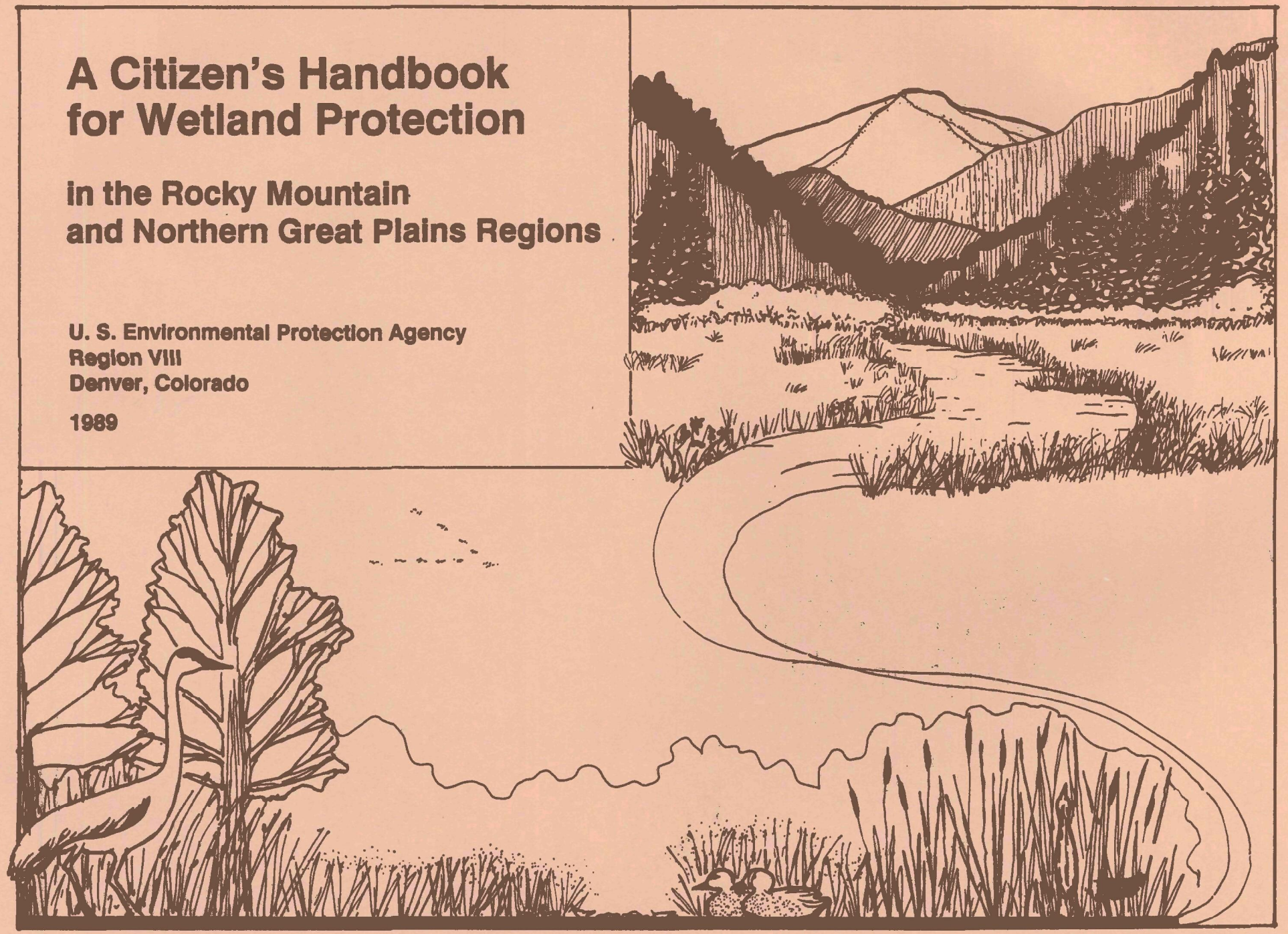
A Citizen's Handbook for Wetland Protection

in the Rocky Mountain and Northern Great Plains Regions

U. S. Environmental Protection Agency
Region VIII
Denver, Colorado

1989



A Citizen's Handbook for Wetland Protection in the Rocky Mountain and Northern Great Plains Regions

U.S. Environmental Protection Agency
Region VIII

1989

by Dr. David J. Cooper

EPA Project Coordinator: CeCe Forget

Credits:

Illustrations: Joan Hirschman

Photographs: David J. Cooper, except as noted

Layout: Sally L. White

Table of Contents

INTRODUCTION

Did you know that wetlands are fascinating ecosystems, critically important for providing you with clean water? It's true. Wetlands can remove sediment, excess nutrients such as some nitrogen compounds, heavy metals and other pollutants, and play a key role in maintaining high quality water. Former EPA Administrator Lee Thomas stated that "if you don't protect wetlands you're eventually going to have major problems in water quality – eventually that translates into health issues". Wetlands also benefit humans by providing flood control and ground water recharge.

In addition, wetlands are the most important habitat for waterfowl, fish, and most species of mammals and birds in the semi-arid West. Because water is the most important factor that limits growth, complex ecosystems with intricate food chains of plants and animals occur in wetlands. Prolific biological activity makes wetlands among the world's most productive and important ecosystems. You probably are surprised that wetlands perform all these important functions when you may have thought that they were wastelands.

Natural riparian wetlands are very dynamic ecosystems. Many have braided channels and complex vegetation patterns. Cherry Creek, Colorado.

This booklet is provided to help people living in the Rocky Mountain and northern Great Plains regions understand: (1) what wetlands are, (2) why they are vitally important, and (3) how you can help protect them. It describes the different types of wetlands that occur in our region [the Environmental Protection Agency's (EPA) Region VIII includes Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming], the functions which make wetlands valuable, and government regulations affecting wetlands. It also suggests a number of ways that you and others can become involved in wetland protection.

ECOLOGY OF WETLANDS

Wetlands are lands where the soil or substrate is at least periodically saturated with water during the growing season. Wetlands often form the transition between well-drained uplands and aquatic habitats, such as streams and lakes. Soil saturation occurs for a long enough period of time to create anaerobic (lacking free oxygen) conditions in the soil. Only plant species adapted to living in anaerobic soils can survive in wetlands. Wetlands always have at least one, and usually all three, of the following characteristics:

(1) the water table is usually at or near the ground surface for at least a portion of the growing season, or there may be shallow standing water;

(2) the substrate is predominantly an undrained, wet soil (hydric soil) which is anaerobic in the upper part of the soil; and

(3) this soil supports vegetation dominated by plants adapted to the wetlands environment (hydrophytes).

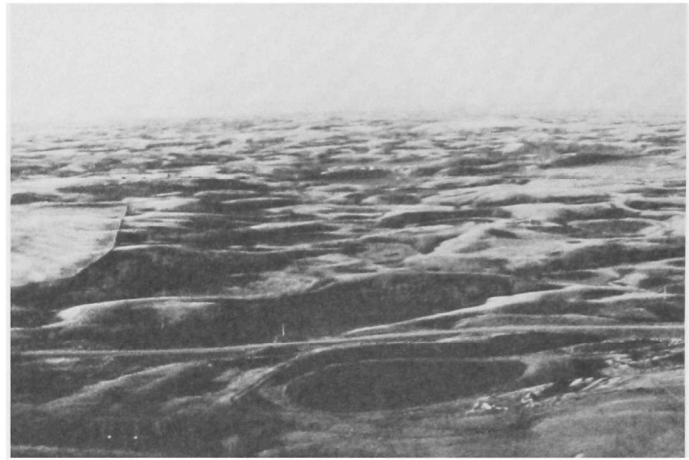
Federal regulatory agencies have adopted the following definition of wetlands: "Wetlands consist of areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions".

