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Wetlands Protection Section

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RESTORING AND CREATING WETLANDS:

A Planning Guide for the Central States Region: Iowa, Kansas, Missouri, and Nebraska

This document was produced to aid planners, local governments, businesses, and the general public in understanding how to plan a wetland restoration or creation project. Wetland restoration and creation is one means of achieving the goal of the Clean Water Act to restore the chemical, physical, and biological integrity of the nation's waters.

Prepared for the U.S. Environmental Protection Agency, Region 7, by JT&A, inc. This document was adapted from an original text prepared by Kelly Kindscher under a grant to the University of Kansas. It has been subjected to EPA peer and administrative review and has been approved for distribution as an EPA document.

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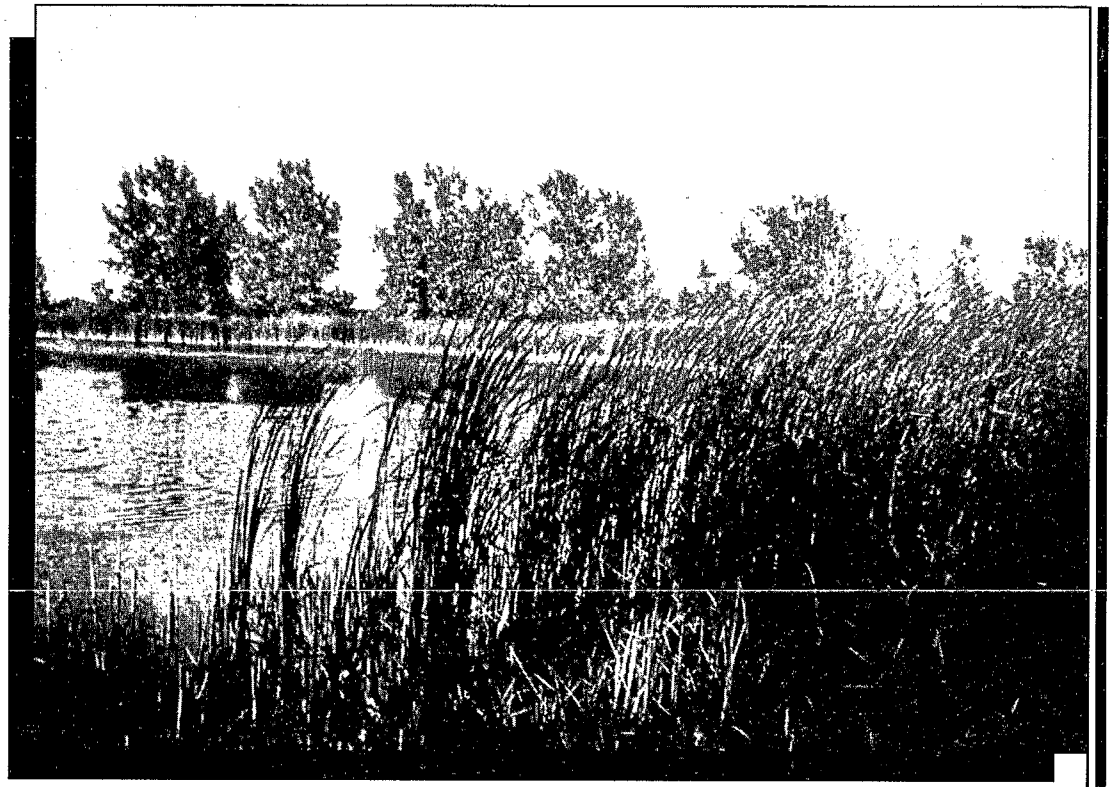


CHAPTER 1

Wetlands in the Central States

Wetlands are now recognized as some of the most productive natural areas in the world. They are also important as buffers between uplands and streams or lakes, performing such functions as controlling shoreline erosion, filtering pollutants from upland runoff, and storing floodwaters.

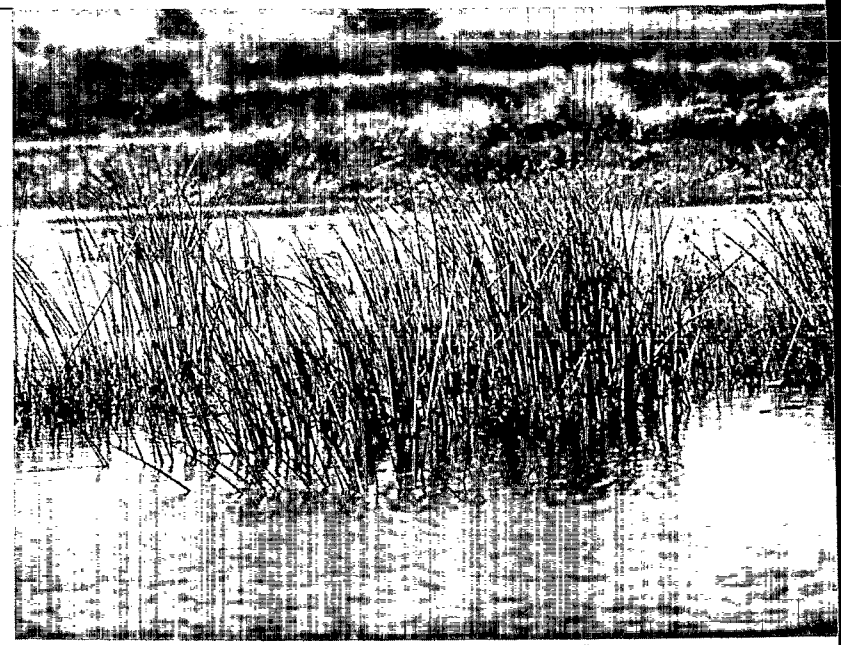
Their important values and functions are derived from a combination of their high natural productivity and location within the landscape. However, the values of wetlands to the environment and society have not always been recognized. More than half of the wetlands that existed in the lower 48 states when this nation was formed have been lost in the process of building our industrial, residential, and agricultural resources.

Wetlands can serve the public in a number of ways by providing economic, health, and aesthetic benefits, such as:

- Reducing flooding,
- Decreasing erosion,
- Recharging ground water,
- Improving water quality,
- Augmenting or providing wastewater treatment,
- Providing recreational and educational opportunities, and
- Providing wildlife habitat.

Urban planners and developers often incorporate wetlands into their projects as natural buffers between different land uses and as natural filters for stormwater runoff.

Wetlands exist in a broad range of environmental conditions but have in common, under natural conditions, plant communities, soils, and hydrology that differ from most upland plant communities. Wetland plants are adapted to growing in soils that, during part or all of the growing season, are too wet for plants that normally grow in upland conditions.



Wetlands are defined in federal regulations as "areas which are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils conditions." This is the regulatory definition used by EPA and the Corps of Engineers in administering Section 404 of the Clean Water Act.

Local, state, and federal laws and ordinances now emphasize protection of existing natural wetlands and promote restoration of former wetlands. Anyone seeking to do work in an existing wetland, including many restoration and enhancement projects, must follow the prescribed regulatory and legal procedures.

