Jim Crawford, Ocracoke Island, NC

Wetlands

What Are Wetlands?

Wetlands occur where water and land come together for a prolonged period of time (Figure 5-1). They are lands where saturation with water is the dominant factor determining the nature of soil development and the types of plant and animal communities living in the soil and on its surface. Wetlands vary widely because of regional and local differences in soils, topography, climate, hydrology, water chemistry, vegetation, and other factors, including human disturbance. They 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 freshwater wetlands. Included among the many types of wetlands found in the United States are peat lands, marshes, mires, vernal pools, swamps, muskegs, wet meadows, playas, bogs, pocosins, sloughs, potholes, and fens.

It is important to point out that unlike streams, rivers, lakes, and estuaries, some wetlands contain little or no surface water and are primarily influenced by high ground water tables. These wetlands are normally "dry" or have standing water for just a few months out of the year, but can be of extraordinary value.

Value of Wetlands

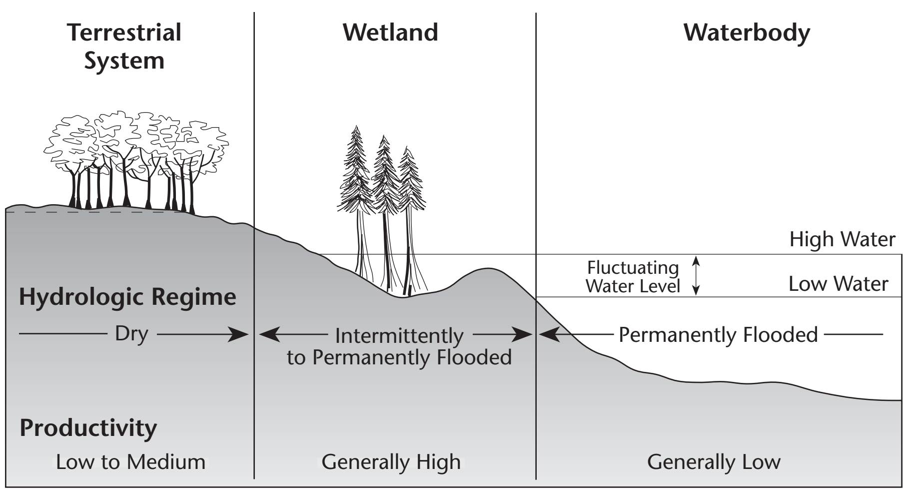
Maintaining and restoring the quality of our wetlands is important because of the many beneficial uses that they provide to humans, aquatic life, other wildlife, and the environment as a whole.

Wetlands can be thought of as biological "supermarkets." They produce great quantities of food that attract many animal species. The complex, dynamic feeding relationships among the organisms inhabiting wetland environments are referred to as food webs. The combination of shallow water, high levels of inorganic nutrients, and high rates of primary productivity (the synthesis of new plant biomass through photosynthesis) in many wetlands is ideal for the development of organisms that form the base of the food web—many species of insects, mollusks, and crustaceans, for example.

For many fish and wildlife species, wetlands are primary habitats, meaning that these species depend on them for survival; for others, wetlands provide important seasonal habitats, where food, water, and cover are plentiful. The U.S. Fish and Wildlife Service estimates that up to 43% of the federally threatened and endangered species rely directly or indirectly on wetlands for their survival. Because they produce so much plant biomass and invertebrate life, estuaries and

Figure 5-1

Depiction of Wetlands Adjacent to a Waterbody



Wetlands are often found at the interface between dry terrestrial ecosystems, such as upland forests and grasslands, and permanently wet aquatic ecosystems, such as lakes, rivers, bays, estuaries, and oceans.