This definition stresses that soil saturation in the rooting zone controls the types of plants and animals that can live in wetlands and most of these species occur only in wetlands. Because the wetland environment is so different from the environment of drier uplands, many unique processes occur such as peat formation and water quality control.

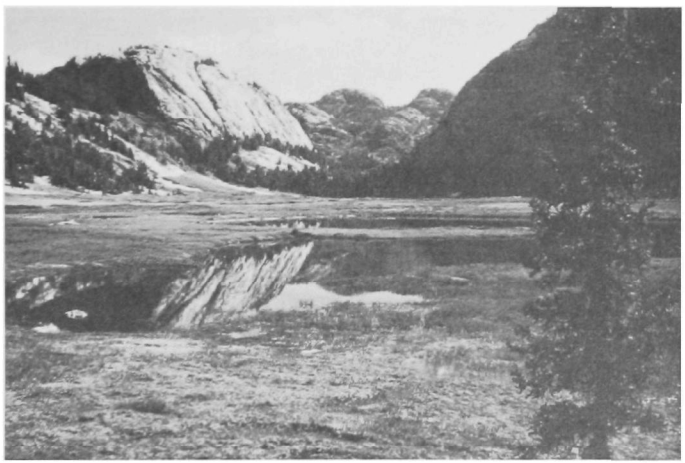
TYPES OF WETLANDS

Because the climate and landscape are so varied, many different types of wetlands occur in our region. Elevation, topography, position relative to mountain ranges, temperature, and characteristics of the water sources vary widely across the region.

On the **glaciated prairie** region of the northern Great Plains, prairie potholes are abundant. Prairie potholes are landscape depressions that hold surface water temporarily, seasonally or permanently, or are fed by ground water. Most were formed by glaciation. Prairie potholes range in size from less than one acre to hundreds of acres and the size of many potholes depends partially upon precipitation in the winter and spring.



Prairie potholes — glaciated prairie wetlands, North Dakota. Photo courtesy of U.S. Fish and Wildlife Service



High mountain wetland, Wyoming.

In the **high mountains**, "montane" wetlands occur where glacial erosion and deposition have created valley bottoms that are nearly level. Water tables in these areas are seasonally or permanently high. Stream systems in deeply incised mountain valleys generally have narrow floodplains and wetlands occur as narrow bands along their banks. Snowmelt basins at the highest elevations usually support extensive wetlands.

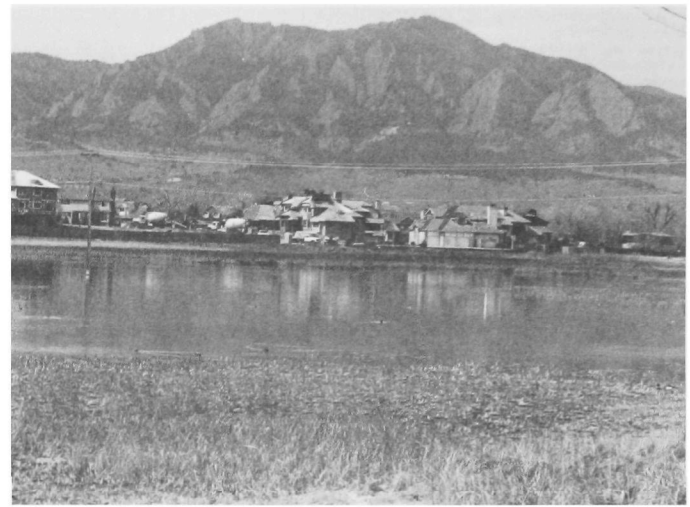
Intermountain basin wetland, Colorado.

Riparian wetlands occur along rivers and streams in the lower mountains, foothills, Great Plains and intermountain basins. These wetlands are distinct because the energy of moving water adds the dynamic aspect of erosion, sediment deposition and seasonal flooding that can shape and characterize the environment. Riparian wetlands are the only native forests on most of the western Great Plains and are dominated by species such as cottonwood and willow trees, willow shrubs, alder, birch, box elder and ash.

Basins between the mountain ranges receive relatively little precipitation compared with the mountains. For example, portions of the San Luis Valley in southern Colorado and the Bighorn Basin of northwestern Wyoming receive an average annual total of less than 7 inches of precipitation. However, numerous streams draining the surrounding mountain ranges enter the basins, and the level topography inhibits runoff. Ponds occur and high water tables extend over large areas supporting extensive wetlands. Many National Wildlife Refuges (NWR) in the Rocky Mountain West are intermountain basin wetlands (for example, Monte Vista and Alamosa NWR in southern Colorado).

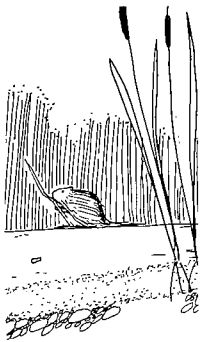
Riparian wetland, Missouri River, Montana.
Photo courtesy of Kelly Drake.

Wetlands also occur in **urban** areas of all sizes and densities. Urban wetlands are either remnants of wetlands that existed prior to settlement or have been formed since urbanization. Water diverted from streams and other sources for municipal uses, such as lawn watering, and increased runoff from impervious surfaces, such as paved streets, roofs and parking lots may create and support wetlands.



Urban wetland, Boulder, Colorado.

WETLAND FUNCTIONS AND VALUES



Wetlands not only are diverse and interesting elements of our Nation's landscapes, they also provide a number of important, but often unrecognized functions that are very valuable to our society. It is their functional values that make it imperative to preserve them. Many of these functions are not easily seen in action, but once they are understood, wetlands take on a critical new sense of value.

Water Quality Improvement

One of the most important, but unseen, wetland functions is **water quality improvement**. Many wetlands occupy depressions where runoff from higher areas is concentrated. Water spreads out and slows down in wetlands and suspended sediment settles out. Nutrients, toxic pollutants and other chemicals that can cause water quality deterioration are often attached to sediment and are removed from the water. Wetland plants also can absorb nutrients, metals and other substances, and fix them into organic matter that later may be stored in the soil.

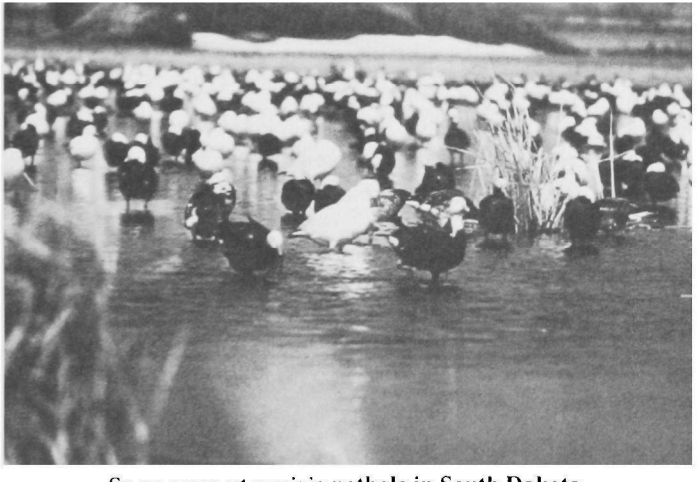
In excessive amounts, nutrients such as phosphorus and nitrogen may become pollutants by causing algae blooms. Bacterial decomposition of algae can lead to low oxygen concentrations in lake and stream water that can harm many forms of aquatic life. Wetlands can remove nutrients from water before they enter the lakes and streams.