In recognizing both the values of our wetland resources and the losses which have occurred, the National Wetlands Policy Forum proposed a long-term goal of increasing the quality and quantity of the nation's wetland resource base. Most activities which meet this long-term goal can be classified into three categories: creation, restoration, and enhancement.

■ ***Creation*** is the act of constructing wetland areas where none had previously existed. Wetlands are usually created by excavation or by blocking a drainageway with a low dike and water control structure.

■ ***Restoration*** refers to the process of returning wetland functions and values to a former wetland area by reestablishing the necessary components such as soils, hydrology, and vegetation.

■ ***Enhancement*** is the modification of an existing wetland to improve one or more of its functions or values. These projects sometimes create conditions which are not naturally supported at the site and require active management to be successful. Enhancement projects may result in a change in the wetland's existing functions and require careful analysis in the planning process to determine if the change is an acceptable trade off for the improvements gained.

This guide will focus on creation and restoration activities.

Recognizing Wetlands in the Central States Region

Water, soil, and plants are the three most important components of wetlands. Each of these three components influences the other two and, along with the other living organisms, creates the conditions that determine the type of wetland and many of its functions.

Water (hydrology)

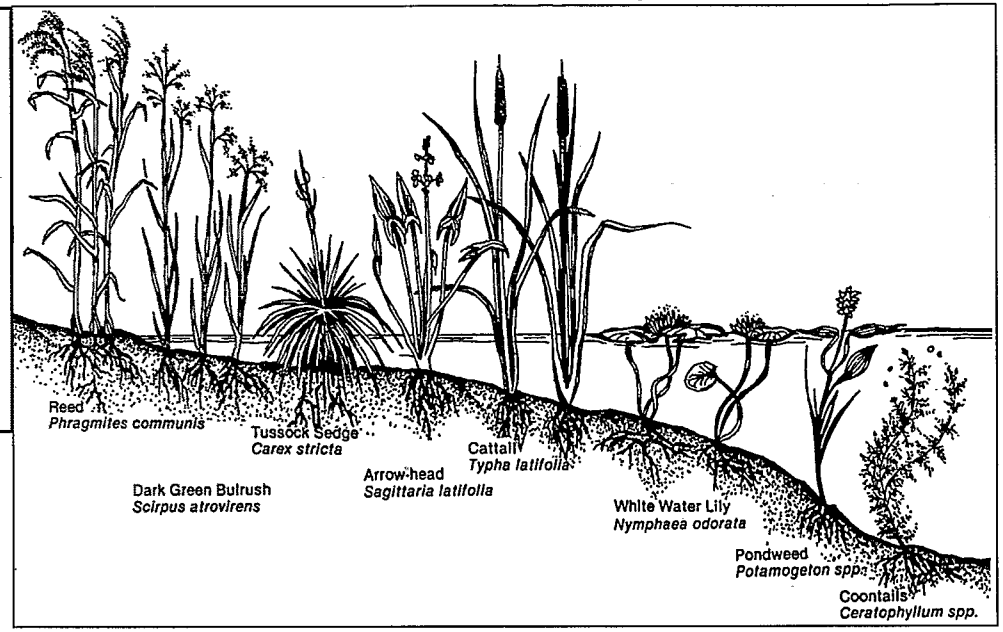
To be considered a wetland, the area must be inundated or saturated with water long enough during the growing season to affect the vegetation and soil. Although *standing* water may be absent in some wetlands for long periods of time (such as during dry seasons), the root zone is saturated during some portion of the growing season. Saturated root zones create anaerobic conditions, which favor plants tolerant of periodic low oxygen concentrations in the soil. The source of water may be precipitation, springs, surface runoff, flooding from a nearby creek or river, or ground water. Although the water is usually fresh, in some areas it can be salty.

Soil

Wetland soils (classified by the Soil Conservation Service as hydric soils) occur in areas with high water tables or frequent, long-lasting flooding or ponding. Although these soils are usually high in clay content, they can also be sandy, such as those found in the Nebraska Sandhills or along sandy rivers. Where organic matter has accumulated, soils such as peats or mucks are found. Some wetland soils are farmed, especially if the source of water has been removed by draining or by diking to eliminate flooding.

Common Wetland Plant Species in the Central States Region

Grasses and Grass-like Plants	Shrubs and Trees	Other Wetland Plants
prairie cord grass	willows	smartweeds
barnyard grass	cottonwood	marsh elder
reed canary grass	box elder	water lilies
rushes	green ash	pondweeds
sedges	silver maple	cattails
bulrushes	pin oak	arrowheads
	sycamore	
	buttonbush	



Common wetland species in the Central States region.

Vegetation

Plants usually found in wetlands are specially adapted to growing in soils that are periodically or permanently inundated or saturated with water. These plants are referred to as hydrophytes. The species found in a particular wetland are determined in part by the soil and water chemistry of the site, the duration of standing water, and the length of time the root zone is saturated. Over long periods of time, plants influence the quality of the water and the development of the soil. Occasionally, plants associated predominantly with uplands are also found in wetlands, usually because of seasonal variation or drought periods.

Wetlands in the Central States may be isolated — not hydrologically connected to a stream or large open water body — or may be an integral part of a stream (riverine) or lake (lacustrine) system. Wetlands that are often dominated by persistent vegetation, such as sedges, prairie grasses, rushes, cattails, shrubs, or trees, are usually called palustrine wetlands. Palustrine wetlands may be isolated or associated with riverine or lacustrine systems.

Most of the wetlands in the Central States are palustrine wetlands ranging from open water marshes on wetter sites to wet meadows or some bottomland forests that may only seasonally have saturated soils or surface water.

Although less common in the more arid western areas, wetlands are found throughout the Central States. Some wetlands that are recognized by their location, importance, and/or ecological features are:

- Prairie potholes in north central Iowa;
- Sandhill wetlands and lakes in north central Nebraska;

- Rainwater Basins in south central Nebraska;
- Saline wetlands, predominantly in Nebraska and Kansas, and occasionally in Missouri;
- The Cheyenne Bottoms in central Kansas and playa lakes in southwestern Kansas;
- Fens in Iowa, Missouri, and Nebraska;
- Bottomland hardwood swamps along the Mississippi River in southeastern Missouri; and
- Riparian forested wetlands in floodplains throughout the region.

Geologically, the origins of wetlands differ:

■ **Wetlands along rivers** have usually developed fairly recently and have been greatly affected by erosion and sedimentation.

