United States
Environmental Protection
Agency

Office of Water
Office of Wetlands,
Oceans and Watersheds (4502F)

America's Wetlands

OUR VITAL LINK BETWEEN LAND AND WATER

U.S. EPA Involvement

The U.S. Environmental Protection Agency (EPA), in partnership with other federal agencies, and state, local, and tribal governments, is responsible for restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Because of the value and function of wetlands as an integral part of those waters, EPA is also charged with protecting wetland resources. The major federal regulatory tool for this is Section 404 of the Clean Water Act, which is jointly administered by the U.S. Army Corps of Engineers and EPA. Section 404 establishes a permit program to regulate the discharge of dredged or fill material into waters of the United States, including most wetlands. The U.S. Fish and Wildlife Service and the National Marine Fisheries Service have important advisory roles in the permit review process under the Clean Water Act, and the Natural Resources Conservation Service has the lead responsibility for identifying wetlands on agricultural lands.

EPA recognizes that a truly effective program to protect our nation's wetlands must include supplemental approaches to the Clean Water Act, along with the cooperation of federal, state, and local agencies; developers; farmers; foresters; environmental groups; the scientific community; and the public. Active citizen support and participation is an essential ingredient of such a program.

EPA uses a number of non-regulatory programs to supplement the Section 404 program: a contractor-operated telephone hotline to allow easy access to the EPA for information about wetlands (see back cover); distribution of publications and fact sheets about wetlands; partnerships with private landowners and state and local governments; comprehensive watershed planning; education programs for the public; and support of efforts to improve wetlands management (e.g., workshops, conferences, and research). The EPA is also involved in a long-term project to monitor and assess the ecological resources of our country.

America's Wetlands

Wetlands are indeed the vital link between water and land. "Wetlands" is the collective term for marshes, swamps, bogs, and similar areas found in generally flat vegetated areas, in depressions in the landscape, and between dry land and water along the edges of streams, rivers, lakes, and coastlines. Wetlands can be found in nearly every county and climatic zone in the United States. Most likely, a wetland exists in your neighborhood or very close to it. Because they are so varied, wetlands can be difficult to recognize. Some are wet all of the time; some may look completely dry most of the time. Our ideas of what a wetland should look like may not include all types of wetlands. Some wetlands are large and some are very small. Many have been altered by human activities such as farming, ranching, and the building of roads, dams, and towns.

Wetlands have often been regarded as wastelands — sources of mosquitoes, flies, unpleasant odors, and disease. People thought of wetlands as places to avoid or, better yet, eliminate. Largely because of this negative view, more than half of America's original wetlands have been destroyed—drained and converted to farmland, filled for housing developments and industrial facilities, or used to dispose of household and industrial waste.

As people understand ecological processes better, attitudes towards wetlands change. We now know that

Great Blue Heron U.S. FWS, Herb Stein

For more information, contact the EPA Wetlands Information Hotline

wetlands are, in fact, valuable natural resources. Whether drier or wetter, bigger or smaller, wetlands provide important benefits to people and the environment. Wetlands help regulate water levels within watersheds; improve water quality; reduce flood and storm damages; provide important fish and wildlife habitat; and support hunting, fishing, and other recreational activities. Wetlands are natural wonderlands of great value.

Reading this booklet will give you a better understanding of the rich variety of wetlands, their importance, how they are threatened, and what can be done to conserve them for future generations.

Prairie Pothole Wetlands U.S. FWS

Forested Wetland EPA Region 1

What are Wetlands?

Wetlands are areas where water covers the soil, or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season. Water saturation (hydrology) largely determines how the soil develops and the types of plant and animal communities living in and on the soil. Wetlands may support both aquatic and terrestrial species. The prolonged presence of water creates conditions that favor the growth of specially adapted plants (hydrophytes) and promote the development of characteristic wetland (hydric) soils.

Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. Indeed, wetlands are found from the tundra to the tropics and on every continent except Antarctica. Two general categories of wetlands are recognized: coastal or tidal wetlands and inland or non-tidal wetlands.