Heavy metals, such as lead, zinc, copper, cadmium and chromium, are introduced into streams and wetlands from abandoned and active metal mines, and runoff from urban, commercial, industrial and agricultural areas. Dissolved metal concentrations in 1,400 miles of Colorado waterways (7.5 % of the total of 18,500 miles of streams and rivers in Colorado) exceed basic standards for aquatic life, agricultural use, or domestic water supply. Many of these streams contain no aquatic life and no fisheries. Water passing through wetlands receives filtration that can improve water quality by removing some of the sediment, nutrients, metals, herbicides and pesticides. Water quality improvement benefits aquatic life and all downstream human users and is achieved at no cost to the public. Wetlands have been constructed in many areas as tertiary treatment facilities for municipal waste water.

Fish and Wildlife Habitat

Wetlands are important **fish and wildlife habitat** because water is essential for the survival of virtually all species. Wetlands provide attractive food sources, protection from weather and predators, resting sites, reproductive sites, and molting grounds for wildlife.

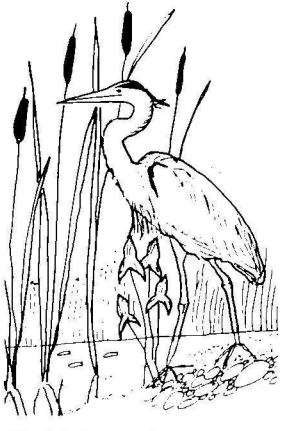
Fish, aquatic insects, mollusks and waterfowl (ducks, geese, shorebirds) in particular require wetlands for survival. Many other animals, such as amphibians, require wetlands at certain stages in their life. Fish species, such as northern pike, yellow perch, and bluegills, depend upon wetlands for spawning and nursery grounds. Wetlands are critical habitat for endangered animal species such as grizzly bears in Montana and whooping cranes and bald eagles on the Great Plains.



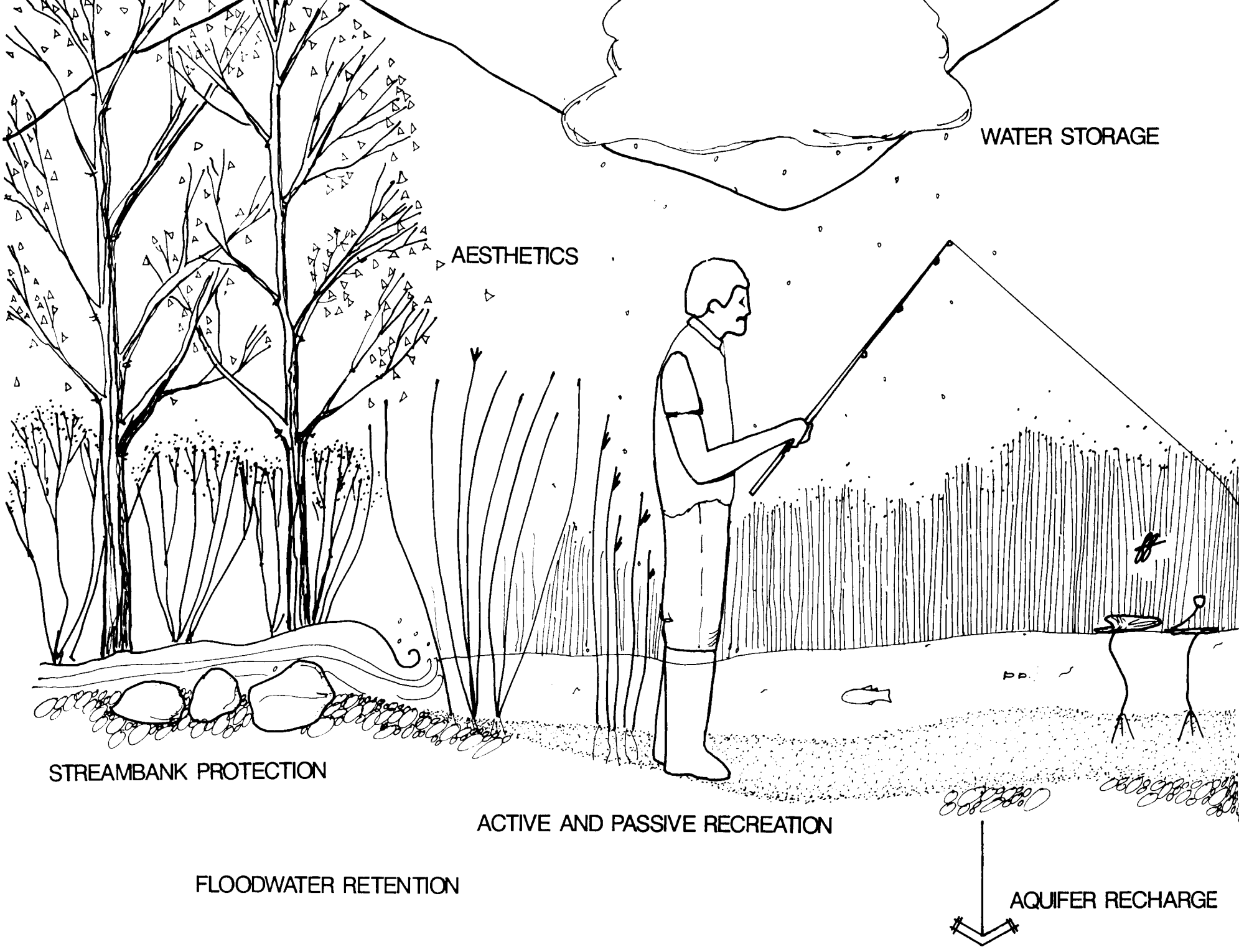
Snow geese at prairie pothole in South Dakota. Photograph courtesy U.S. Fish and Wildlife Service.