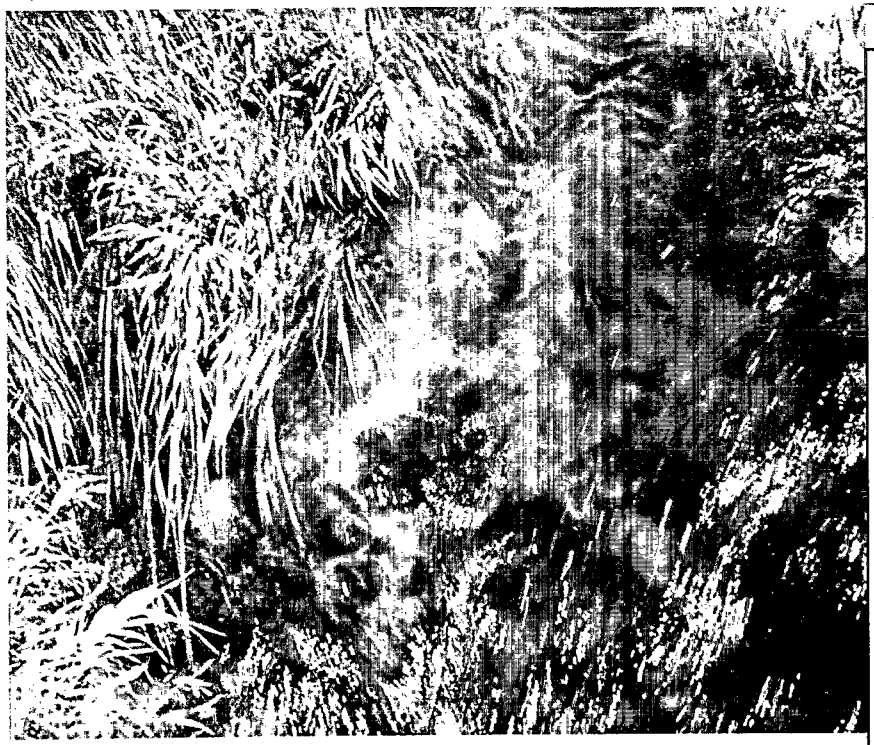
■ **Prairie potholes** were formed by the retreat of glaciers, which often left depressions deep enough to hold water.

■ **The Nebraska Sandhills wetlands and Rainwater Basins** were formed during glacial periods when large dust storms moved massive quantities of sand and silt (loess). In the Sandhills, wetlands form in wind blown depressions and the water in the wetlands is often directly influenced by ground water. The rainwater basins of Nebraska and playa lakes of Kansas are believed to have formed in windblown depressions that trapped and held rainwater.

■ **Saline wetlands** occur in swales and shallow depressions of stream valleys where naturally occurring salts have accumulated.

■ **Fens** form where cold ground water comes to the surface and the slow deterioration of organic matter results in a highly organic soil.

The prairie pothole area covers about 300,000 square miles from Edmonton, Alberta, to Des Moines, Iowa. Waterfowl and other wildlife flourish in this habitat.



The wetland filtered out silt and other pollutants from runoff before discharging this clean water.

Wetland Functions and Values

✔ ***Flood conveyance*** — riverine wetlands and adjacent floodplains often form natural floodways: areas with large bodies of water and/or wetlands can reduce flood peaks by as much as 95 percent.

✔ ***Flood storage*** — wetlands may store water during floods, then slowly release it downstream.

✔ ***Sediment control*** — wetlands reduce floodwater velocity, causing suspended sediments to settle out in these areas rather than being carried downstream.

✔ ***Habitat for waterfowl, fish, and other wildlife*** — wetlands provide essential breeding, nesting, feeding, and escape habitat for many species of birds, mammals, fish, reptiles, and amphibians. Wetlands provide important food resources for large numbers of migratory birds and waterfowl. Many wetlands serve as spawning and nursery areas for fish.

✔ ***Habitat for rare and endangered species*** — some federal- or state-listed threatened and endangered species, such as the whooping crane and the prairie fringed orchid, are either located in Central States' wetlands or depend upon them.

✔ ***Water quality*** — wetlands contribute to improving water quality by trapping suspended sediments and removing dissolved nutrients and other chemicals. Wetlands have been constructed for treatment of wastewater and can remove up to 85 percent of the nutrient load.

✔ ***Water supply*** — wetlands are increasingly important as a source for replenishing ground and surface water, both of which have decreased because of urban growth and agricultural irrigation. In Kansas and Nebraska, wetlands are especially important in recharging underground aquifers used for water supply and irrigation. Other wetlands slowly discharge stored water into nearby streams to maintain a more constant water supply in the streams.

✔ ***Recreation*** — because of their natural abundance and diversity of wildlife, wetlands serve as sites for fishing, hunting, and observing birds and other wildlife.

✔ ***Food production*** — their high natural productivity makes wetlands potentially valuable as hay meadows, sources of food (such as pecans and mint), and sites for fish production and other aquaculture.

✔ ***Timber production*** — properly managed, forested wetlands can provide an important source of timber.

✔ ***Education and research*** — wetlands provide educational opportunities for nature observation and scientific studies.

✔ ***Open space and aesthetic values*** — wetlands often contain a wide variety of plants and animals that provide visual enjoyment and a sense of wildness.

CHAPTER 2

The Wetlands Project: Restoration and Creation

Determining whether an area is a wetland — and what type — can be difficult. The area may be drier than normal and, therefore, its vegetation may not clearly indicate whether it is a wetland. Determining whether it is still a functioning wetland becomes even more difficult when the area has been disturbed or degraded.

The Critical First Step: Evaluation

The essential first step in beginning a wetlands restoration or creation project is to evaluate the site to determine if it is presently a wetland. If it is, the next step is to evaluate whether it is in a natural or disturbed condition and how well it is providing the desired functions. Although it may seem apparent that a site is suitable for wetland restoration or creation, technical assistance should be obtained. The following sources of technical information should be consulted to determine if a site is a wetland and if it is suited for restoration or creation (see Appendix II for citations and availability).

- The wetlands delineation manual used by the Corps of Engineers and the U.S. Environmental Protection Agency. (Call the EPA Wetlands Information Hotline for up-to-date information, 1-800-832-7828.)
- A list of hydric soils from your county Soil Conservation Service (SCS) office.
- The SCS soil survey for your county.
- National List of Plant Species that Occur in Wetlands: Central Plains Region (for Kansas and Nebraska), or North Central Region (for Missouri and Iowa).
- National Wetland Inventory maps prepared by the U.S. Fish and Wildlife Service.
- Topographic maps from the U.S. Geological Survey; these show small-scale details of an area, including drainage patterns and contours.
- SCS Wetlands Inventory prepared for the 1985 Food Security Act.
- *Wetland Evaluation Technique* (1987); *A Method for Wetland Functional Assessment* (1983) or other methodologies for assessing functions and values.

Farming right up to the water's edge leaves a pothole with little value to nesting birds and may threaten water quality in the wetland.

This wetland restoration project was a joint project of the Iowa Department of Natural Resources and the U.S. Fish and Wildlife Service.

Design and Implementation

The success of a restoration or creation project will depend largely on careful planning and implementation. Once the site has been initially evaluated, the next steps are to:

1. Develop project goals and objectives.
2. Prepare a plan for achieving the project's goals and objectives.
3. Analyze the feasibility of reaching the goals.
4. Establish a set of procedures for implementation.

The last step — formulating procedures tailored to the site and project — is critical. Although you may gain useful information by studying similar projects, conditions vary by site and such differences must be considered in the project design.

Natural wetlands are difficult to duplicate because of their complex systems, functions, and biological interactions. The science of wetland restoration and creation is still evolving. Although engineers can design and build water management systems for wetlands, the resulting wetland may not achieve the same functions or values as a natural wetland because of differences in soils and the biotic community. However, some systems can be approximated and many functions and values can be restored.

