mid-1980s can be viewed as a time in which wetland conversion reversed its course. As was the case with past extensive wetland drainage efforts, federal and state agencies were again serving leadership roles by developing programs and policies that protect and restore wetlands. Interagency cooperation through a Memorandum of Agreement strengthened wetland regulation by more clearly

defining the roles of the Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service, and the Natural Resources Conservation Service (NRCS) with respect to wetland delineation. Also, congressional mandates have attempted to define wetlands based on scientific criteria with the goal of making wetland identification and regulation more consistent.

New programs have been developed and funded with the goal of protecting existing wetlands or restoring some of the wetlands that have been lost over the last century. Most significant were:

North American Waterfowl Management Plan—The North American Waterfowl Management Plan (NAWMP) drafted in 1986 provided a vision to protect 2.8 million ha (7 million ac) of wetlands, restore 2.8 million ha (7 million ac), and enhance 4 million ha (10 million ac) to ensure a fall flight of 100 million waterfowl. Actions by state and federal wildlife biologists, private sporting groups, private conservation organizations, industry, and interested individuals initiated a chain of events that provided the impetus for the North American Wetlands Conservation Act and other wetland protection efforts by both the private and public sectors. The NAWMP is probably the single most important step in reversing the loss of wetlands in Iowa. This plan recommended funding for the acquisition and protection of breeding, migratory, and wintering habitat in the United States, Canada, and Mexico. It provided direction for the formation of joint ventures in all three countries. Joint ventures are cooperative partnerships made up of federal and state personnel, private conservation groups, and interested citizens committed to protecting, enhancing, and restoring wetlands as well as improving reproductive success of breeding waterfowl and habitat for many other bird species.

North American Wetlands Conservation Act—This act was passed by Congress in 1989 and is one of the major funding mechanisms for the North American Waterfowl Management Plan. The act directed Congress to appropriate up to \$15 million annually to help fund wetland protection projects in Canada, United States, and Mexico, and required that a minimum of 50% of the project costs be provided by local cooperators. This program provided the opportunity for the public acquisition and restoration of wetlands and associated uplands.

Wetlands Reserve Program (WRP)—This USDA program administered by the Natural Resources Conservation Service was authorized by the 1990 Farm Bill to restore and protect 395,000 ha (975,000 ac) of wetlands nationwide. The WRP is a voluntary program in which agricultural producers can restore and protect wetlands on their property. A conservation easement between the producer and USDA establishes limitations on future use of the land to produce agricultural crops. Producers are paid for granting the easement based on the agricultural value of the land. The USDA also pays the majority of the cost of restoring wetlands and adjacent uplands to native vegetation. The easement is vested in the United States of

America for a specified number of years and may be in perpetuity. Lands eligible for this program must have wetland restoration potential and be classified as farmed wetlands or prior converted wetlands. In Iowa, priority for WRP participation is given to farmed wetlands in the prairie pothole region.

Emergency Wetlands Reserve Program (EWRP)—This USDA program is also administered by the NRCS. It was authorized through the Emergency Watershed Program (PL 81-516) as a response to the floods of 1993. The EWRP was established to offer agricultural producers alternatives to rebuilding levees for protection of cropland against flooding, and to help reduce the frequent repair costs of flood-damaged cropland. Through this program, landowners can restore frequently-flooded croplands to wetlands rather than continuing to repair flood-damaged lands. They can also enroll associated uplands to enhance and buffer the restored wetlands. For participating in the EWRP, landowners are paid for permanent easements that guarantee the land will remain as wetland. Easement payments are based on the agricultural value of the land as determined by professional land appraisers. USDA also pays the majority of the cost of restoring flood-damaged lands to wetland and associated uplands to native vegetation. Lands enrolled in EWRP are concentrated along riparian corridors that have experienced significant flooding (Fig. 1).

Together WRP and EWRP programs have resulted in the formation of partnerships with other state and federal agencies and private conservation organizations to achieve wetland conservation goals in Iowa. Efforts have been made to concentrate both programs in problem areas in which high landowner interest has been shown. In many instances, landowners have been willing to sell their remaining interest in these easement lands to the U.S. Fish and Wildlife Service or Iowa Department of Natural Resources. The concentrated acquisitions have resulted in large, manageable public areas with considerable natural resource and recreation benefits.