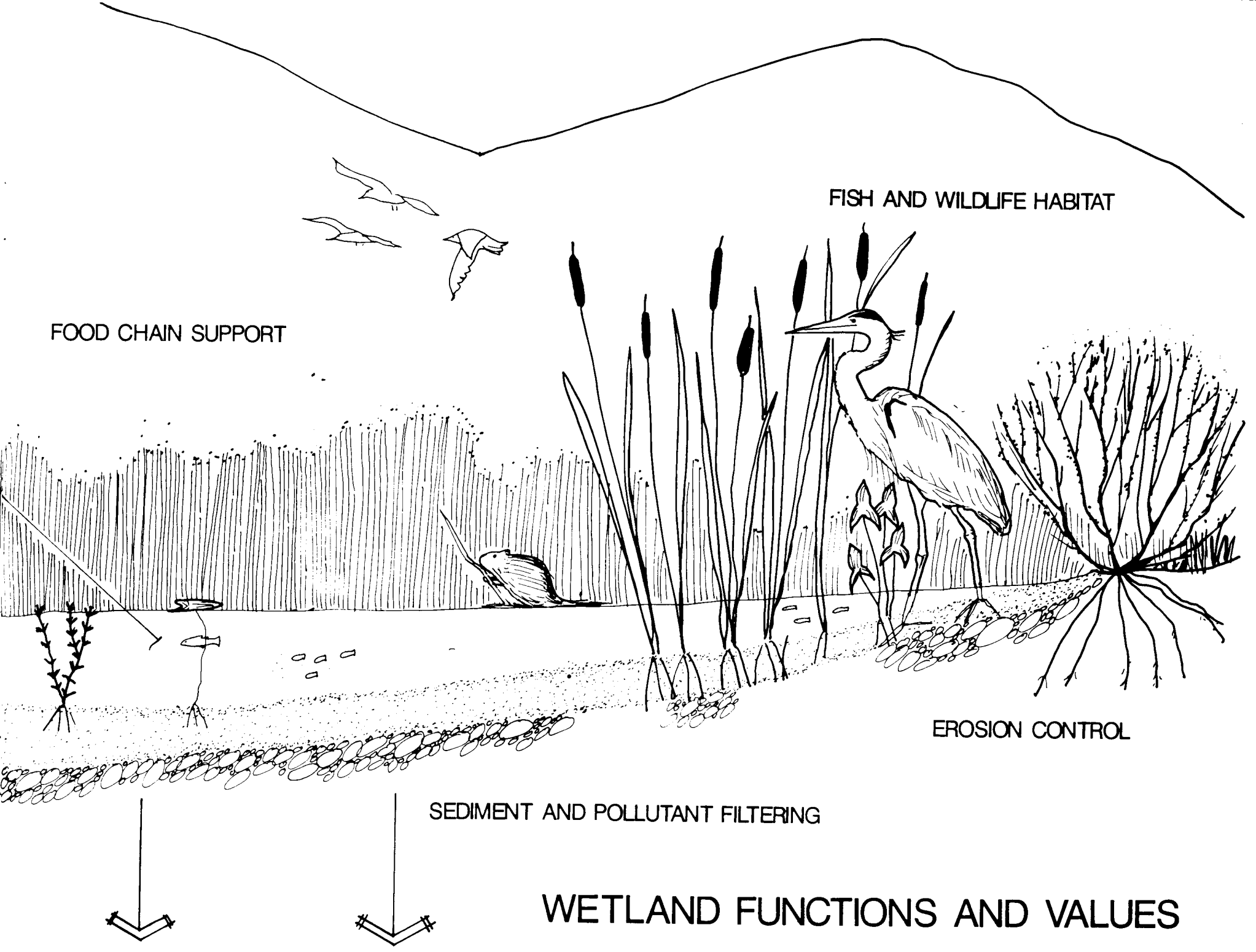
North Dakota, with abundant prairie pothole wetlands, is the leading duck producing state in the nation. Yet over 50 % of North Dakota's wetlands have been drained primarily to make land available for agriculture.

Aquatic Food Chain Support



Wetlands provide vital support for **aquatic food chains.** The energy and nutrients stored in wetland plants become available to the variety of animals in the food chain. For example, leaves falling from trees become an important food source for aquatic insects in streams. Large trees that fall into streams are essential for creating and maintaining a diversity of habitats, such as pools and riffles within stream ecosystems. Food chains connect different ecosystems and the plants and animals living in them to each other. Food chains may tie a forest many miles upstream to wetlands in another state or region. They illustrate the interconnectedness of all living organisms and their environments.


WATER STORAGE
AESTHETICS
STREAMBANK PROTECTION
ACTIVE AND PASSIVE RECREATION
FLOODWATER RETENTION
AQUIFER RECHARGE



WETLAND FUNCTIONS AND VALUES

Flood Attenuation and Storm Water Detention

Wetlands that occupy landscape depressions and level terrain naturally receive runoff water from uplands and overbank waters from flooding rivers and streams. These wetlands can detain large volumes of water, slowly releasing it to surface or ground water providing important **flood attenuation and storm water detention.** Watersheds with 40 % of their land area as lakes and wetlands have flood peaks only 20 % as large as those in basins with little or no wetland area.

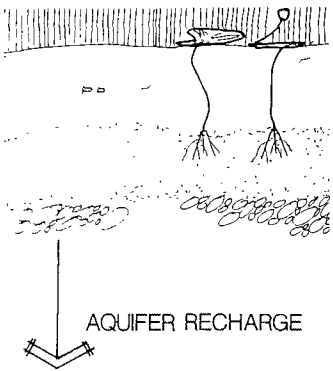
When wetlands are filled, ditched, paved or otherwise modified, storm water quickly runs to streams and rivers resulting in higher flood peaks. Many streams now have higher flooding potentials due to wetland destruction in their basin. Predicted 100-year flow volumes for streams in urban environments have, in some areas, more than doubled after wetlands have been filled and large impervious areas created. The importance of wetlands in flood attenuation was dramatically documented during a 1982 failure of the Lawn Lake dam in Rocky Mountain National Park, Colorado. Approximately 29 million cubic feet of water rushed down a steep canyon and entered Horseshoe Park, a large wetland, where the wall of water was reduced from 22-28 feet to 10 feet in height and the water velocity was reduced from 9 to 2 miles per hour. This flood attenuation allowed time for warnings to be forwarded to the town of Estes Park, Colorado, just downstream from Horseshoe Park, and no loss of life occurred in Estes Park.

Shoreline Anchoring

Plant roots, particularly those of shrubs, trees and mats of spreading sedges, rushes and grasses, stabilize soil along streambanks of rivers, streams and lakes providing important **shoreline anchoring**. Shoreline erosion threatens adjacent wetlands and uplands and their value as high quality aquatic and terrestrial wildlife habitat. This function also is of economic importance, because stream and river banks are very costly to stabilize once rapid erosion begins.

Shoreline anchoring by dense growth of willows along the Blue River, Colorado.

Ground Water Recharge and Discharge



Wetlands are accumulation areas for surface runoff water and may function to recharge underground aquifers. Ground water aquifer recharge is of regional importance. Ground water discharge occurs where the water table intersects the ground surface. These seeps and springs can support many diverse types of wetlands.

Recreation, Education, Nature Study and Natural Areas

For many people, the most personal value of wetlands and adjacent waterways is for **recreation, education, nature study and natural areas.** Fishing, boating, bird watching, photography and hunting provide many hours of enjoyment and pleasure for many people. These activities are also very important to the regional economy. Many times wetlands are the last portions of the landscape to be developed or modified in the course of human settlement and consequently attract wildlife and people interested in natural history and beauty.

Wetlands have great aesthetic quality because they combine the elements of land and water. This is particularly important in the semi-arid West where water can be scarce. Usually so many different forms of aquatic and terrestrial, plant and animal life occur in wetlands that they are vital outdoor education facilities. If wetlands are relatively undisturbed they provide natural laboratories for studies by school groups and the public of all ages. Wetlands that have interpretive centers and boardwalks to allow public access are extremely popular.

The value of wetlands for hunting and fishing is well-known. These sports are not only important for human recreation, but provide important economic stability for many areas.

Summary of Wetland Functions and Values

Important wetland functions such as water quality improvement, erosion control through stream and lake shoreline anchoring, flood peak reduction, essential fish and wildlife habitat, ground water recharge and discharge, and passive and active recreation opportunities play vital roles in many aspects of our lives. These functions are provided at no cost to taxpayers. By helping to maintain high quality surface and ground water supplies, wetlands provide a basic necessity for all life forms and help ensure that economic and recreational opportunities and human health are not diminished. Almost all activities associated with human life require clean water.

WETLAND LOSSES

Wetland losses in our area and the entire U.S. have been substantial. In North and South Dakota, prairie pothole wetlands originally covered approximately 7 million acres. Today only slightly more than 3 million acres remain. Most of this loss is due to agriculture and irrigation and flood control projects. Many areas have been converted to cropland, while other areas have been badly overgrazed by livestock.

Riparian ecosystems have been so mistreated that they probably represent the most modified land type in the West. In Colorado, more than 90 % of the Colorado River's riparian wetlands have been destroyed. Dam construction has severely modified the natural hydrologic regime of many streams making it impossible for many native plant species to reproduce and exotic plant species such as tamarisk and Russian olive have invaded. In addition, sand and gravel mining along rivers has taken a mighty toll of riparian wetlands, particularly near urban and industrial centers. Wetlands in urban areas have been impacted due to increasing development pressure for residential housing, industry, and commercial facilities.