Restoration rather than creation is usually preferable. Wetlands that have been degraded by such actions as clearing or construction of drainage ditches or fills offer the greatest opportunity for successful restoration because hydric soils and water relationships may still exist, as may some wetland plants and seeds, insects, and animals.

Techniques for Restoring and Creating Wetlands

Although restoration and creation of wetlands is a relatively new science with little scientific documentation, two types of wetland projects have been common in the Central States:

- Impoundments for waterfowl habitat, and
- Creation of marshes on dredged spoil areas along major rivers.

These and other wetlands restoration and creation projects revolve around the three essential components of a wetland: water, soil, and vegetation. Working with them is the core of any wetland restoration or creation project.

Information Needed in a Restoration or Creation Plan

1. Clear project goals: identify the purpose of the project, along with a site-specific plan;
2. Applicable laws and regulations, at all levels — federal, state, county, township, town, city;
3. For restorations, determination of original type of wetland present;
4. Boundaries of the restoration or creation area and the relationship of the area to surrounding areas, including buffer zones, and the watershed (a detailed map);
5. Proposed elevations and slopes (specifically of those areas to be altered);
6. A detailed map of the site showing pre- and post-project conditions;
7. Sources of water supply and connection to existing waters and uplands (including quantity and quality of the water supply and the frequency, duration and depth of inundation or extent of saturation);
8. Determination of soils present or those to be used, their characteristics, and the effects of the project on these soils;
9. Methods for planting vegetation if needed;
10. Methods to make maximum use of the seeds and other propagules (any part of a plant used to grow more plants) already in the existing soil;
11. Determination of plant materials needed, their sources, and storage requirements for propagules before planting time;
12. Determination of whether undesirable plant species are present or may later invade the site, and how they will be controlled;
13. Consideration of establishing protective buffer zones around the wetland site;
14. Measures for determining project success;
15. A monitoring program;
16. Guidelines for a possible mid-course correction if needed; and
17. A plan for project management and oversight (in some cases, projects will be designed to exclude the need for management).

Water

The most important factor in wetland restoration and creation projects is restoring or establishing water levels, including appropriate annual and seasonal variations that approximate natural conditions. Methods must be site-specific, but usually involve engineering solutions such as:

- Blocking surface and sub-surface drainage systems,
- Creating or re-creating water-holding depressions, or
- Excavating down to the seasonal water table.

Soil

The site should be characteristic of a wetland, with the types of soils usually found in low-lying wet areas. Characteristically, many of these soils have slow permeability (tight soils) or high organic content or, if highly permeable, have direct contact with a water table close to the surface. If hydric soils are not already present, management of water levels and water chemistry may be necessary to encourage their development. Alternatively, hydric soil types may need to be imported to the site to create optimum conditions for quickly establishing the desired wetland functions and values.

Vegetation

Vegetation diversity should be reestablished to encourage biological diversity and interactions between species that are important to the wetland's functions. Most plant species found in a nearby wetland area having similar soils and water conditions can be established, using one or more of several methods:

- **Seeding plants directly.** Seeding plants on the site is often the least expensive method of establishing vegetation. If possible, seeds should be col-

lected from wetlands in the project vicinity because they will be acclimated to the local area.

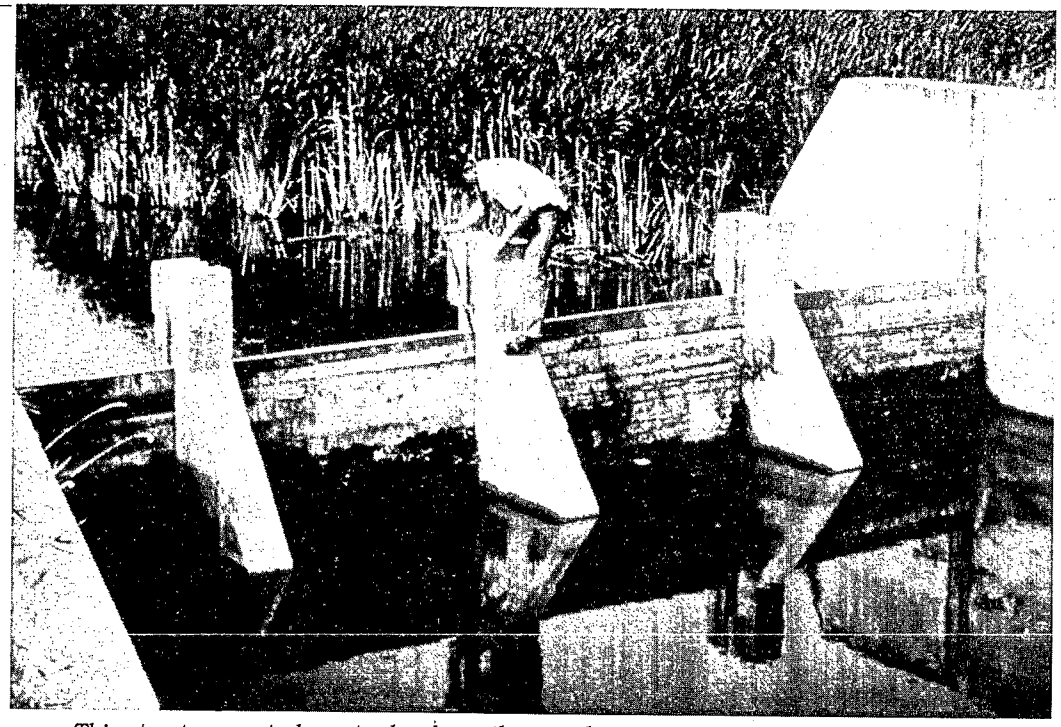
■ **Transplanting seedlings.** This is a good technique for many difficult-to-establish plants that would probably die if seeded directly. Seedlings of some species are often available through commercial suppliers who have the needed nursery or greenhouse facilities. Although this may be the most expensive method, this option is necessary for species that cannot be otherwise obtained or established.

■ **Transplanting established vegetation from another site.** A variety of perennial plants can be moved from another wetland area — and with them, soil micro-organisms, insects, seeds, and other plant propagules. This can be a difficult process, however, because plants are most successfully moved when dormant; yet it is difficult to find and identify many species when they are dormant because they may not be visible above ground.

■ **Using seeds existing in the soil (seed bank).** Using an existing seed bank may involve flooding formerly hydric soils, as in many restoration projects, or importing soil from another wetland. Hydric soils may be available from a permitted activity located in wetlands. The surface layer of hydric soil then can be removed before the permitted filling or excavation occurs and spread over the wetland being restored or created.

Considerations in determining the method of reestablishing vegetation include:

■ **Seed and transplant availability.** Only a few species are commercially available, leaving field collection as the only alternative for other desired species.



This structure controls water levels on the marsh to encourage growth of beneficial aquatic vegetation.

■ **Survival rate.** The plant survival rate resulting from seeding or transplanting will depend on many factors, such as length of time in and method of transport or storage, age of seeds, season planted, planting depth, soil and water conditions, weather conditions, and acclimation of the plants to local conditions.

■ **Damage to existing wetlands.** Caution should be taken to avoid significant damage to wetlands used as sources of plant propagation materials. In general, obtaining soil from functional, non-degraded wetlands should be avoided.