RESULTS OF WETLAND PROTECTION PROGRAMS

North American Waterfowl Management Plan

The NAWMP was the catalyst for development of cooperative wetland restoration programs and the formation of the Prairie Pothole Joint Venture (PPJV). Iowa, Minnesota, North Dakota, South Dakota and Montana make up the PPJV. These states set a goal of protecting 1 million ha (2.6 million ac) of wetlands and associated uplands. A goal of protecting 12,000 ha (30,000 ac) of grasslands and wetlands having a 3 to 1 grassland to wetland ratio was initially set for Iowa. This goal was later raised to 20,000 ha (50,000 ac). In Iowa from 1987 through 1996, 11,108 ha (27,436 ac) were placed under public protection at a cost of \$25,676,628. Of this total, 1,073 ha (2,650 ac) were existing wetlands, 1,802 ha (4,451 ac) were restorable wetlands, and 8,234 ha (20,338 ac) were uplands (Zohrer 1997).

Restoration of wetlands has been a significant part of this endeavor. Biologists working with private landowners, mostly on land entered into the Conservation Reserve Program restored 638 basins totaling 1,009 ha (2,493 ac). In addition, 644 basins were restored on public land adding 1,611 ha (3,978 ac) of wetlands. Total restoration on public and private lands of 1,282 basins equaling 2,620 wetland ha (6,471 wetland ac) have been added to Iowa's landscape (Fig. 2).

A simple process to restore the wetlands has been utilized. Wetland basins were identified on NRCS aerial photos and landowner input was provided on tile lines draining the basins. One of two restoration methods was used. In larger wetlands, an earthen dike with a water control structure was built across the existing flowline of the basin and identified tile lines entering the basin were broken

with a backhoe. The other method used mostly for smaller wetlands required surveying and establishing the basin line, digging down to the tile line or lines, breaking the tile, and bringing it to the surface with solid plastic tile. A standpipe could be connected to the outgoing end of the broken tile line and served as the overflow to regulate the water level within the basin.

North American Wetlands Conservation Act

Projects in six Iowa locations were approved for funding by the NAWCA Board (Fig. 1). NAWCA contributed \$2.9 million resulting in 1,538 ha (3,800 ac) acquired through the end of 1997.

WETLANDS RESERVE AND EMERGENCY WETLAND RESERVE PROGRAMS

Through the active endeavors of NRCS personnel, Iowa ranked number one in the U.S. for WRP and EWRP sign-ups, enrolling 24,541 ha (60,617 ac) in WRP and EWRP. The exact nature and size of resulting wetland restorations are still being determined, and it will take several years before we know the true extent of wetland restoration under WRP and EWRP (Fig. 3). As of April 1, 1997, 310 easements had been finalized under EWRP totaling 14,166 ha (34,990 ac), and 154 easements to restore 4,661 ha (11,512 ac) of wetlands were finalized under WRP. (James E. Ayen, Mark D. Lindflott, and Douglas B. Oelman, personal communications). The future results of these programs could be extensive depending on positive landowner interest and political policies. The potential exists to create greenbelts along major river corridors. These greenbelts would protect against flood loss, help control erosion, and improve water quality.

Riverine wetlands are the major focus of WRP and EWRP activities. Little documentation exists in the literature on the extent of presettlement or current extent of riverine wetlands. Riverine restorations are more difficult to understand and develop than are prairie potholes. Options do exist depending on wetland type, size and wetland management techniques previously employed. We hope to learn much in the near future, and some learning will be from trial and error. The one advantage in riverine restorations over pothole restorations is that we can change restoration practices on these floodplains if we discover a development technique that yields greater benefits to wetlands and wildlife.

THE FUTURE HOLDS ITS CHALLENGES

The future of wetlands in Iowa will require that we focus our energies.

1. We must sustain the momentum that is currently driving the programs described above. Interest in the WRP and EWRP programs remains high. In 1997, the NRCS received another 141 easement applications for WRP that would total about 5,668 ha (14,000 ac) if accepted. Documentation of societal benefits and public support are needed if we expect the U.S. Congress to fund these programs in the future.
2. Public support for wetland restoration and acquisition through the Department of Natural Resources, NRCS, and the U.S. Fish and Wildlife Service must be strongly voiced to the U.S. Congress and state legislators. Active participation by private individuals and private organizations is needed to maintain the current momentum for wetland protection and restoration.
3. Congress is still trying to determine which wetlands are worthy of protection. The result will probably be a political decision that identifies a "comfort zone" that balances the desires of recreational, environmental, and agricultural/industrial interests. Again, public input is important.