Mountain wetlands are impacted by ski area development, road and highway construction, water diversion projects, mining, grazing and many other uses. Land-use patterns are historical and complex in many instances. Cumulative impacts by a multitude of projects are usually unforeseen, but can result in widespread wetland destruction.

The region cannot withstand additional losses of wetlands vital to water quality control, flood attenuation and wildlife species. In most instances, wetland losses can be prevented by careful planning, and the loss of wetland functions can be averted.

Wetland loss due to road construction through a prairie pothole, North Dakota.

REGULATIONS FOR WETLAND PROTECTION

Government regulations have been developed to protect the high quality of waters of the U.S. and to ensure that wetland functions are maintained. With the1972 passage by Congress of the Amendments to the Federal Water Pollution Control Act, which is now called the Clean Water Act (CWA), wetlands were determined to be waters of the United States and were given protection under the more comprehensive CWA. The goal of the CWA is, "to **restore and maintain the chemical, physical, and biological integrity of the Nation's waters**" (33 U.S.C. 1251(a)). This goal is key to understanding how broad the Act is. The CWA prohibits the discharge of pollutants into waters of the U.S. except where permitted by the Act.

A knowledge of the main sections of the Clean Water Act will help you understand how you can use the CWA to protect wetlands. Section 301 of the Act prohibits unpermitted discharges of any pollutant into waters of the United States, unless otherwise permitted by the Act. Under this section it is illegal to discharge material into wetlands or otherwise use wetlands to discharge wastes. There are two main exemptions to Section 301.

(1) Section 402 creates the National Pollutant Discharge Elimination System (NPDES) which requires permits for discharges of wastes to waters of the United States from industrial and sewage treatment facilities and similar facilities. This permit program is generally administered by states with oversight by the Environmental Protection Agency.

(2) Section 404 provides a permit program for the discharge of dredged and fill material into waters of the United States. A Section 404 permit is required for the discharge of dredge or fill material into waters of the United States.

The 404 Permit Program

The Corps of Engineers and the Environmental Protection Agency jointly administer the Section 404 permit program. The COE reviews permit applications, publishes public notices, receives review comments, issues permits and provides enforcement for illegal activities (see Section 404 Permit Process Flow Chart). The EPA developed the Section 404(b)(1) guidelines which the COE must use to determine the environmental impacts of a proposed permit activity. Section 404(c) of the CWA gives EPA veto power over COE issued permits for filling a particular wetland when EPA determines that it will have an "unacceptable adverse effect" on the environment. Other agencies also review Section 404 permits and the public has the opportunity to comment on these permits. The U.S. Fish and Wildlife Service and state wildlife agencies ensure that possible effects on wildlife have been considered. The state health or water quality agency can ensure that water quality issues are addressed. Section 401 of the CWA provides every

state with the right to veto a Section 404 permit if it can show that water quality will be impaired.

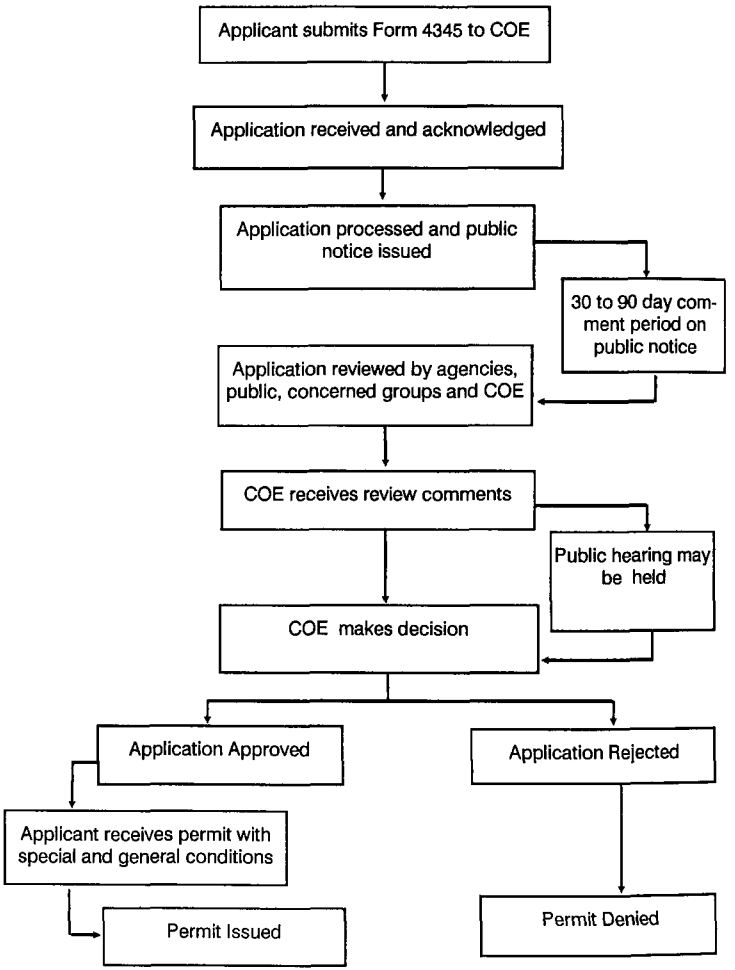
The 404(b)(1) guidelines allow EPA to identify, in advance of a permit application, sites that are unsuitable for the disposal of dredged or fill material. Under the advanced identification process, all wetlands in a region are mapped and a determination is made identifying those wetlands which are suitable and unsuitable for receiving discharges of material. Through the advanced identification process the most important aquatic and wetland resources in a region can be identified and preserved.

The Section 404 Permit Process

Applications for Section 404 permits must include a detailed description of the proposed activity, including the dimensions of structures, fills and excavation, the purpose, need and intended use of the proposed activity, and the type and quantities of dredged or fill material to be used.

Following submittal of a completed application to the appropriate COE district office, a public notice describing the proposed activity is issued (usually within 15 days), and a 30 to 90 day comment period follows (see Section 404 Permit Process Flow Chart). Public notices are posted at many federal government offices, such as post offices in the region of the proposed activity. To keep informed of proposed activities that threaten wetlands, it is necessary to determine where COE public notices are posted in your area. **Citizens can also request to receive COE public notices.**

THE SECTION 404 PERMIT PROCESS



All permit applications are available to the public. However, to read an entire permit application may require a trip to the COE District office. The application is reviewed by the COE, the public, special interest groups and local, state and federal agencies. All comments are considered and a public hearing may be held if significant impacts may occur and if a substantial number of individuals or agencies request a hearing.

Several different types of 404 permits exist. Section 404(e) of the Clean Water Act authorizes the issuance of **nationwide** and **general permits** for dredge and fill activities that meet three conditions:

(1) the activities are similar in nature (e.g. a number of minor fillings associated with highway maintenance);

(2) the activities will have only minimal adverse environmental effects when performed separately; and

(3) the activities will have only minimal cumulative adverse effects on the environment.

In EPA's Region VIII, activities that will result in the filling of a wetland or a portion of a wetland that is less than one acre in size may be covered under nationwide permits. However, nationwide permits only cover activities that will have minimal adverse effects on the environment. Many discharges into wetlands affect areas larger than one acre, and/or have significant adverse effects on the environment. These activities must be individually assessed and the 404 **individual permit** process provides the mechanism for assessing these effects.

Section 404(f)(1) describes a number of activities that are potentially exempt from the Section 404 permit requirements. These include:

(1) normal farming, forestry and ranching practices, except activities that would change wetlands in their natural state into a different type of use;

(2) maintenance and emergency reconstruction activities;

(3) construction or maintenance of farm ponds and irrigation ditches; and

(4) construction and maintenance of farm or forest roads.