Coastal wetlands in the United States, as their name suggests, are found along the Atlantic, Pacific, Alaskan, and Gulf coasts. They are closely linked to our nation's estuaries, where sea water mixes with fresh water to form an environment of varying salinities. The salt water and the fluctuating water levels (due to tidal action) combine to create a rather difficult environment for most plants. Consequently, many shallow coastal areas are unvegetated mud flats or sand flats. Some plants, however, have successfully adapted to this environment. Certain grasses and grasslike plants that adapt to the saline conditions form the tidal salt marshes that are found along the Atlantic, Gulf, and Pacific coasts. Mangrove swamps, with salt-loving shrubs or trees, are common in tropical climates, such as in southern Florida and Puerto Rico. Some tidal freshwater wetlands form beyond the upper edges of tidal salt marshes where the influence of salt water ends.

Inland wetlands are most common on floodplains along rivers and streams (riparian wetlands), in isolated depressions surrounded by dry land (for example, playas, basins, and "potholes"), along the margins of lakes and ponds, and in other low-lying areas where the groundwater intercepts the soil surface or where precipitation sufficiently saturates the

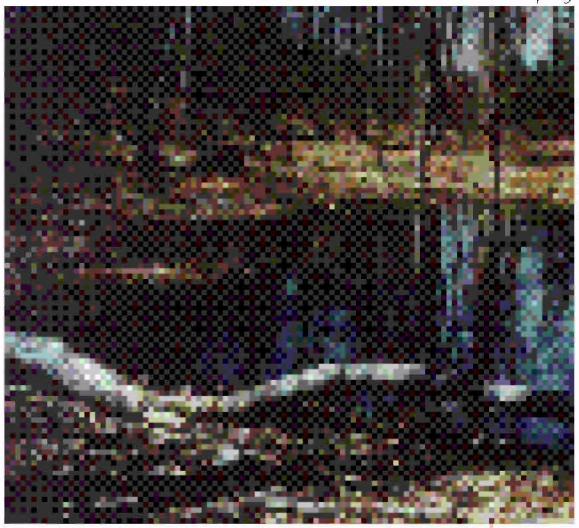
Riparian Wetland EPA Region 8, Paul McIver

soil (vernal pools and bogs). Inland wetlands include marshes and wet meadows dominated by herbaceous plants, swamps dominated by shrubs, and wooded swamps dominated by trees. Certain types of inland wetlands are common to particular regions of the country:

- *bogs and fens of the northeastern and north-central states and Alaska*
- *wet meadows or wet prairies in the Midwest*
- *inland saline and alkaline marshes and riparian wetlands of the arid and semiarid west*
- *prairie potholes of Iowa, Minnesota and the Dakotas*
- *alpine meadows of the west*
- *playa lakes of the southwest and Great Plains*
- *bottomland hardwood swamps of the south*
- *pocosins and Carolina Bays of the southeast coastal states*
- *tundra wetlands of Alaska.*

Many of these wetlands are seasonal (they are dry one or more seasons every year), and, particularly in the arid and semiarid West, may be wet only periodically. The quantity of water present and the timing of its presence in part determine the functions of a wetland and its role in the environment. Even wetlands that appear dry for a few months — such as vernal pools — often provide critical habitat for wildlife adapted to breeding exclusively in these areas.