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Figure 5-2

Coastal Wetlands Produce Detritus that Supports Fish and Shellfish

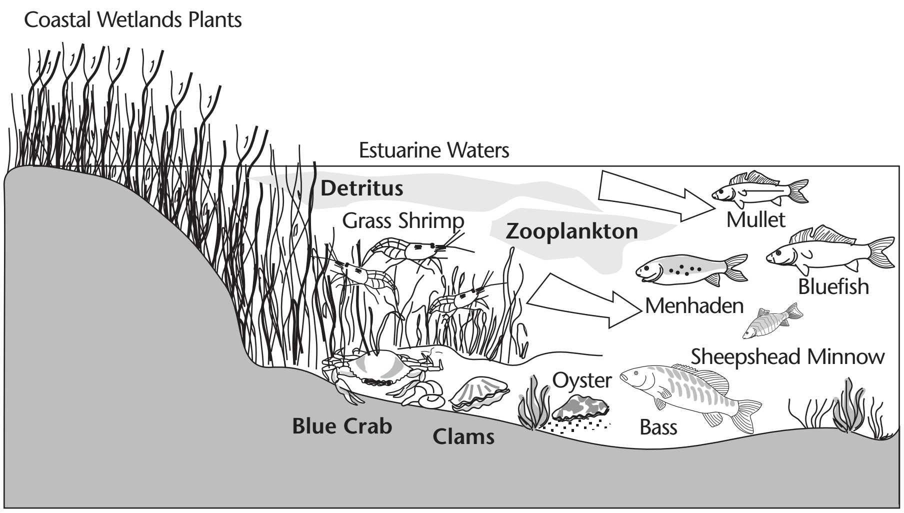
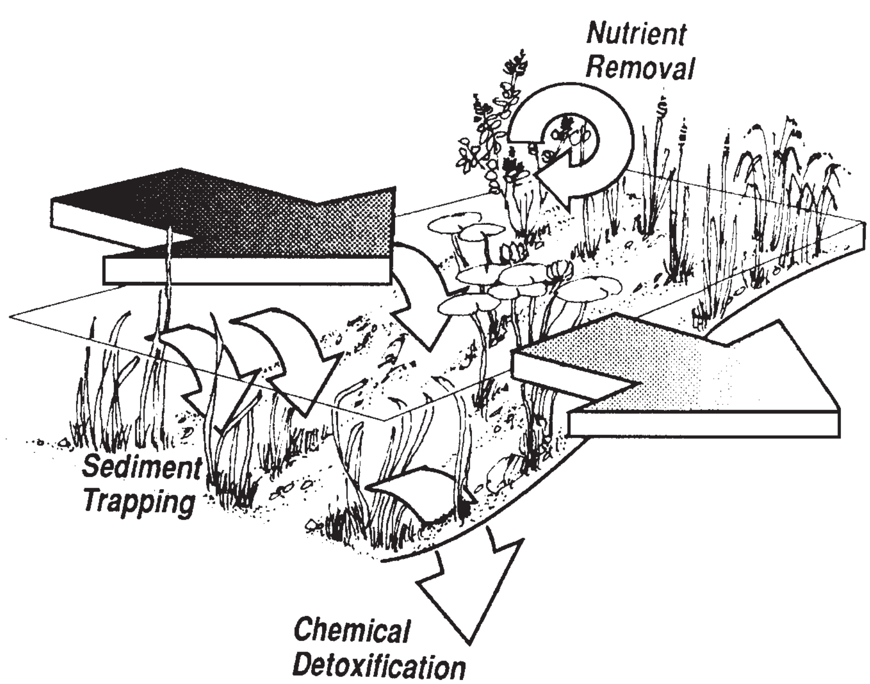


Figure 5-3

Water Quality Improvement Functions in Wetlands



Source: Washington State Department of Ecology.

their coastal marshes serve as important nursery areas for the young of many game and commercial fish and shellfish (Figure 5-2).

Wetlands are also valuable because they greatly influence the flow and quality of water. They help improve water quality, including drinking water, by intercepting surface runoff and removing or retaining inorganic nutrients, processing organic wastes, and reducing suspended sediments before they reach open water (Figure 5-3). In performing this filtering function, wetlands save us a great deal of money. For example, the Congaree Bottomland Hardwood Swamp in South Carolina removes a quantity of pollutants that would be equivalent to that removed annually by a $5 million wastewater treatment plant.

In addition to improving water quality through filtering, some wetlands maintain stream flow during dry periods; others replenish ground water. For instance, one calculation for a 5-acre Florida cypress swamp that is known to recharge ground water reveals that if 80% of the swamp was drained, available ground water would be reduced by an estimated 45%.