Section 404(f)(2) however, limits the above uses to activities that will not change the flow, circulation or reach of the waters. Activities that will cause these types of changes are required to obtain a Section 404 permit.

The decision on whether or not to issue a permit is based on several criteria. First, the COE must evaluate each permit application using the Section 404 (b)(1) guidelines. A public interest review process occurs next and evaluates the probable impacts, including cumulative impacts of the proposed activity and its intended use on the public interest. The review process includes consideration of fish and wildlife values, wetlands, floodplains, local and regional land use policies, recreation opportunities and other factors that affect the needs and welfare of the people. Wetland functions and values that will be lost due to a proposed project must be weighed against the project benefits so that the review process can be balanced.

Four general criteria provide guidance for regulators in determining whether a proposed project is in the public interest. These are:

(1) the relative extent of public and private need for the proposed project;

(2) the availability and practicability of alternative sites and methods for the project;

(3) the extent and permanence of public and private beneficial and detrimental effects; and

(4) whether or not the project is "water-dependent". Water-dependent activities are activities which must be located in or close to the aquatic environment and include bridge crossings of streams and rivers as well as marinas on lakes and reservoirs.

EPA's Section 404(b)(1) guidelines require that five general conditions be satisfied. No permit should be issued:

(1) if there is a practicable alternative which would have less impact;

(2) if the discharge would violate any applicable legal standards;

(3) if it would result in significant degradation of the waters of the United States;

(4) if the project is not water-dependent; and

(5) unless appropriate and practicable steps have been taken to minimize potential adverse effects.

A number of other federal, state and local laws also are incorporated into the Section 404 permit review process. Proposed activities that will not comply with the requirements of any of these laws can result in denial of a permit application. These laws include:

- The Endangered Species Act
- The National Environmental Policy Act
- The Wild and Scenic Rivers Act
- The Fish and Wildlife Coordination Act
- The National Historic Preservation Act
- other federal, state and local laws and regulations.

The National Environmental Policy Act (NEPA) requires federal agencies to evaluate the environmental consequences of their actions, consider all feasible alternatives, incorporate mitigating measures into projects when possible and involve other interested state, federal, and local officials as well as the public. Under NEPA every major federal action that will significantly affect the quality of the human environment must be evaluated through an Environmental Impact Statement (EIS). The EIS provides an analysis of a broad range of possible environmental effects by a proposed project and compares different proposed project alternatives. The EIS must also consider not only the immediate project impacts, but also all reasonably foreseeable secondary and cumulative effects. In some situations, Section 404 permits are considered major federal actions. Thus, NEPA may apply to wetland permitting programs and an EIS may be required if a significant environmental impact is expected.

The Endangered Species Act provides protection for species whose continued existence is in jeopardy. The Act prohibits taking of threatened or endangered species and "taking" is broadly defined to include habitat destruction. Wetlands are critical habitat for several endangered species, for example the whooping crane and bald eagle. Thus, actions in waters of the U.S. which could affect the known habitat of these species must be considered.

Citizen Involvement

The public review process is an essential part of the evaluation of every Section 404 permit application and a permit can be issued only after notice and opportunity for public input. In reviewing public notices, you should look at both **the details of the proposed activities** and at the broader issue of **potential cumulative effects of these activities** on the wetland resources to be impacted on-site and off-site. **If your information leads you to believe that "unacceptable adverse effects" will result, then it is important that you provide written comments to the appropriate COE and EPA offices regarding your concerns.**

In many instances COE officials who make permit decisions are located in another state. Therefore, local citizens may be more knowledgable about the potential cumulative effects and the effects to endangered species or water quality than the COE personnel. **Citizens can provide critical facts and inform the COE of impacts which may result from a proposed action. Citizens can also request that a public hearing be held if they can raise substantial issues that are not addressed by the permit application.**

The COE usually makes a decision on a permit within 60 to 90 days following receipt of all comments on a proposed project, but this can be delayed if a public hearing is held or if review agencies require additional time to review the project and develop comments. Once the COE decides to issue a permit for an activity that you feel will have "unacceptable adverse effects", you cannot appeal the decision directly to the Corps. You should first contact the EPA and discuss your concerns with an appropriate official (refer to Key Agencies on page 22). Under Section 404(c), EPA has veto power over COE permitting when unacceptable adverse effects are predicted to occur from a proposed activity. If EPA cannot veto the permit, your only recourse is to file a lawsuit in federal district court.

Section 404 permits the filling of wetlands in accordance with regulations of the Clean Water Act and in compliance with state water quality standards. Acceptable projects receive certification from their state under Section 401 of the Clean Water Act. Citizens should examine state and local water quality standards to determine the direct, as well as cumulative, impacts of the proposed project. While a single proposed project may not have a massive adverse impact on water quality, when a larger perspective of the impacts of several past projects are linked together with the proposed project, the cumulative effects can be much more severe on a regional or statewide scale.

WETLAND PROTECTION HOW YOU CAN BECOME INVOLVED

A number of different ways exist to protect wetlands and you should choose the best options for your area. Individual citizens can play an important role by monitoring activities in wetlands. Good ways to become involved in wetlands protection are to learn how to identify wetlands, determine where important wetlands occur in your area, and learn what functions these wetlands perform, including their value to people.

The National Wetlands Inventory of the U.S. Fish and Wildlife Service has an ongoing program for mapping wetlands throughout the United States. Many portions of the northern Great Plains and Rocky Mountain states have already been mapped and the maps are for sale to the public (see reference in Key Agency List). These maps will help you learn where wetlands occur in your area. Other references cited at the end of this handbook can help you learn more about how to identify wetlands and about their biological, hydrological, physical and chemical characteristics. Additional information on wetland functions may be available in documents or reports by federal, state or local government agencies. This information will allow you to be more informed and to provide valuable comments on public notices for proposed Section 404 permits.

Specific wetland protection measures you can take include:

(1) Public Comments on Section 404 Permit Applications

Become familiar with the Section 404 permit process and keep abreast of proposed dredge and fill activities in your area. It is critical that you provide comments to regulatory agencies on the potential effects of these activities on your local wetlands.

(2) Adopt-a-Wetland

The EPA Region VIII office in Denver is taking the lead on generating "Adopt-A-Wetland" programs. The program is based on the Kentucky model which encourages local groups to adopt a water resource and act as the "guardian" of that resource. The program promotes individual participation and responsibility for natural resources. In Region VIII, the emphasis is on wetland protection. By adopting a wetland, individuals/groups make a commitment to protect the integrity of the wetland with its many habitat and other values. Adopting a wetland can provide opportunities for recreational and educational experiences which increase public awareness and appreciation for wetlands.

For example, four 7th grade science classes from a school in Colorado have adopted a nearby wetland. Students have participated in several activities that they felt were important, including developing and distributing a brochure about wetland values to their neighbors. The students also plan to give educational tours through the wetland to teach local people about the benefits of wetlands. For additional information on EPA's Adopt-A-Wetland Program, contact EPA in Denver (see list of Key Agencies on page 22).

(3) Education

Destruction of some wetlands has occurred because people did not know that federal law regulates many activities in wetlands on public **and** private land. Also, much wetland destruction has taken place because people do not recognize the valuable functions that wetlands perform. Education programs can minimize wetland loss due to ignorance.