Seasonal Wetland in Spring



EPA Region 1, Leo Kenney

Seasonal Wetland in Summer

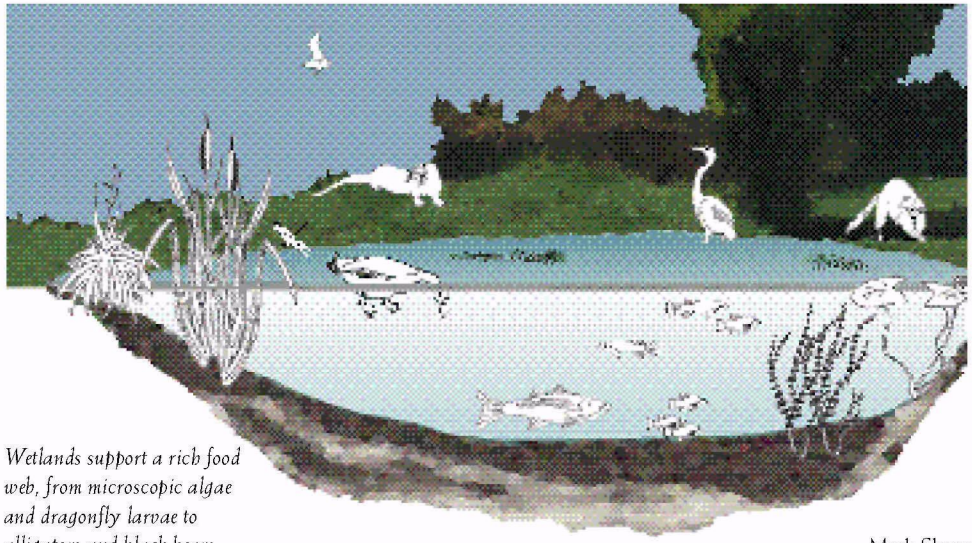
Wetlands and Nature

Wetlands are among the most productive ecosystems in the world, comparable to rain forests and coral reefs. An immense variety of species of microbes, plants, insects, amphibians, reptiles, birds, fish, and mammals can be part of a wetland ecosystem. Physical and chemical features such as climate, landscape shape (topology), geology, and the movement and abundance of water help to determine the plants and animals that inhabit each wetland. The complex, dynamic relationships among the organisms inhabiting the wetland environment are referred to as food webs. (see illustration below).This is why wetlands in Texas, North Carolina, and Alaska differ from one another.

Wetlands can be thought of as "biological supermarkets." They provide great volumes of food that attract many animal species. These animals use wetlands for part of or all of their life-cycle. Dead plant leaves and stems break down in the water to form small particles of organic material called "detritus." This enriched material feeds many small aquatic insects, shellfish, and small fish that are food for larger predatory fish, reptiles, amphibians, birds, and mammals.

The functions of a wetland and the values of these functions to human society depend on a complex set of relationships between the wetland and the other ecosystems in the watershed. A watershed is a geographic area in which water, sediments, and dissolved materials drain from higher elevations to a common low-lying outlet or basin — a point on a larger stream, lake, underlying aquifer, or estuary.

Wetlands play an integral role in the ecology of the watershed. The combination of shallow water, high

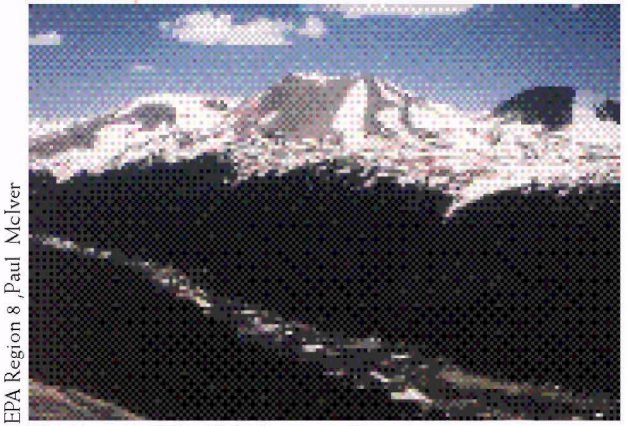


Wetlands support a rich food web, from microscopic algae and dragonfly larvae to alligators and black bears.

Mark Sharp

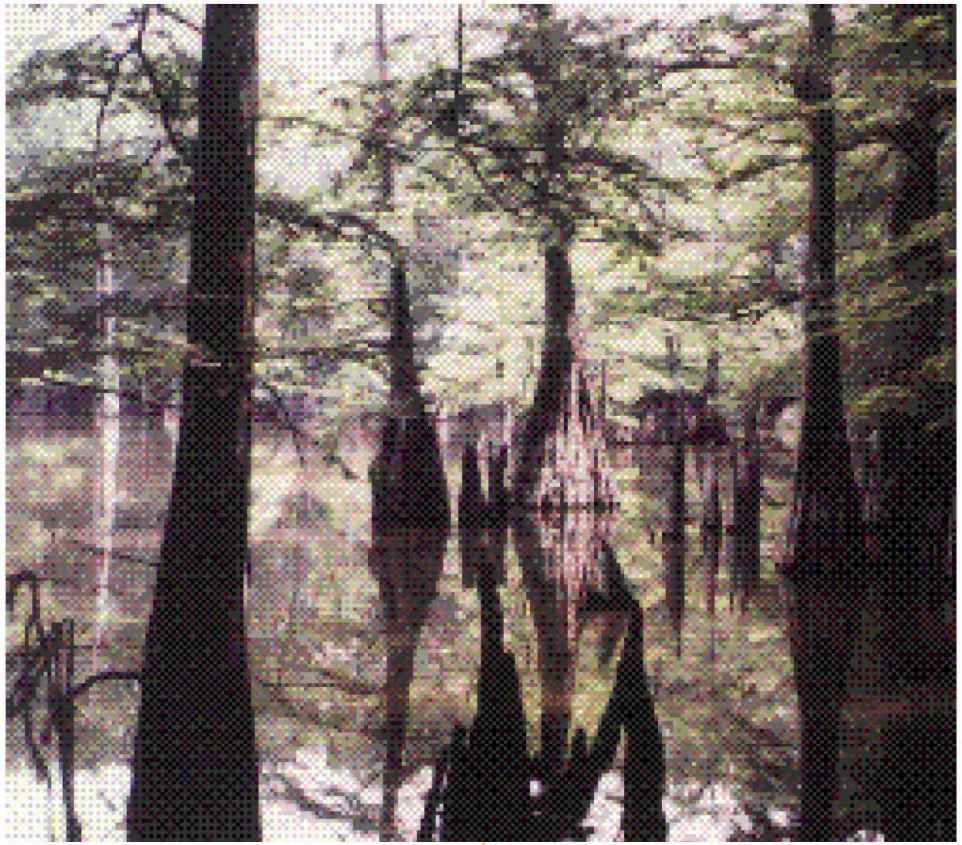
levels of nutrients, and primary productivity is ideal for the development of organisms that form the base of the food web and feed many species of fish, amphibians, shellfish, and insects. Many species of birds and mammals rely on wetlands for food, water, and shelter, especially during migration and breeding.