Because of their low topographic position relative to uplands, wetlands store and slowly release surface water, rain, snowmelt, ground water and flood waters. Trees and other wetland vegetation also impede the movement of flood waters and distribute them more slowly over floodplains. This combined water storage and slowing action lowers flood heights and reduces erosion downstream and on adjacent lands. Preserving and restoring wetlands can often afford a level of flood protection otherwise provided by expensive impoundments, dredging operations, and levees. In Minnesota, for example, the cost of replacing the natural flood control function of 5,000 acres of drained wetlands was found to be $1.5 million annually.

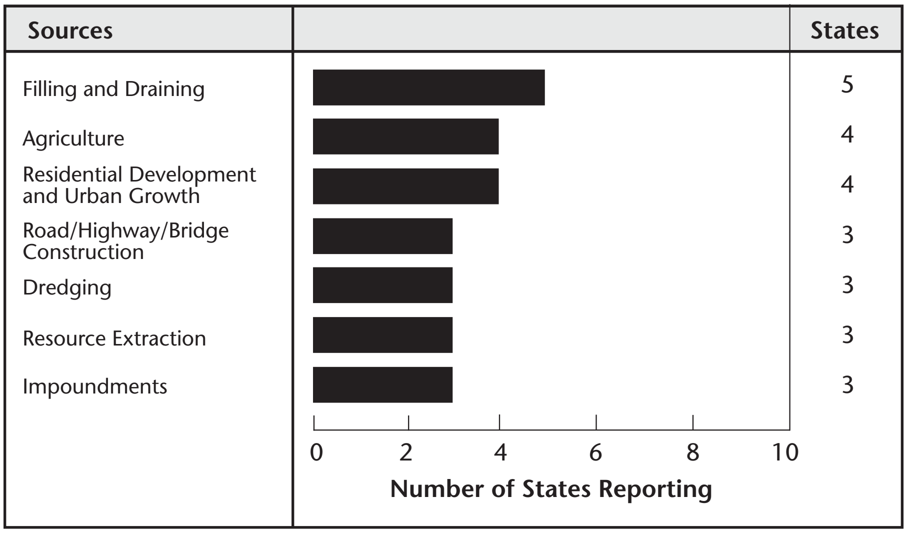
Wetlands at the margins of lakes, rivers, bays, and the ocean help protect shorelines and stream banks against erosion. Wetland plants hold the soil in place with their roots, absorb the energy of waves, and break up the flow of stream or river currents. The ability of wetlands to control erosion is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

Lastly, wetlands play a major role in our economy. For instance:

- Wetlands that support timber harvests total about 55 million acres.
- Various plants like blueberries, cranberries, mints, and wild rice are produced in wetlands.
- About 96% of the commercial fish and shellfish harvest and more than 50% of the recreational catch depend on estuarine or coastal wetlands.
- The nation's harvest of muskrat pelts is valued at over $70 million annually.
- At least $18 billion in economic activity is generated annually from recreational fishing in coastal wetlands by 17 million Americans.
- Nationally, economic activity directly associated with recreational bird watching (closely tied to wetlands and aquatic habitats) generated 191,000 jobs and more than $895 million in tax revenues in 1991.

Figure 5-4

Sources of Recent Wetland Losses
(9 States Reporting)



Based on data contained in Appendix D, Table D-4.

Wetland Loss in the United States

It is estimated that over 200 million acres of wetlands existed in the lower 48 states at the time of European settlement. Since then, extensive wetland acreage has been lost. Many of our original wetlands have been drained and converted to farmland and urban development. One of the surest ways to degrade the beneficial use of a wetland is to eliminate it through excavation, filling, or draining.

The average annual loss of wetlands has decreased over the past 40 years. According to a report issued by the National Wetland Inventory (*Status and Trends of Wetlands in the Conterminous United States 1986 to 1997*, U.S. Fish and Wildlife Service), the rate of wetland loss in the United States has decreased to an estimated annual loss of 58,500 acres (an 80% reduction compared to the previous decade). The Natural Resource Conservation Service's Natural Resource Inventory (NRI), reporting on the health of America's private lands, also shows significant reduction in wetland losses. The NRI found an average annual net loss of 32,600 acres of wetlands on nonfederal lands from 1992 to 1997 (a 58% reduction compared to the previous decade).