In addition to reconstituting the water–soil–vegetation makeup of the wetland, it also may be desirable to enhance habitat conditions by providing nesting, feed-

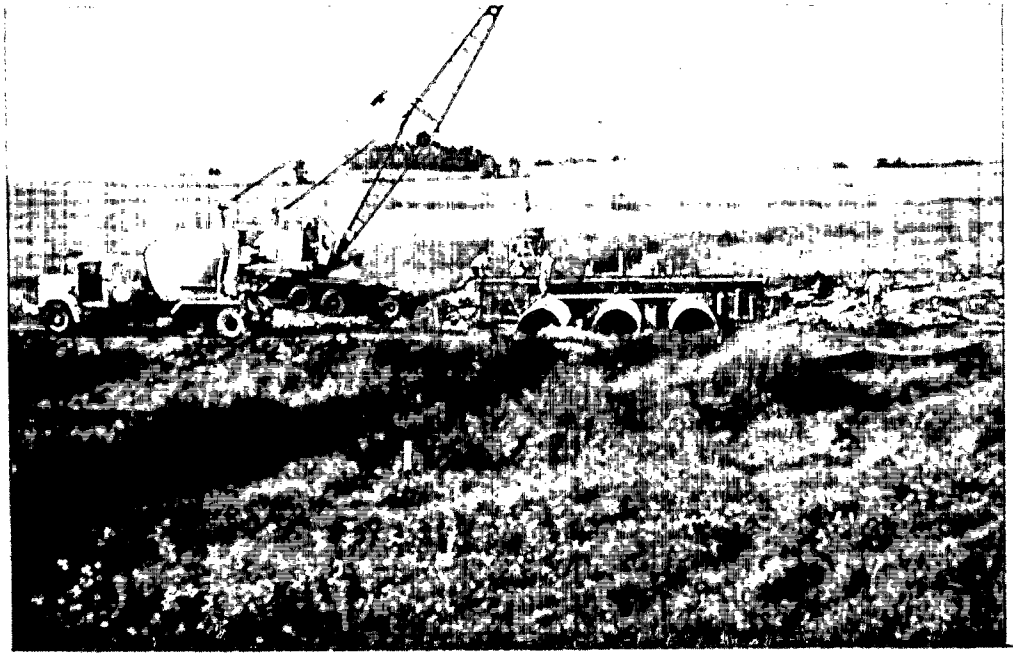
ing, and resting areas or structures, or protection from predators. Some habitat requirements may need to be met outside of the restored or created wetland. For example, creating or maintaining stands of grass around a wetland provides nesting cover for waterfowl. Providing for all needs of a wetland community will hasten the full development of the desired functions and values.

Funding a Wetlands Restoration or Creation Project

Just as costs vary according to site, so do the sources for funding wetland projects. Examples include:

- Local and state governments may fund wetland creation or restoration as part of development of parks and recreation areas.
- Federal programs provide money and assistance for restoring wetlands on private lands and for wetlands associated with wastewater treatment.
- Local civic groups and businesses may adopt specific wetland projects.
- Local, state, or national environmental organizations support wetlands work by offering technical expertise such as publications and referrals to consultants.
- Private organizations may fund wetlands creation and restoration. Ducks Unlimited, for example, funds waterfowl habitat projects.
- Foundations may award grants for wetland projects.
- Individuals may be required to bear the cost to restore wetlands as part of mitigation for an activity authorized by a Clean Water Act Section 404 permit.
- A project proponent for a major federal action requiring an Environmental Impact Statement may fund wetland creation or restoration as part of mitigation for the adverse effects of the project.

A water control structure being constructed in a wetland area.



Success or Failure?

Floods, droughts, and other weather extremes can affect the short-term success of a project. But in the long term, even the unexpected can usually be managed. Long-term success will be enhanced by good initial planning for the wetland site, managing the restored site and surrounding buffer areas, planning for unex-

pected events, and monitoring to determine your success in reaching your goals and objectives.

Your project will have a greater chance of succeeding if you incorporate the following:

- Basic scientific information concerning hydrology, soils, and vegetation and their effects on wetland restoration and creation;
- Accurate information about the site, including what species were originally present or could adapt to the proposed site conditions;
- Expertise in designing wetland systems;
- Expertise and supervision during the implementation phases of the project;
- Proper site conditions such as water quality, soil types, nutrient conditions, and grades or slopes; and
- Maintenance of appropriate water levels.

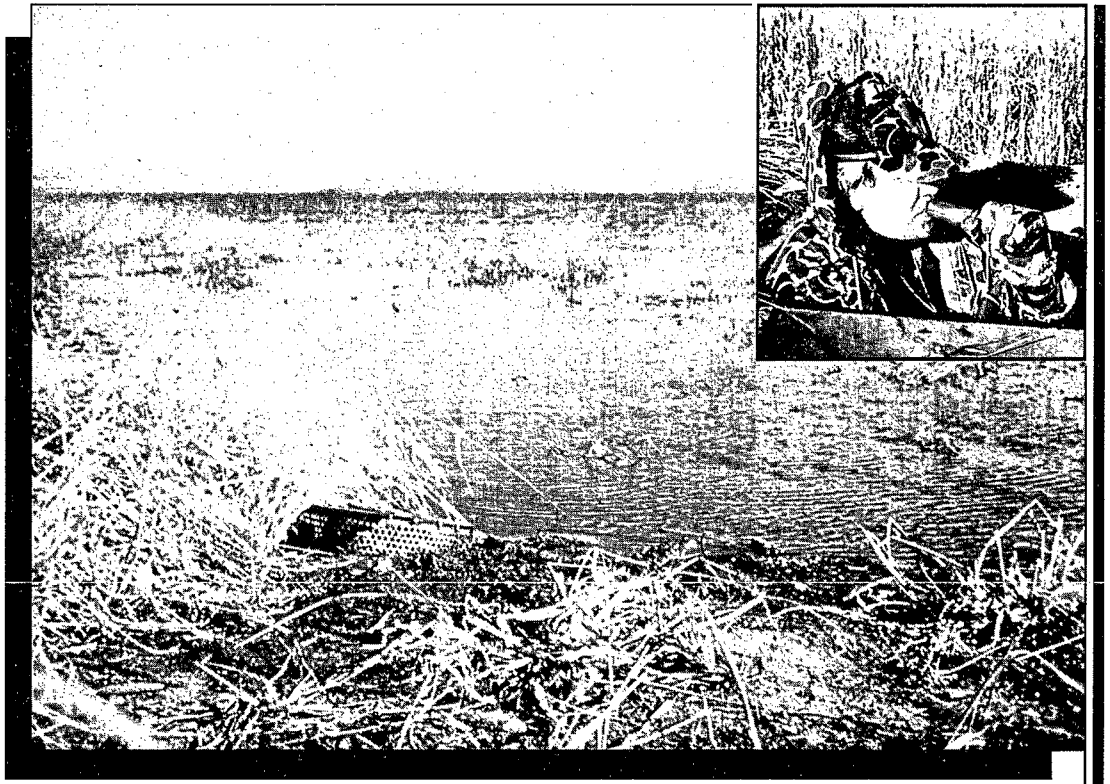
Projects also benefit by planning for:

- Invasion or overabundance of undesirable species; and
- Catastrophic events such as toxic spills, damage by off-road vehicles, and unusually severe floods, fires, or sediment deposition.