Wetlands' microbes, plants, and wildlife are part of global cycles for water, nitrogen, and sulfur. Furthermore, scientists are beginning to realize that atmospheric maintenance may be an additional wetlands function. Wetlands store carbon within their plant communities and soil instead of releasing it to the atmosphere as carbon dioxide. Thus wetlands help to moderate global climate conditions.



EPA Region 8 ,Paul McIver

High Mountain Valley Wetland at 10,000 Feet



Bottomland Hardwood Swamp

Todd Votteler

Kelly Drake

Wetlands and People

Only recently have we begun to understand the importance of the functions that wetlands perform. Far from being useless, disease-ridden places, wetlands provide values that no other ecosystem can, including natural water quality improvement, flood protection, shoreline erosion control, opportunities for recreation and aesthetic appreciation, and natural products for our use at no cost. Wetlands can provide one or more of these functions. Protecting wetlands in turn can protect our safety and welfare.

Water Quality and Hydrology

Wetlands have important filtering capabilities for intercepting surface-water runoff from higher dry land before the runoff reaches open water. As the runoff water passes through, the wetlands retain excess nutrients and some pollutants, and reduce sediment that would clog waterways and affect fish and amphibian egg development. In performing this filtering function, wetlands save us a great deal of money. For example, a 1990 study showed that, without the Congaree Bottomland Hardwood Swamp in South Carolina, the area would need a $5 million waste water treatment plant.

In addition to improving water quality through filtering, some wetlands maintain stream flow during dry periods, and many replenish groundwater. Many Americans depend on groundwater for drinking.

Flood Protection

Wetlands function as natural sponges that trap and slowly release surface water, rain, snowmelt, groundwater and flood waters. Trees, root mats, and other wetland vegetation also slow the speed of flood waters and distribute them more slowly over the floodplain. This combined water storage and braking action lowers flood heights and reduces erosion. Wetlands within and downstream of urban areas are particularly valuable, counteracting the greatly increased rate and volume of surface-water runoff from pavement and buildings.

Texas Parks and Wildlife Dept.

Otter

The holding capacity of wetlands helps control floods and prevents water logging of crops. Preserving

Heron Bolivar Flats, TX

and restoring wetlands, together with other water retention, can often provide the level of flood control otherwise provided by expensive dredge operations and levees. The bottomland hardwood-riparian wetlands along the Mississippi River once stored at least 60 days of floodwater. Now they store only 12 days because most have been filled or drained.

Shoreline Erosion

The ability of wetlands to control erosion is so valuable that some states are restoring wetlands in coastal areas to buffer the storm surges from hurricanes and tropical storms. Wetlands at the margins of lakes, rivers, bays, and the ocean protect shorelines and stream banks against erosion. Wetland plants hold the soil in place with their roots, absorb the energy of waves, and break up the flow of stream or river currents.

Fish and Wildlife Habitat

More than one-third of the United States' threatened and endangered species live only in wetlands, and nearly half use wetlands at some point in their lives. Many other animals and plants depend on wetlands for survival.