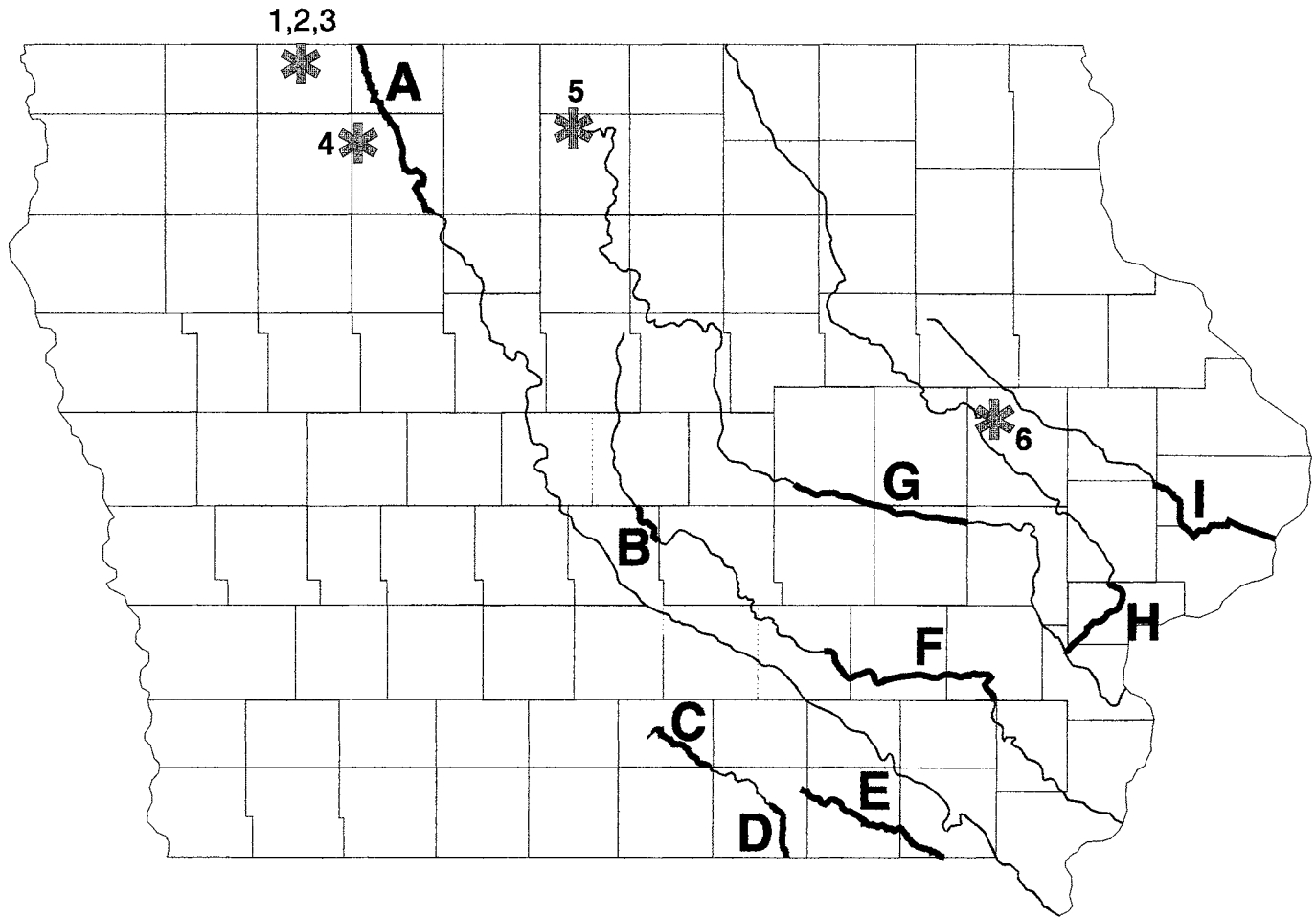


Fig. 1. Iowa DNR/Fish and Wildlife Service priority wetland restoration areas including North American Wetlands Conservation Act and Emergency Wetland Reserve Program projects.