(4) Wetland Surveys

You can also urge your city, county and states to complete detailed wetland surveys to identify and map all wetlands and to designate wetlands with high functional value as priority wetlands. Cooperative efforts between EPA Region VIII and local governments on "Advanced Identification" wetland mapping projects have been undertaken for the Jordan River drainage near Salt Lake City, Utah, the City of Boulder, Colorado planning area, and the Cherry Creek drainage basin southeast of Denver. Other similar projects are planned. These studies should expand our understanding of wetlands in these areas and identify individual wetlands with the highest functional value so that protection efforts can focus on these priority wetlands.

(5) Wetland Study

Presently we know very little about most individual wetlands and a pressing need exists for further study. Studies can be sponsored by school science classes (like the Colorado schools described in "2" above), adult education courses and interested groups such as Audubon Society, Ducks Unlimited, Trout Unlimited and others that sponsor field trips, workshops and classes. A local data base and experience is the best way to understand wetland functions.

This local information will provide you with the best reasons to preserve wetlands in your area. Also, encourage people in your area or in the state or local government to conduct applied research projects aimed at addressing specific management questions.

(6) State Wetland Protection Laws

Thirteen states in the U.S. have wetland protection laws, but no state in EPA's Region VIII has yet developed a comprehensive wetland protection law. North Dakota has developed a "no net wetlands loss act" (SB 2035) which requires that every acre of wetland that is filled must be mitigated by creating an equal area of wetlands elsewhere. You can discuss wetland protection with your elected state representatives and urge them to introduce appropriate legislation. Laws enacted in Connecticut, Florida, Maine, Massachussets, Michigan, Minnesota, New Hampshire, New York, Oregon, Pennsylvania, Rhode Island, Vermont and Wisconsin can be used as models of existing state programs.

(7) Local Wetland Regulations

Wetland protection can also occur at the county or city level of government. The City of Greenwood Village in Colorado has identified all wetlands within their city limits. City code requires that all projects proposed to occur on sites containing wetlands must identify the acreage of wetlands to be impacted and take steps to avoid these impacts. All unavoidable impacts must be mitigated. The City of Boulder, Colorado, is using the data base derived from their "Advanced Wetland Identification" process to develop a local wetland ordinance.

Local regulations can take many forms, including designating certain wetlands as critical wildlife habitat or as flood attenuation basins. Zoning has been the tool most commonly used by local governments for wetland protection. Important wetlands can be zoned unsuitable for certain types or densities of developments. Development can be clustered into upland portions of a site leaving wetlands as open space.

(8) Wetland Acquisition

State and local governments can purchase critical wetlands in many instances and manage them for the public good. Many public wetlands provide important sites for nature study by school groups. They also provide important recreational opportunities for residents and visitors. Purchases of critical wetlands may actually save taxpayer dollars by functioning to reduce flood risk and by maintaining clean water.

(9) Private Land Conservation

Individuals whose private land contains wetlands can donate the wetland area, grant conservation easements, or "Transfer Development Rights" (TDR) to their local government or to conservation organizations. Conservation easements are legal in many states and they assure that the use of part or all of a property is permanently limited to specific activities. Conservation easements must be granted to a government agency or land trust that will ensure that present and future owners abide by the terms of the easement. Conservation easements can allow some residential, farming and other uses.

(10) Tax Incentives

Significant tax incentives can be implemented to help preserve wetlands. In Delaware, Maryland, New Jersey, Rhode Island and South Carolina there is a significant property tax decrease for conservation easements. Maryland also has a complete tax credit for 15 years following establishment of a conservation easement. In Oregon, a riparian tax incentive program for riparian habitat improvement allows a 25% personal state income tax exemption. Other creative tax incentives are also being tried.

(11) Best Management Practices

Private landowners can seek advice from professional wetland managers on best management practices and modify their land uses where necessary to ensure that wetlands perform their functions to the highest degree possible. Some private land owners may wish to develop a wildlife preserve on their property.

CONCLUSIONS

Wetlands are vital to the functioning of the earth's ecosystems, maintaining water quality, fish and other wildlife populations, and nutrient cycling on a global scale. In addition, aesthetic beauty and recreational activities are also provided by wetlands.

Wetlands in our region are of national and international importance. For example, wetlands such as the prairie potholes in the northern prairie region support some of the most significant populations of waterfowl in North America.

Individuals and local and regional groups can have a tremendous influence on wetland management once they understand the functions and values of individual wetlands. You can effect wetland protection in your area by starting to work with local, regional and state governments to enact wetland protection regulations and policies. Most importantly, you can inform people in your region about the values of wetlands, and the personal responsibility we all share to protect and preserve the balance of Nature.

Riparian wetland loss due to gravel mining along the Cache la Poudre River, Colorado.

DIRECTORY OF KEY AGENCIES

ENVIRONMENTAL PROTECTION AGENCY (EPA) REGION VIII

Water Quality Requirements Section
One Denver Place, Suite 500
999 18th St.
Denver, CO 80202-2405 (303) 293-1570

U.S. ARMY CORPS OF ENGINEERS (COE)

Missouri River Basin

District Engineer
P.O. Box 5
Omaha, NE 86101-0005 (402) 221-4143

Arkansas and Rio Grande River Basins

District Engineer
Albuquerque District Corps of Engineers
Albuquerque, NM 87103-1580 (505) 766-2776

Colorado River Basin

District Engineer
Sacramento District Corps of Engineers
650 Capitol Mall
Sacramento, CA 95814 (916) 551-2260

U.S. FISH AND WILDLIFE SERVICE, BIOLOGICAL SERVICES

Colorado

Fish and Wildlife Enhancement
529-25 1/2 Road, Suite B-113
Grand Junction, CO 81505 (303) 243-2778

Fish and Wildlife Enhancement
730 Simms Street, Suite 292
Golden, CO 80401 (303) 236-2675

Montana

Fish and Wildlife Enhancement
P.O. Box 10023
Federal Bldg., & US Courthouse
301 S. Park, Room 494
Helena, MT 59626 (406) 449-5225

Fish and Wildlife Enhancement
1501 14th Street West, Suite 230
Billings, MT 59102 (406) 657-6750

Fish and Wildlife Enhancement
HS 105D, University of Montana
Missoula, MT 59812 (406) 329-3223

North Dakota

Fish and Wildlife Enhancement
1500 Capitol Avenue
Bismarck, ND 58501 (701) 255-4011

U.S. Fish and Wildlife, Biological Services (cont.)

South Dakota

Fish and Wildlife Enhancement
P.O. Box 986, Federal Bldg.
Room 227
225 S. Pierre
Pierre, SD 57501 (605) 224-8693

Utah

Fish and Wildlife Enhancement
2078 Admin. Bldg.
1745 W. 1700 South
Salt Lake City, UT 84104-5110 (801) 524-4430

Wyoming

Fish and Wildlife Enhancement
2120 Capitol Ave., Room 7010
Cheyenne, WY 82001 (307) 772-2372

U.S. Fish and Wildlife Service NATIONAL WETLANDS INVENTORY (for wetland maps)

Regional Wetlands Coordinator
Fish and Wildlife Enhancement
P.O. Box 25486, Denver Federal Center
Denver, CO 80225 (303) 236-8180

STATE WILDLIFE AND NATURAL RESOURCES DEPARTMENTS

Colorado

Colorado Division of Wildlife
6060 Broadway
Denver, CO 80216 (303) 297-1192

Montana

Department of Fish, Wildlife and Parks
1420 East 6th Avenue
Helena, MT 59620 (406) 444-3186

North Dakota

Game and Fish Department
100 North Bismark Expressway
Bismark, ND 58501 (701) 221-6300

South Dakota

Division of Game, Fish and Parks
Sigurd Anderson Bldg.
445 E. Capitol
Pierre, SD 57501 (605) 773-3387