Estuarine and marine fish and shellfish, various birds, and certain mammals must have coastal wetlands to survive. Most commercial and game fish breed and raise their young in coastal marshes and estuaries. Menhaden, flounder, sea trout, spot, croaker, and striped bass are among the more familiar fish that depend on coastal wetlands. Shrimp, oysters, clams, and blue and Dungeness crabs likewise need these wetlands for food, shelter, and breeding grounds.

For many animals and plants, like wood ducks, muskrat, cattails, and swamp rose, inland wetlands are the only places they can live. Beaver may actually create their own wetlands. For others, such as striped bass, peregrine falcon, otter, black bear, raccoon, and deer, wetlands provide important food, water, or shelter. Many of the U.S. breeding bird populations—including ducks, geese, woodpeckers, hawks, wading birds, and many song-

Shrimp Harvest U.S. EPA, Steve Delaney

birds—feed, nest, and raise their young in wetlands. Migratory waterfowl use coastal and inland wetlands as resting, feeding, breeding, or nesting grounds for at least part of the year. Indeed, an international agreement to protect wetlands of international importance was developed because some species of migratory birds are completely dependent on certain wetlands and would become extinct if those wetlands were destroyed.

Natural Products for Our Economy

We use a wealth of natural products from wetlands, including fish and shellfish, blueberries, cranberries, timber, and wild rice, as well as medicines that are derived from wetland soils and plants. Many of the nation's fishing and shellfishing industries harvest wetland-dependent species; the catch is valued at $15 billion a year. In the Southeast, for example, nearly all the commercial catch and over half of the recreational harvest are fish and shellfish that depend on the estuary-coastal wetland system. Louisiana's coastal marshes produce an annual commercial fish and shellfish harvest that amounted to 1.2 billion pounds worth $244 million in 1991. Wetlands are habitats for fur-bearers like muskrat, beaver, and mink as well as reptiles such as alligators. The nation's harvest of muskrat pelts alone is worth over $70 million annually.

Alligator U.S. EPA

Hunting in a Wetland Texas Parks and Wildlife Dept.

Recreation and Aesthetics

Wetlands have recreational, historical, scientific, and cultural values. More than half of all U.S. adults (98 million) hunt, fish, birdwatch or photograph wildlife. They spend a total of $59.5 billion annually. Painters and writers continue to capture the beauty of wetlands on canvas and paper, or through cameras, and video and sound recorders. Others appreciate these wonderlands through hiking, boating, and other recreational activities. Almost everyone likes being on or near the water; part of the enjoyment is the varied, fascinating lifeforms.

Status and Trends

Current Situation

The lower 48 states contained an estimated 103.3 million acres of wetlands in the mid-1980s. This is an area about the size of California. An estimated 170-200 million acres of wetland exist in Alaska — covering slightly more than half of the state — while Hawaii has 52,000 acres. Next to Alaska, Florida (11 million), Louisiana (8.8 million), Minnesota (8.7 million), and Texas (7.6 million) have the largest wetland acreage.

In the 1600s, over 220 million acres of wetlands are thought to have existed in the lower 48 states. Since then, extensive losses have occurred, with many of the original wetlands drained and converted to other uses. From the 1950s to the 1970s was a time of major wetlands loss, but since

Peat Mining in a Wetland/Montane EPA Region 8, Paul McIver

Major Causes of Wetland Loss and Degradation

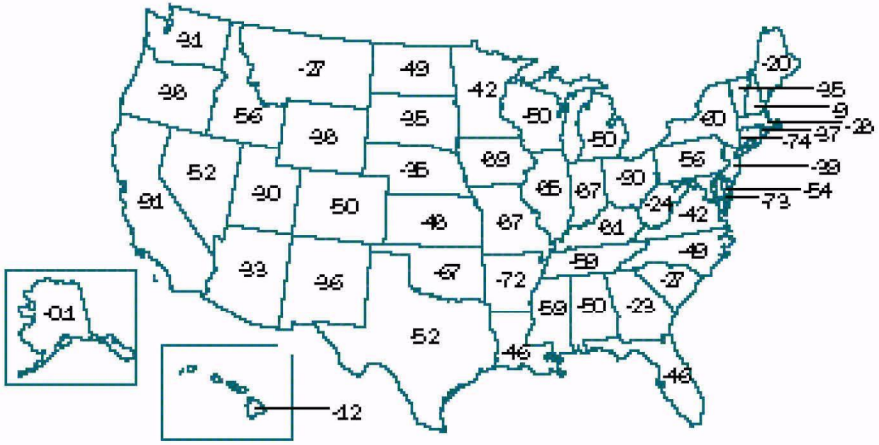
Human Actions

Drainage
Dredging and stream channelization
Deposition of fill material
Diking and damming
Tilling for crop production
Levees
Logging
Mining
Construction
Runoff
Air and water pollutants
Changing nutrient levels
Releasing toxic chemicals
Introducing nonnative species
Grazing by domestic animals