Project success is measured by the realization of the project's goals and objectives. However, it may take several years before a created or restored wetland develops to the point that it can fully achieve the plan's objectives.

Plans made to restore or create a particular wetland function may require different design criteria than plans to restore a different function. For example, a wetland designed for flood storage and flood conveyance may differ from one designed to protect waterfowl or to provide habitat for endangered species.

Careful evaluation and planning is the key to designing and completing a wetlands restoration or creation project. Wetlands are as diverse as the organisms that live in them and the humans who use them. Knowing how a site best fits the biological, geological, geographical and sociological systems is critical to assuring that the desired functions and values are achieved.



CHAPTER 3

Federal Laws to Consider When Creating or Restoring Wetlands

Birdwatching draws more than a million people to wetlands

Wetland restoration projects may be subject to federal laws protecting natural resources. The Clean Water Act, Section 404, regulates discharges of dredged or fill material into waters of the United States, including wetlands. Its primary goal is to restore and maintain the chemical, physical, and biological integrity of the nation's waters. To obtain a Section 404 permit, the project must also comply with other laws, including the National Environmental Policy Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act.

The Clean Water Act Section 404 Permit Program

Section 404 authorizes the **Corps of Engineers** to issue permits for discharge of dredged or fill material into wetlands or other waters of the United States, unless the action is exempt under the Act. A state may administer the Section 404 permits if the state has assumed the permit program from the Corps. However, the states of Iowa, Nebraska, Kansas, and Missouri do not administer the Section 404 permit program. The Clean Water Act does not categorically prevent all filling of wetlands but provides through Section 404 a mechanism for allowing some filling while preventing unnecessary loss or damage to wetlands and other water bodies. Wetland restoration projects that involve the placement of dredged or fill material into existing wetlands or other waters will require a Section 404 permit.

- **EPA**, in conjunction with the Corps, establishes guidelines for these permits. EPA has the authority to veto the Corps' decision if the proposed activity has an unacceptable impact on water supply, fish, shellfish, wildlife, or recreation.
- **The U.S. Fish and Wildlife Service** reviews permit applications to assure minimal adverse effects on wildlife and endangered species.
- **The state** in which the activity is located issues, denies, or waives certification that the activity complies with State Water Quality Standards as required by Section 401 of the Clean Water Act.

When a project involves damage to a wetland that cannot be avoided or minimized, the wetland impacts should be fully offset by wetlands restoration or creation. If a wetland restoration or creation project involves fill into a wetland, a Section 404 permit will be required, but a well-designed project should move through the permit process smoothly, providing the project complies with the guidelines.

The Permit Process

When application for a Section 404 permit is made to the Corps of Engineers, the Corps first confirms the need for an individual permit, then issues a *public notice* that contains such information as:

- commenting deadlines,
- the agency contact persons to whom comments and questions should be addressed,
- applicable laws and regulations,

- the type of permit requested,
- a brief description of the proposed activity,
- its location,
- its potential impacts, and
- the availability of a public hearing.

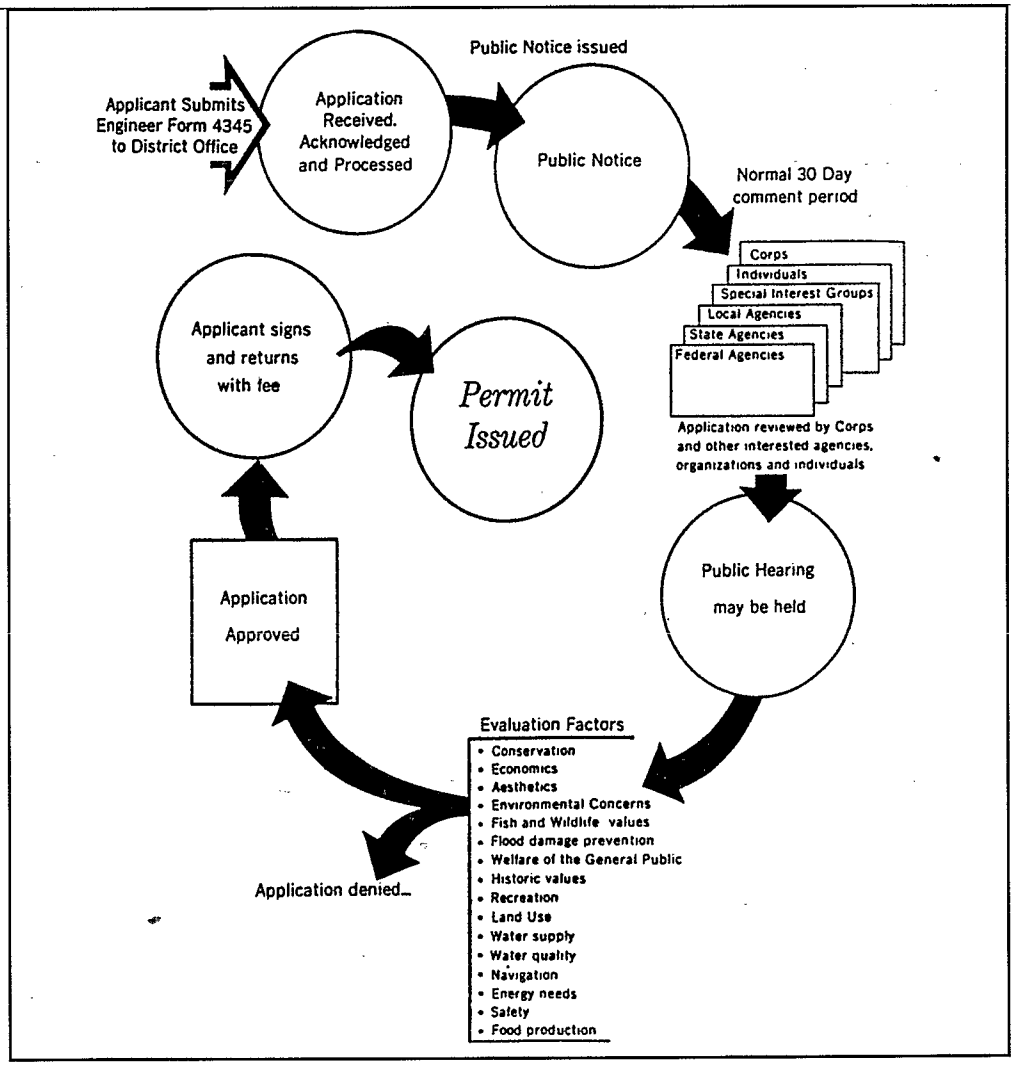
The public notice is sent to the post office, local newspapers, governmental offices, and concerned individuals. Public notices may be obtained by written request to the appropriate Corps of Engineers District office (see Appendix I for addresses).

The public notice provides for a comment period in which the Corps accepts comments on your proposed project. The comment period provides individuals, organizations, and government agencies the opportunity to submit comments about the project.