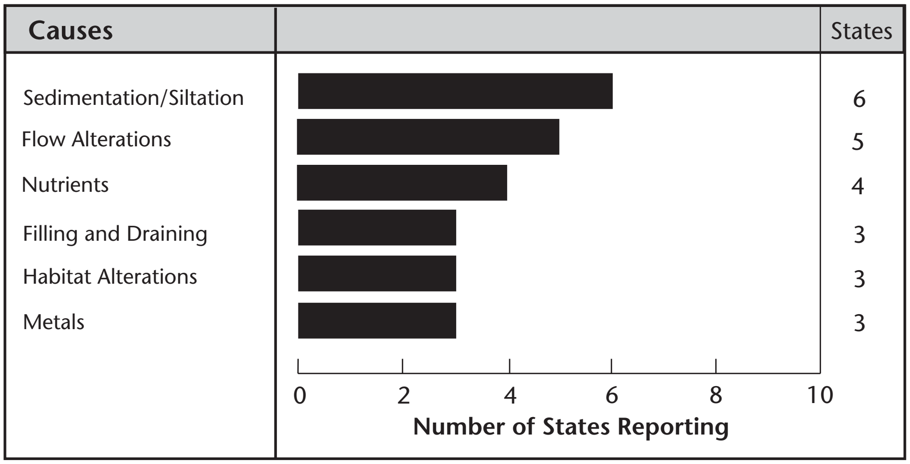
The decline in wetland losses is a result of several trends, including the decline in profitability of converting wetlands for agricultural production, the presence of Clean Water Act Section 404 permit programs as well as development of state management programs, greater public interest and support for wetland protection, and implementation of wetland restoration programs at the federal, state, and local levels. Filling and draining, agriculture, and development are the leading sources of recent wetland loss (Figure 5-4).

Assessing the Quality of Wetlands

Applying water quality standards to wetlands is a key goal of EPA's program to protect the nation's wetland resources. According to the

Figure 5-5

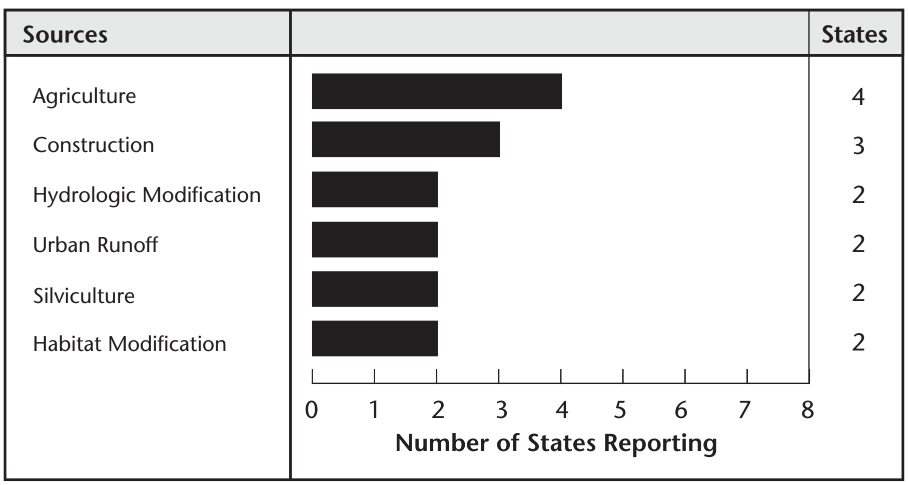
Causes Degrading Wetland Integrity
(9 States Reporting)



Based on data contained in Appendix D, Table D-2.

Figure 5-6

Sources Degrading Wetland Integrity
(9 States Reporting)



Based on data contained in Appendix D, Table D-3.