Natural Threats

Erosion
Subsidence
Sea level rise
Droughts
Hurricanes and other storms

Percentage of Wetlands Acreage Lost, 1780's-1980's



Twenty-two states have lost at least 50 percent of their original wetlands. Seven states- Indiana, Illinois, Missouri, Kentucky, Iowa, California, and Ohio have lost over 80 percent of their original wetlands. Since the 1970s, the most extensive losses of wetlands have been in Louisiana, Mississippi, Arkansas, Florida, South Carolina, and North Carolina.

that time the rate of loss has decreased. Today, less than half of our original wetlands remain, and recent trend estimates show that wetlands are still being degraded and lost. Recent estimates on non-federal land indicate that the rate of loss is between 70,000 and 90,000 acres annually.

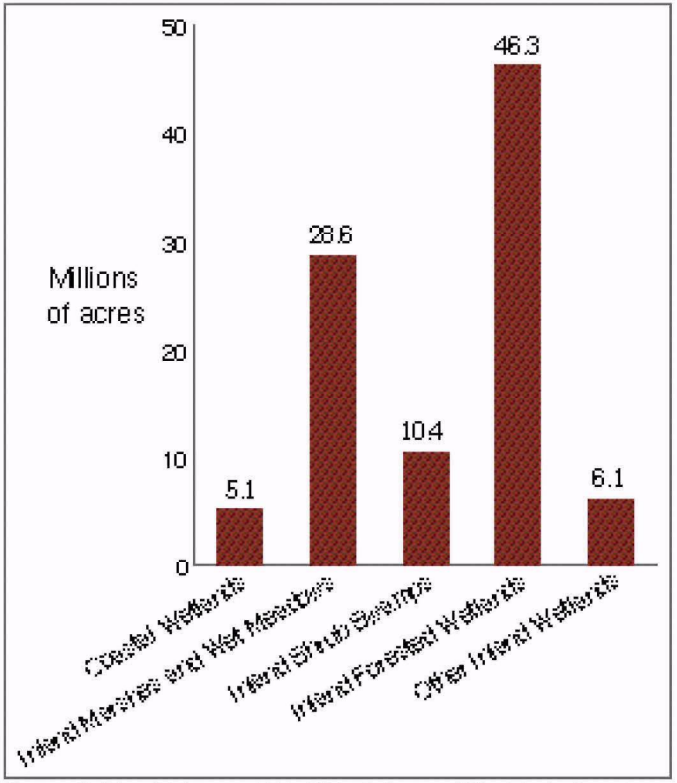
Between the mid-1970s and the mid-1980s, approximately 3.3 million acres of inland freshwater wetlands were destroyed, and the amount of coastal wetlands decreased by 71,000 acres. Inland forested wetlands, primarily in the southeast, were impacted the most during this time, with a loss of 2.5 million acres. Approximately 900,000 acres were converted from forested wetlands to other wetland types (through logging and other activity). Conversion to agricultural use was responsible for 54 percent of the losses, drainage for urban development for 5 percent, and development for 41 percent. In addition to these losses, many other wetlands have suffered degradation of functions, although calculating the magnitude of the degradation is difficult.

These losses, as well as degradation, have greatly diminished our nation's wetlands resources; as a result, we no longer have the benefits they provided. The increase in flood damages, drought damages, and the declining bird populations are, in part, the result of wetlands degradation and destruction.

Wetlands have been degraded in ways that are not as obvious as direct physical destruction or degradation. Other threats have included chemical contamination, excess nutrients, and sediment from air and water. Global climate change could affect wetlands through increased air temperature; shifts in precipitation; increased frequency of storms, droughts, and floods; increased atmospheric carbon dioxide concentration; and sea level rise. All of these impacts could affect species composition and wetland functions.