The following issues are often raised in comments on a wetlands project. You should be prepared to address these issues during your planning process:

- the purpose of the project,
- wetland functions and values gained or lost,
- direct, indirect, and cumulative impacts on existing wetlands and other water resources; the benefits to or adverse effects on other landowners or other public interests,
- whether or not you have considered available practicable alternatives which satisfy your basic project purpose and would have significantly less adverse impact on aquatic resource values, and
- other environmental laws.

Most wetland creation or restoration projects are permitted. However, if the Corps of Engineers determines that wetlands will still be degraded or lost even with steps being taken to minimize impacts, the permit will usually require compensative mitigation. Mitigation often involves the creation or restoration of additional wetlands.



Typical Corps permit review process. Source: U.S. Army Corps of Engineers.

In rare cases, a wetlands restoration or creation project may be denied a Section 404 permit when significant adverse impacts to an existing wetland or other water body are involved.

Generally, a project will be permitted, if:

- there are no available practicable alternatives that have less adverse environmental impact,
- toxic effluent standards or state water quality standards will not be violated,
- endangered species or their critical habitat will not be jeopardized,
- waters of the United States will not be significantly degraded, and
- appropriate and practicable steps are taken to minimize unavoidable adverse impacts.

The National Environmental Policy Act

The National Environmental Policy Act (NEPA) requires federal agencies to incorporate environmental considerations in their planning and decision-making through a systematic interdisciplinary approach. The NEPA process consists of an evaluation of the environmental effects of a federal undertaking including its alternatives. There are three levels of analysis:

- **Categorical Exclusion,** based on a previous federal agency determination that a category of projects will have no significant impact;
- **Environmental Assessment (EA)** to determine whether a project would significantly affect the environment; and
- **Environmental Impact Statement (EIS),** a detailed statement assessing the environmental impact of and alternatives to major federal actions significantly affecting the environment.

The EIS process is a comprehensive procedure that allows citizens, planners, and businesses to comment both in writing and through public testimony. As the permitting authority, the Corps of Engineers decides whether an EIS is required for a restoration project needing a Section 404 permit.

Among other issues, an EIS addresses any expected adverse environmental effects on wetlands. Normally, a mitigation plan will be proposed to reduce or offset the adverse effects. Mitigation includes:

- avoiding adverse impacts,
- minimizing adverse impacts, and
- compensating for adverse impacts that cannot be avoided.

The Endangered Species Act

The Endangered Species Act protects federally listed threatened and endangered species. This includes only species listed with the U.S. Fish and Wildlife Service. The Fish and Wildlife Service must be consulted for projects involving federal funding or permits including Section 404 permits required for wetland restoration projects.

The Endangered Species Act protects the species and its critical habitat. When these species use a wetland, the restoration of adjacent wetland habitats can provide an important buffer and add to the stability of the species' local population. When planning a restoration project, the anticipated effects on endangered species must be considered.

Note: *Each state usually has additional threatened or endangered species covered by state law.*

The Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act authorizes the U.S. Fish and Wildlife Service (FWS) and state agencies responsible for fish and wildlife resources to evaluate federal undertakings and non-federal actions needing a federal permit that would modify a water body. The FWS or state agency makes recommendations for mitigation and enhancement to the involved federal agency. In the case of a Section 404 permit, the FWS would make its recommendations to the Army Corps of Engineers or appropriate state agency (if the state has assumed operation of the 404 permit program).

The National Historic Preservation Act

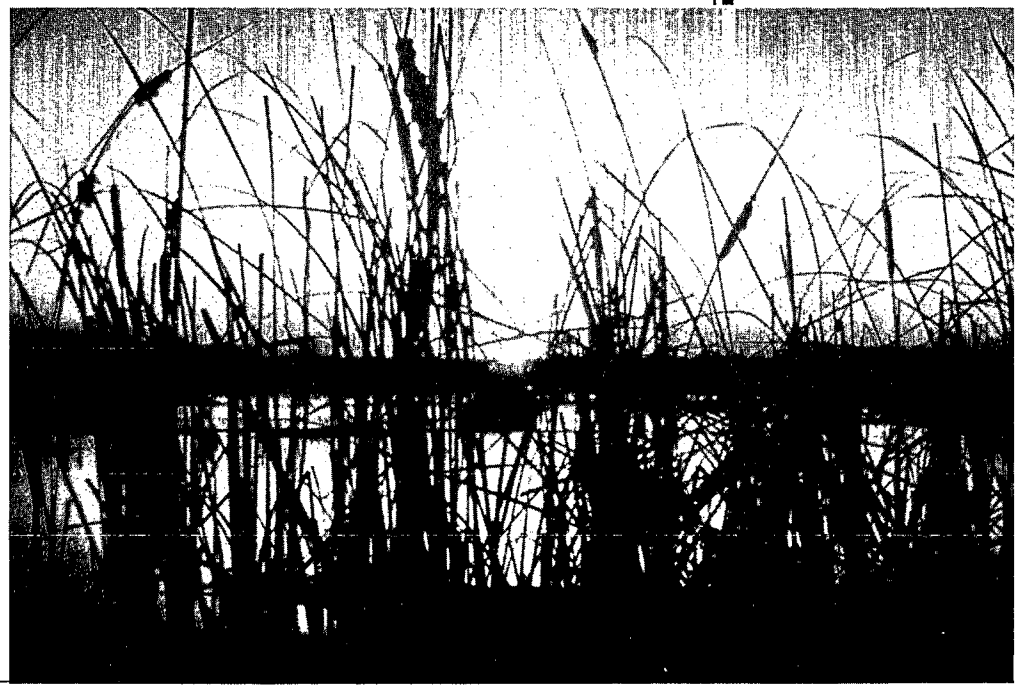
This Act requires an evaluation of historical or cultural resources to determine if a project may affect historical sites listed on or eligible for listing on the National Register of Historic Places. If historical or cultural resources may be adversely affected by a wetland restoration project requiring a Section 404 permit, the federal licensing or permitting agency consults with the State Historic Preservation Officer and National Advisory Council on Historic Preservation for recommendations on how to protect the resource.

Other Laws

Additional laws that affect activities in wetlands or provide funding for wetlands protection include:

- the Food Security Act of 1985
- the Food, Agriculture, Conservation and Trade Act of 1990
- the Emergency Wetlands Resources Act
- the North American Wetlands Conservation Act
- the Water Resources Development Act
- state and local laws, where applicable

More information regarding wetlands may be obtained by calling the EPA Wetlands Protection Hotline, 1-800-832-7828.