NAWCA PROJECTS	EWRP PROJECTS
1. Meinking/Krumman	A. West Fork Des Moines River
2. Iowa Great Lakes Wetland Project	B. South Skunk River
3. Iowa Great Lakes II Wetland Project	C. Upper Chariton River
4. Lost Island-Trumbull Lake Watershed	D. Lower Chariton River
5. Eagle Lake Wetland Complex	E. Fox River
6. Cedar River Ecosystem	F. Skunk River
	G. Iowa River
	H. Cedar River
	I. Wapsipinicon River

- The scientific community must continue to explore and document the values of wetlands. Our economically based society will demand that wetlands be justified from a "dollar and cents" standpoint to justify their existence.
 - Wetland data bases, such as the National Wetlands Inventory and Swampbuster Inventory must be refined and verified on the ground so that future losses and gains can be measured. This information will also provide the basis for new programs and regulatory measures.
 - Long-term operation and maintenance funding will be needed for the NRCS to manage the WRP and EWRP easements that remain in private ownership.
- Since 1980, in the world of wetlands, we have progressed from an atmosphere of gloom and pessimism to one of progress and excitement. No net loss has been achieved and presently an annual net gain exists. Various plans, agencies, and programs including the NAWMP, NAWCA, CRP, WRP and EWRP, the U.S. Fish and



Fig. 2 Restored wetland basins in the Prairie Pothole Region of Iowa.



Fig. 3. Wetland restored through the Emergency Wetland Reserve Program.

Wildlife Service, Natural Resource Conservation Service, Army Corps of Engineers, Iowa Department of Natural Resources, county conservation boards, Iowa Natural Heritage Foundation, Pheasants Forever, Ducks Unlimited, and a host of others have joined together to provide a baseline of wetland protection and to identify their value to society.

Art Roseland, an Iowa DNR biologist on the Mississippi River for many years, views floodplain restoration efforts with similar optimism. He sees a bright future for wetland restoration and enhancement efforts on the Upper Mississippi River and makes the following predictions: easements and acquisitions will continue to be utilized and new tools like setback levees, decreased flood control, and incentives for floodplain-compatible uses may become available; restoration of natural river hydrology will be emphasized, but site-specific wetland projects that support ecosystem objectives must be

included in planning efforts; and finally, methods to improve connectivity of managed wetlands to the river without sacrificing wetland values will be developed.

Wetland acres are still increasing. Every month more land is entered into the WRP, more land receives public protection, and more wetlands are restored. We now have an opportunity to protect riparian corridors along inland rivers. Wetland protection can strengthen the state economically and at the same time provide recreational opportunities. By increasing wetland acreage, we are positively impacting wildlife and our quality of life. The magnitude of future wetland gains is unknown, but in the near future several thousand more acres will be restored or protected. This momentum will obviously not continue unless it is nurtured with public support.

A public awareness of the multiple benefits of wetlands has emerged. The need for clean drinking water, the desire to maintain waterfowl populations, protection of endangered species and the need to prevent other species from joining those ranks, reduced economic losses due to flooding, preservation of our natural heritage, and the need for education and scientific outdoor laboratories have all contributed to today's interest in wetland conservation. The necessary legislation is in place, but it will need the concerted support of all interested parties, be they scientific or agricultural. Scientists, teachers, biologists, recreationalists, stewards of the land cannot expect proper wetland values will prevail. All must strive to educate those with whom we have influence. Each must become politically vocal. The public must be provided with the knowledge of wetland values that have a direct bearing on their physical well-being as well as their quality of life.

The momentum for wetland protection is real and growing. The need for clean water, wildlife habitat, recreational opportunities as well as the need to reduce the devastation from flooding has provided a window of opportunity for the future. In one's lifetime, there are rare opportunities when the timing is right, and our vision is clear for a collective "us" to chart a future course that will provide such monumental benefits to those who follow us. Without question, this is one of those rare opportunities. Let us not squander this chance to protect our valuable natural resources for future generations; for those of us in the scientific and public domain, we can achieve no higher honor.

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