Siting Industrial Operations in a Wetland Todd Votteler

Extent of Wetlands in the Lower 48 States



Source: Dahl and Johnson. 1991. *Wetlands Status and Trends in the Coterminous*

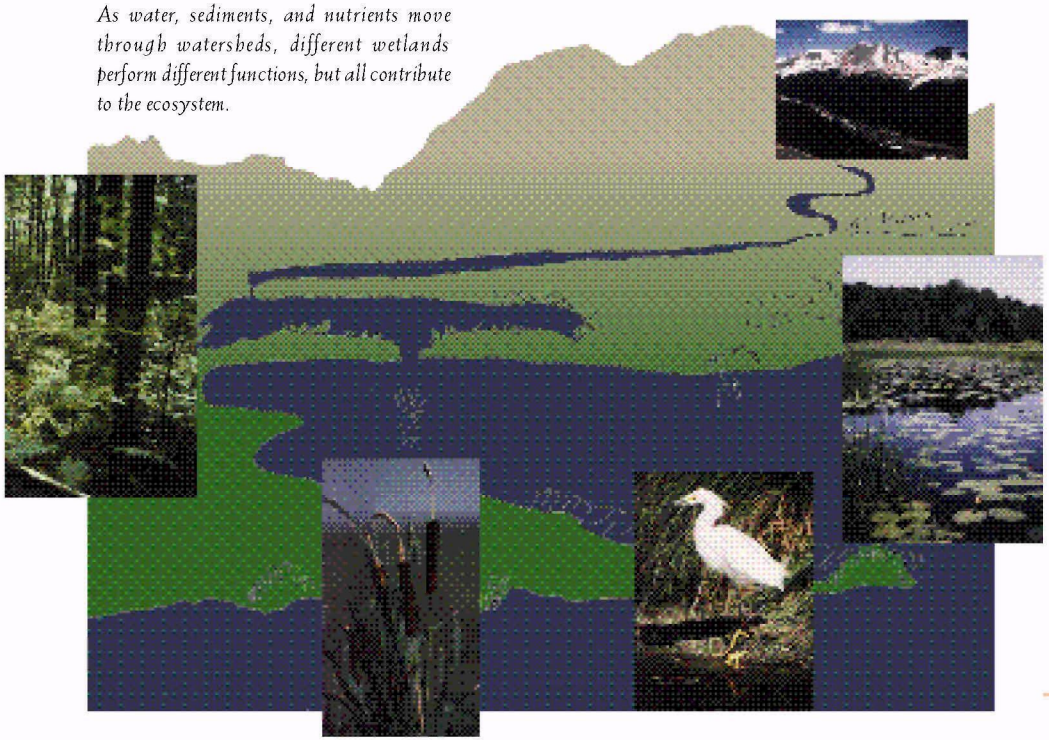
Draining Wetlands for Irrigation Dick Gersib

Wetlands Protection

The federal government protects wetlands through *regulations* (like Section 404 of the Clean Water Act), *economic incentives and disincentives* (for example, tax deductions for selling or donating wetlands to a qualified organization and the "Swampbuster" provisions of the Food Security Act), cooperative programs, and *acquisition* (for example, establishing national wildlife refuges). You can find out more about these mechanisms by calling the Wetlands Hotline (1-800-832-7828).

Beyond the federal level, a number of states have enacted laws to regulate activities in wetlands, and some counties and towns have adopted local wetlands protection ordinances or have changed the way development is permitted. Most coastal states have significantly reduced losses of coastal wetlands through protective laws. Few states, however, have laws specifically regulating activities in inland wetlands, although some states and local governments have non-regulatory pro-

Inland Marsh Todd Votteler



As water, sediments, and nutrients move through watersheds, different wetlands perform different functions, but all contribute to the ecosystem.

For more information, contact the EPA Wetlands Information Hotline

Jennifer Matchett

grams that help protect wetlands.

Recently, partnerships to manage whole watersheds have developed among federal, state, tribal, and local governments; nonprofit organizations; and private landowners. The goal of these partnerships is to implement comprehensive, integrated watershed protection approaches. A watershed approach recognizes the inter- connectedness of water, land, and wetlands resources and results in more complete solutions that address more of the factors causing wetland degradation. The government achieves the restoration of former or degraded wetlands under the Clean Water Act Section 404 program as well as through watershed protection initiatives. Together, partners can share limited resources to find the best solutions to protect and restore America's natural resources.