Utah

Division of Wildlife Resources
1596 West North Temple
Salt Lake City, UT 84116 (801) 533-9333

Wyoming

Game and Fish Department
5400 Bishop Boulevard
Cheyenne, WY 82002 (307) 777-7631

STATE WATER QUALITY OR HEALTH DEPARTMENTS

Colorado

Colorado Department of Health
4210 E. 11th Ave.
Denver, CO 80220 (303) 331-4575

Montana

Department of Health & Environmental Sciences
Water Quality Bureau
Capitol Station
Helena, MT 59601 (406) 444-2406

North Dakota

North Dakota Department of Health
1200 Missouri Ave.
Bismarck, ND 58505 (701) 224-2354

South Dakota

Department of Water & Natural Resources
Joe Foss Bldg.
Pierre, SD 57501 (605) 773-5048

Utah

Bureau of Water Quality Control
Division of Environmental Health
150 West North Temple
P.O. Box 2500
Salt Lake City, UT 84110 (801) 538-6146

Wyoming

Wyoming Department of Environmental Quality
Herschler Bldg. 4th Floor
122 W. 25th St.
Cheyenne, WY 82002 (307) 777-7075

ADDITIONAL READINGS

Adamus, P.R. and others. 1987. **Wetland Evaluation Technique (WET).** II. Department of the Army, U.S. Army Corps of Engineers. (Available from: Department of the Army, Waterways Experiment Station, Corps of Engineers, PO Box 631, Vicksburg, Mississippi, 39180-0631).

Brinson, M.M., B.L. Swift, R.C. Plantico, and J.S. Barclay. 1981. **Riparian Ecosystems: Their Ecology and Status.** U.S. Department of the Interior, Fish and Wildlife Service, Biologial Services Program. FWS/OBS- 81/17. (Available from: Information Transfer Center, Eastern Energy and Land Use Team, U.S. F&WS, Route 3, Box 44, Kearneysville, WV 35430).

Eng, R.L., J.C. Peters, and D.A. Childress. 1987. **Montana Wetlands: Their Distribution, Uses, Values, and Future**. Proceedings of a symposium and workshop, June 24 and 25, 1986, Bozeman, Montana.

Environmental Laboratory. 1987. **Corps of Engineers Wetland Delineation Manual.** Technical Report Y-87-1, US Army Engineer Waterways Experiment Station. (Available from: Department of the Army, Waterways Experiment Station, Corps of Engineers, PO Box 631, Vicksburg, Mississippi, 39180-0631).

Greeson, P.E. and J.R. Clark and J.E. Clark. 1979. **Wetland Functions and Values: The State of our Understanding**. American Water Resources Association (AWRA). 674p. (Available from: AWRA, 5410 Grosvenor Lane, Suite 220, Bethesda, Maryland 20814)

Hansen, P.L., S.W. Chadde, and R.D. Pfister. 1988. **Riparian Dominance Types of Montana**. Miscellaneous Publication No. 49. 411p. (Available from: Montana Riparian Association, School of Forestry, University of Montana, Missoula, Montana, 59812).

Johnson, R.R., C.D. Ziebell, D.R. Patton, P.F. Folliott, R.H. Hamre. 1985. **Riparian Ecosystems and their Management: Reconciling Conflicting Uses**. First North American Riparian Conference. Proceedings of a symposium held April 16-18, 1985, Tucson, Arizona. USDA Forest Service General Technical Report RM-120. (Available from· U.S. Forest Service, Rocky Mountain Forest and Range Experiment Station, 240 W. Prospect St., Fort Collins, CO 80526).

Johnson, R.R. and J.F. McCormick. 1978. **Strategies for Protection and Management of Floodplain Wetlands and other Riparian Ecosystems.** Proceedings of the Symposium, Dec. 11-13, 1978, Callaway Gardens, Georgia. U.S. Dept. of Agriculture, Forest Service, General Technical Report WO-12.

Kusler, J.A. 1983. **Our National Wetland Heritage: A Protection Guidebook.** The Environmental Law Institute. (Available from: The Environmental Law Institute, Suite 600, 1346 Connecticut Avenue, N.W., Washington, D.C. 20036).

Kusler, J.A., and P. Riexinger, editors. 1986. **National Wetland Assessment Symposium.** Association of State Wetlands Managers. Proceedings of a symposium, June 17-20, 1985. (Available from: Association of State Wetland Managers, Berne, N.Y. 12023).

Mitsch, W.J. and J.G. Gosselink. 1986. **Wetlands.** Van Norstrand Reinhold Company, N.Y. 539p.

Mutz, K.M., D.J. Cooper, M.L. Scott and L.K. Miller (Technical Coordinators). 1988. **Restoration, Creation and Management of Wetland and Riparian Ecosystems in the American West**. Proceedings of a symposium of the Rocky Mountain Chapter of the Society of Wetland Scientists. 235 p. (Available from U.S. Fish and Wildlife Service, National Ecology Research Center, 2627 Redwing Rd., Fort Collins, CO,80526-2899).

National Wetlands Newsletter. Published 6 times each year by the Environmental Law Institute. (Available from: The Environmental Law Institute, Suite 200, 1616 P Street NW, Washington, D.C. 20036).

Office of Technology Assessment. 1984. **Wetlands: Their Use and Regulation**. OTA-O-206, March 1984. (Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402).

Platts, W.S., and many others. 1987. **Methods for Evaluating Riparian Habitats with Applications to Management**. U.S.D.A. Forest Service. Intermountain Research Station. General Technical Report INT-221. 177p. (Available from: Intermountain Research Station, 324 25th St, Ogden, Utah 84401).

26 ADDITIONAL READINGS

Reed, P.B. 1988. **National List of Plant Species that Occur in Wetlands: 1988 National Summary.** U.S. Department of Interior, Fish and Wildlife Service. Biological Report 88(24). 244p. (Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402)

Sather, J.H. and P.J. Ruta Stuber. 1984. **Proceedings of the National Wetland Values Assessment Workshop.** May 23-26, 1983, Alexandria, Vl. U.S. Fish and Wildlife Service, Western Energy and Land Use Team. FWS/OBS-84/12. 100p. (Available from: U.S. Department of the Interior, Washington, D.C. 20240).

Stewart, R.E. and H.A. Kantrud. 1971. **Classification of Natural Ponds and Lakes in the Glaciated Prairie Region.** Resource Publication 92. Bureau of Sport Fisheries and Wildlife. Fish and Wildlife Service, U.S. Department of the Interior.

Tiner, R. W. Jr. 1984. **Wetlands of the United States: Current Status and Recent Trends.** National Wetlands Inventory. U.S. Fish and Wildlife Service. (Available from: Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402)

Van Der Valk, A. 1989. **Northern Prairie Wetlands.** Iowa State University Press. Ames, Iowa. 400 p.

Weller, M.W. 1981. **Freshwater Marshes; Ecology and Wildlife Management.** University of Minnesota Press. (Available from: University of Minnesota Press, 2037 University Avenue, S.E., Minneapolis, MN 55414).

Windell, J.T., B.E. Willard, D.J. Cooper, S.Q. Foster, C.F. Knud-Hansen, L.P. Rink, G.N. Kiladis. 1986. **An Ecological Characterization of Rocky Mountain Montane and Subalpine Wetlands.** Biological Report 86(11). (Available from U.S. Fish and Wildlife Service, National Ecology Center, 2627 Redwing Rd., Fort Collins, CO. 80526-2899).

North Dakota Wetlands Workshop. Proceedings of a workshop held 13-15 July 1987. Published by the North Dakota State University Extension Service and the Environmental Protection Agency. 280 p.