APPENDIX I

Directory of Primary Federal Agencies with Information Relating to Wetland Restoration and Creation

Regional

U.S. Environmental Protection Agency
Region 7
Wetlands Protection Section
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7042

U.S. Environmental Protection Agency
Environmental Research Laboratory
Wetlands Research Program
200 S.W. 35th Street
Corvallis, OR 97333
(503) 757-4600

U.S. Army Corps of Engineers
Waterways Experiment Station
3909 Halls Ferry Road
Vicksburg, MS 39180-6199
(601) 634-2513

U.S. Fish & Wildlife Service
National Wetlands Research Center
1010 Gause Blvd.
Slidell, LA 70458
(504) 646-7295

U.S. Fish & Wildlife Service
National Ecology Research Center
4512 McMurray
Ft. Collins, CO 80525-3400
(303) 226-9100

USDA Soil Conservation Service
Plant Materials Center
3800 South 20th Street
Manhattan, KS 66502
(913) 539-8761

USDA Soil Conservation Service
Plant Materials Center
R.R. 1, Box 9
Elsberry, MO 63343
(314) 898-2012

Iowa

U.S. Army Corps of Engineers
Rock Island District
Regulatory Functions Branch
Clock Tower Bldg., P.O. Box 2004
Rock Island, IL 61204-2004
(309) 788-6361

U.S. Fish & Wildlife Service
Rock Island Field Office
4469 48th Ave. Court
Rock Island, IL 61201
(309) 793-5800

USDA Soil Conservation Service
Engineering Section
693 Federal Bldg.
Des Moines, IA 50309
(515) 284-4260

Iowa Department of Natural Resources
Surface & Groundwater Protection Bureau
Wallace State Office Bldg.
9th & Grand Ave.
Des Moines, IA 50319
(515) 281-8869

Iowa Department of Natural Resources
Wildlife Bureau
Wallace State Office Bldg.
9th & Grand Ave.
Des Moines, IA 50319
(515) 281-6156

Kansas

U.S. Army Corps of Engineers
Kansas City District
Regulatory Branch
700 Federal Building
601 E. 12th St.
Kansas City, MO 64106
(816) 426-3645

U.S. Fish & Wildlife Service
Kansas State Office
315 Houston, Suite E
Manhattan, KS 66502
(913) 539-3474

USDA Soil Conservation Service
760 S. Broadway
Salina, KS 67401
(913) 823-4565

Kansas Department of Wildlife and Parks
Operations Office
RR 2, Box 54A
Pratt, KS 67124
(316) 672-5911

Kansas Department of Health & Environment
Building 740
Forbes Field
Topeka, KS 66620
(913) 296-1500

Missouri

U.S. Army Corps of Engineers
Kansas City District
Regulatory Branch
700 Federal Building
601 E. 12th St.
Kansas City, MO 64106
(816) 426-3645

U.S. Army Corps of Engineers
Rock Island District
Regulatory Functions Branch
Clock Tower Bldg., P.O. Box 2004
Rock Island, IL 61204-2004
(309) 788-6361

U.S. Army Corps of Engineers
St. Louis District
Regulatory Branch
1222 Spruce
St. Louis, MO 63103-2833
(314) 331-8575

U.S. Army Corps of Engineers
Little Rock District
Regulatory Branch
P.O. Box 867
Little Rock, AR 72203
(501) 324-5295

U.S. Army Corps of Engineers
Memphis District
Regulatory Branch
Clifford Davis Fed. Bldg., Room B-202
Memphis, TN 38103-1894
(901) 544-3471

U.S. Fish & Wildlife Service
Fish & Wildlife Enhancement
Columbia Field Office
608 East Cherry Street
Columbia, MO 65201
(314) 876-1911

University of Missouri
Gaylord Memorial Laboratory
Route 1, Box 185
Puxico, MO 63960
(314) 222-3531

USDA Soil Conservation Service
U.S. Department of Agriculture
Parkade Plaza, Suite 250
601 Business Loop 20 West
Columbia, MO 65203
(314) 876-0900

Missouri Department of Conservation
P.O. Box 180
Jefferson City, MO 65102-0180
(314) 751-4115

Missouri Department of Natural Resources
Missouri State Wetlands Hotline
1-800-334-6946
— or —
Division of Environmental Quality
Water Resources Program
P.O. Box 176
Jefferson City, MO 65102
(314) 751-2867

Nebraska

U.S. Army Corps of Engineers
Omaha District
Regulatory Branch
P.O. Box 5
Omaha, NE 68101-0005
(402) 221-4211

U.S. Fish & Wildlife Service
Nebraska Field Office
203 West 2nd St.
Federal Bldg., 2nd Floor
Grand Island, NE 68801
(308) 381-5571

USDA Soil Conservation Service
Federal Bldg., Room 345
100 Centennial Mall N.
Lincoln, NE 68508-3866
(402) 437-5334

Nebraska Department of Environmental Control
Surface Water Section
301 Centennial Mall South
Box 98922
Lincoln, NE 68509-8922
(402) 471-4700

Nebraska Game & Parks Commission
2200 N. 33rd St., Box 30370
Lincoln, NE 68503-0370
(402) 464-0641

APPENDIX II

Other Sources of Information

Publications

Adamus, P.A. et al. 1987. *Wetland Evaluation Technique (WET)*. Vol. II: Methodology. U.S. Army Corps of Engineers, Waterways Experiment Station, P.O. Box 631, Vicksburg, MS 39180-0631.

The Conservation Foundation. 1988. *Protecting America's Wetlands: An Action Agenda, The Final Report of the National Wetlands Policy Forum*. 1250 24th St., NW, Washington, DC 20037; (202) 293-4800.

Dahl, T.E. 1990. *Wetlands Losses in the United States – 1780's to 1980's*. U.S. Department of the Interior, Fish and Wildlife Service, Washington, DC.

Federal Highway Administration. 1983. *A Method for Wetland Functional Assessment*. Vol. II. Rep. No. FHWA-IP-82-24. Office of Research and Development, U.S. Department of Transportation, Washington, DC 20690.

Current *Wetlands Delineation Manual*. Call Wetlands Information Hotline: (800) 832-7828.

Lake Michigan Federation. no date. *Wetlands and Water Quality*. 59 E. Van Buren, Suite 2215, Chicago, IL 60605; (312) 939-0838.

National Wildlife Federation. 1987. *Status Report on Our Nation's Wetlands*. 1400 16th Street, NW, Washington, DC 20036; (202) 797-6800.

National Wildlife Federation. 1989. *A Citizens' Guide to Protecting Wetlands*. 1400 16th Street, NW, Washington, DC 20036; (202) 797-6800.

U.S. Environmental Protection Agency. 1989. *Wetland Creation and Restoration: The Status of the Science Vol. 1 and 2*. EPA 600/389/038a, October 1989. Center for Environmental Research and Information, P.O. Box 12505, Cincinnati, OH 45212; (513) 569-7562

U.S. Fish and Wildlife Service. 1988. *National List of Plant Species That Occur in Wetlands: North Central* [Iowa and Missouri]. National Technical Information Service, 5285 Royal Road, Springfield, VA 22161; (800) 336-4700.

U.S. Fish and Wildlife Service. 1988. *National List of Plant Species That Occur in Wetlands: Central Plains* [Kansas and Nebraska]. National Technical Information Service, 5285 Royal Road, Springfield, VA 22161; (800) 336-4700.

Maps and Other Documents

For the availability of:
National Wetland Inventory Maps and Topographic Maps

Contact:
Mid-Continent Mapping Center-ESIC
U.S. Geological Survey
1400 Independence Road,
Mail Stop 231
Rolla, MO 65401
(314) 341-0851 (ask for prices)

University of Nebraska
Conservation and Survey Division
Lincoln, NE 68588-0517
(402) 472-3471

For the availability of:
County Soil Survey, County Hydric Soils list, or Soil Conservation Service Wetlands Inventory Maps

Contact:
your County Soil Conservation Service office