While regulation, economic incentives, and acquisition programs are important, they alone cannot protect the majority of our remaining wetlands. Education of the public and efforts in conjunction with states, local governments, and private citizens are helping to protect wetlands and to increase appreciation of the functions and values of wetlands. The rate of wetlands loss has been slowing, but we still

Wood Ducks U.S. FWS, Tim McCat

have work to do. You can be a part. Approximately 75 percent of wetlands are privately owned, so individual landowners are critical in protecting these national treasures.

What You Can Do

Despite the efforts of governments and private conservation organizations, pressures that destroy wetlands will continue. The problems of degradation of wetlands from pollution, urban encroachment, groundwater withdrawals, partial drainage, and other actions also require attention.

Many opportunities exist for private citizens, corporations, government agencies, and other groups to work together to slow the rate of wetland loss and to improve the quality of our remaining wetlands. First, state and local governments need to be encouraged to establish programs to effectively protect wetlands, especially inland wetlands, within their borders. Second, because individual landowners and corporations own many of the nation's wetlands, they are in a key position to determine the fate of wetlands on their properties. Finally, all citizens, whether or not they own wetlands, can help protect wetlands by supporting wetlands conservation initiatives.

Wetlands are an important part of our national heritage. Our economic well-being and quality of life largely depend on our nation's wealth of natural resources, and wetlands are the vital link between our land and water resources. As wetlands are lost, the remaining wetlands become even more valuable. We have already lost many of our nation's wetlands since America was first settled. We must now take positive steps to protect wetlands to ensure that the functions and related values they provide will be preserved for present and future generations.

How Can I Make a Difference?

- *Get involved — find out where wetlands exist near your home, try to learn more about them, and support educational efforts.*
- *Support wetlands and watershed protection initiatives by public agencies and private organizations.*
- *Purchase federal duck stamps from your local post office to support wetland acquisition.*
- *Participate in the Clean Water Act Section 404 program and state regulatory programs by reviewing public notices and, in appropriate cases, commenting on permit applications.*
- *Encourage neighbors, developers, and state and local governments to protect the function and value of wetlands in your watershed.*
- *Rather than draining or filling wetlands, seek compatible uses involving minimal wetland alteration, such as waterfowl production, fur harvest, hay and forage, wild rice production, hunting and trapping leases, and selective timber harvest.*
- *Select upland rather than wetlands sites for development projects and avoid wetland alteration or degradation during project construction.*
- *Maintain wetlands and adjacent buffer strips as open space.*
- *Learn more about wetland restoration activities in your area; seek and support opportunities to restore degraded wetlands.*
- *In New England, participate in EPA's "Adopt-a-Wetland" program.*

Regional Offices

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One Congress Street
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(215)597-9800

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Atlanta, GA 30365
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(415)744-1305

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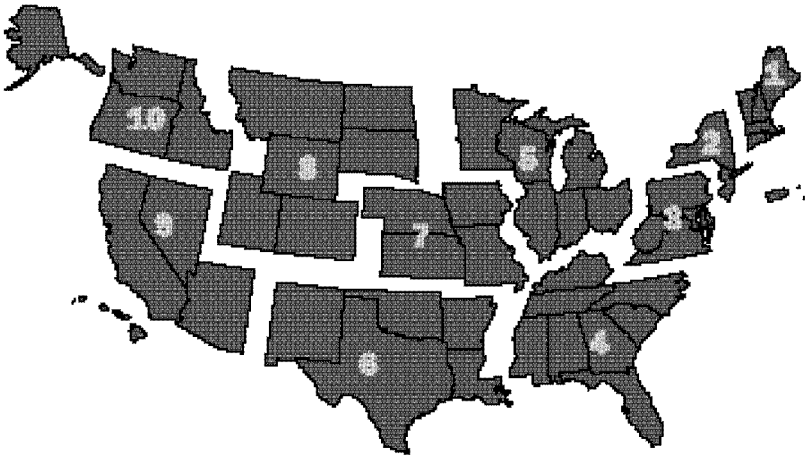
(206)553-1200



Additional information concerning wetlands protection can be obtained from the EPA Wetlands Hotline (contractor operated) at (800) 832-7828 from 9:00 am to 5:00 pm EST.
E-mail address: WETLANDS-HOTLINE@EPAMAIL.EPA.GOV

Cover Photos: *Texas Parks and Wildlife Department and Sandhill Cranes Lake Andes NWR, Gary Zahn*

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