2000 water quality assessments, the states, tribes, and other jurisdictions are making progress incorporating wetlands into water quality standards and developing designated uses and criteria specifically for wetlands. Eleven states have at least a portion of their water quality standards already in place for wetlands, while six additional states have standards under development or proposed (see Appendix D, Table D-5). However, most states and tribes still lack wetland-specific designated uses, criteria, and monitoring programs for wetlands. Without these, they cannot evaluate support of designated uses in their wetlands.

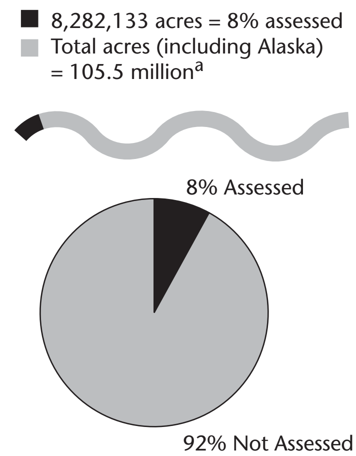
In their 2000 reports, only nine states and tribes reported the designated use support status for some of their wetlands (see Appendix D, Table D-1). EPA cannot draw national conclusions about water quality conditions in all wetlands because the states used different methodologies to survey only 8% of the total wetlands in the nation. Additionally, only one state used random sampling techniques and two used a targeted approach (monitoring where problems were known or suspected).

States reported in 2000 that the leading causes and sources of wetland degradation remained nearly unchanged from those reported in 1998. Sediment/siltation, flow alterations, and nutrients top the list of reported causes of pollution (Figure 5-5). Wetlands can sustain, and are particularly noted for counteracting, a certain amount of these sediments and nutrients. However, excessive amounts of nutrients such as nitrogen and phosphorous affect wetlands by causing too much vegetative growth and decay that can alter water chemistry and make vegetative communities less diverse. Excessive sedimentation can effectively smother a wetland by physically coating its surface and impeding vegetative growth, or in extreme cases by creating too much distance between the root zone and the ground water table, so that it no longer retains wetland characteristics. Flow alteration may occur two ways: as a result of the construction of drainage ditches or canals that intentionally or inadvertently dry out the wetland, or as a result of the construction of flood control berms, dikes, or levees that channel excess water into the wetland or cause the wetland to retain too much water, significantly oversaturating it or even transforming it to open water. Agriculture and construction are reported as important sources of degradation (Figure 5-6).

To adequately monitor the condition of their wetlands, states and tribes may apply a range of methods, including biological assessment, hydrogeomorphic (HGM) assessment, and geographic information system (GIS)-based landscape analyses. For instance, North Carolina does not use on-site monitoring to determine use support for most of the state's 7,175,000 acres of wetlands. Instead, the state often assigns use support designations to wetlands using soil maps, National Wetland Inventory maps, aerial photographs, and information on land use practices. Wetland area that has been converted to agricultural or urban uses, for example, has lost all or most of its original wetland uses, and would be classified as "not supporting." Wetlands where the vegetation, soil, and/or hydrology have been altered but most wetland uses remain intact are termed "partially supporting." North Carolina uses the support numbers determined with these methods to present a general idea of wetlands status throughout the state. In Louisiana, wetlands cover approximately 28% of the state's surface area. The state is now developing a designated use category for wetlands that will have specific water quality criteria to protect different types of wetlands. The state hopes this will be an improvement over the current system, which requires the development of site-specific criteria before a wetland can be classified. Louisiana is also reviewing projects that would alter the water quality standards to allow certain wetland systems to be used for wastewater management. The discharge of treated sanitary wastewater can help prevent wetland loss by preventing subsidence of the sediments, which is a significant problem facing some of Louisiana's wetlands.

EPA and its state, federal, local, and academic partners are developing technical guidance on elements of an adequate wetland monitoring program to support the efforts of states and tribes to accurately characterize the condition of their wetlands. Guidance on development of state water quality standards specifically tailored to the unique characteristics of wetlands is also underway.

Wetland Acres Assessed by States and Tribes



[a]From: National Wetland Inventory, 2000.

Source: 2000 Section 305(b) reports submitted by states, tribes, territories, and commissions.

More information on wetlands can be obtained from EPA's Wetlands Hotline at 1-800-832-7828, 9 a.m. to 5 p.m. Eastern Standard Time.