New Hampshire
Wetland Resources

Wetlands are an integral part of New Hampshire's natural resources. They provide essential habitat for wildlife and vegetation, including rare and endangered species and natural communities. Wetlands are a source of timber and provide opportunities for hunting and fishing, education and research, and bird, wildlife, and plant observation, all of which benefit the tourist industry and economy. Other benefits include flood control, bank- and shoreline-erosion control, sediment retention, water filtration, and nutrient uptake. In recognition of the importance of wetlands, many government agencies and private organizations have worked to preserve wetlands and educate the public about wetland values. For example, Lake Umbagog and its associated wetlands (fig. 1), which constitute one of the most productive wildlife areas in New Hampshire, are protected by the State and by the U.S. Fish and Wildlife Service (FWS) as a National Wildlife Refuge.

TYPES AND DISTRIBUTION

Wetlands are lands transitional between terrestrial and deepwater habitats where the water table usually is at or near the land surface or the land is covered by shallow water (Cowardin and others, 1979). The distribution of wetlands and deepwater habitats in New Hampshire is shown in figure 2*A*; only wetlands are discussed herein.

Wetlands can be vegetated or nonvegetated and are classified on the basis of their hydrology, vegetation, and substrate. In this summary, wetlands are classified according to the system proposed by Cowardin and others (1979), which is used by the FWS to map and inventory the Nation's wetlands. At the most general level of the classification system, wetlands are grouped into five ecological systems: Palustrine, Lacustrine, Riverine, Estuarine, and Marine. The Palustrine System includes only wetlands, whereas the other systems comprise wetlands and deepwater habitats. Wetlands of the systems that occur in New Hampshire are described below.

System	Wetland description
Palustrine	Nontidal and tidal-freshwater wetlands in which vegetation is predominantly trees (forested wetlands); shrubs (scrub-shrub wetlands); persistent or nonpersistent emergent, erect, rooted herbaceous plants (persistent- and nonpersistent-emergent wetlands); or submersed and (or) floating plants (aquatic beds). Also, intermittently to permanently flooded open-water bodies of less than 20 acres in which water is less than 6.6 feet deep.
Lacustrine	Nontidal and tidal-freshwater wetlands within an intermittently to permanently flooded lake or reservoir larger than 20 acres and (or) deeper than 6.6 feet. Vegetation, when present, is predominantly nonpersistent emergent plants (nonpersistent-emergent wetlands), or submersed and (or) floating plants (aquatic beds), or both.
Riverine	Nontidal and tidal-freshwater wetlands within a channel. Vegetation, when present, is same as in the Lacustrine System.
Estuarine	Tidal wetlands in low-wave-energy environments where the salinity of the water is greater than 0.5 part per thousand (ppt) and is variable owing to evaporation and the mixing of seawater and freshwater.
Marine	Tidal wetlands that are exposed to waves and currents of the open ocean and to water having a salinity greater than 30 ppt.

Rubin and others (1993) used LANDSAT (satellite) imagery to estimate wetland area at 396,246 acres, or about 6.7 percent of the State. That estimate probably underestimates the actual wetland area owing to similarities between evergreen forest in upland and wetland areas. Also, LANDSAT imagery cannot discern wetlands smaller than about 2 acres (Ken Kettenring, New Hampshire Wetlands Board, oral commun., 1993). Estimates of wetland area based on review of permits by the U.S. Environmental Protection Agency (EPA) and field checking during functional assessments by the Audubon Society of New Hampshire place New Hampshire's wetland area at about 10 percent of the State's total area (Mark Kern, Environmental Protection Agency, oral commun., 1993).

The distribution of wetlands in New Hampshire has been influenced by the State's physiography (fig. 2*B*). In the northern part of the White Mountain Section, glacial erosion and sediment deposits have created broad valleys in which large wetland complexes have formed. For example, many wetlands are present along tributaries to the Connecticut Lakes and Lake Francis near Pittsburg. Small wetlands in the White Mountains have formed mainly along small streams in river valleys or where streams flow over flat benches on hillsides. Wetlands in the New England Upland and Seaboard Lowland Sections are in many settings, such as in topographic depressions, around the margins of ponds and lakes, and in river valleys. In many areas of the State, small wetlands are interrelated and form large wetland complexes.

To date (1993) there is no published information concerning acreage of the different wetland types in New Hampshire. However, the similarities of the ecological, hydrologic, and physiographic settings of New Hampshire to those in the other New England States makes it likely that the predominant wetland types in the State are the same as in the remainder of the region—palustrine forested and scrub-shrub (Tiner, 1987, 1992; Widoff, 1988). Forested and scrub-shrub wetlands that have organic-rich mineral soils are commonly referred to as swamps, whereas wetlands that have organic soils over mineral soils are called peatlands. In southern New Hampshire and in the Connecticut River Valley, forested swamps in poorly drained basins typically are dominated by red maple or have mixtures of red maple, yellow birch, hemlock, and white pine. Swamps in the flood plains of major rivers typically are dominated by silver maple. Peatlands in southern and coastal New Hampshire commonly contain pitch pine or Atlantic white cedar (Dan Sperduto, New Hampshire Natural Heritage Inventory, written commun., 1993). A few

Figure 1. Wetlands along the mouth of Hampshire Brook and Lake Umbagog. *(Photograph courtesy of the Society for Protection of New Hampshire Forests.)*

swamps in southern New Hampshire contain black gum, which is a species near the northern extent of its range. In northern New Hampshire and at higher altitudes, forested swamps typically contain red spruce and balsam fir, and forested peatlands generally are dominated by black spruce, larch, or northern white cedar.

Peatlands are present throughout New Hampshire but are more common in the north. Most are small. The absence of extensive peatlands in New Hampshire is due largely to the State's mountainous terrain (Johnson, 1985). The terms bog and fen have been used to differentiate peatlands in some classification systems (Damman and French, 1987). Bogs (palustrine forested and scrub-shrub wetlands) are acidic, nutrient poor, and have a low diversity of plant species, whereas fens (palustrine forested, scrub-shrub, and persistent-emergent wetlands) are less acidic and have higher nutrient levels and plant diversity. The herbaceous-plant community in bogs generally is dominated by sphagnum moss, whereas in fens it typically is dominated by mosses and sedges.

Scrub-shrub vegetation grows in most wetlands, typically as a transitional community between emergent wetlands and forested wetlands or upland, or between open water and forested wetlands or upland. In general, shrub swamps are dominated by broad-leaved deciduous shrubs such as willow and alder; scrub-shrub commu-

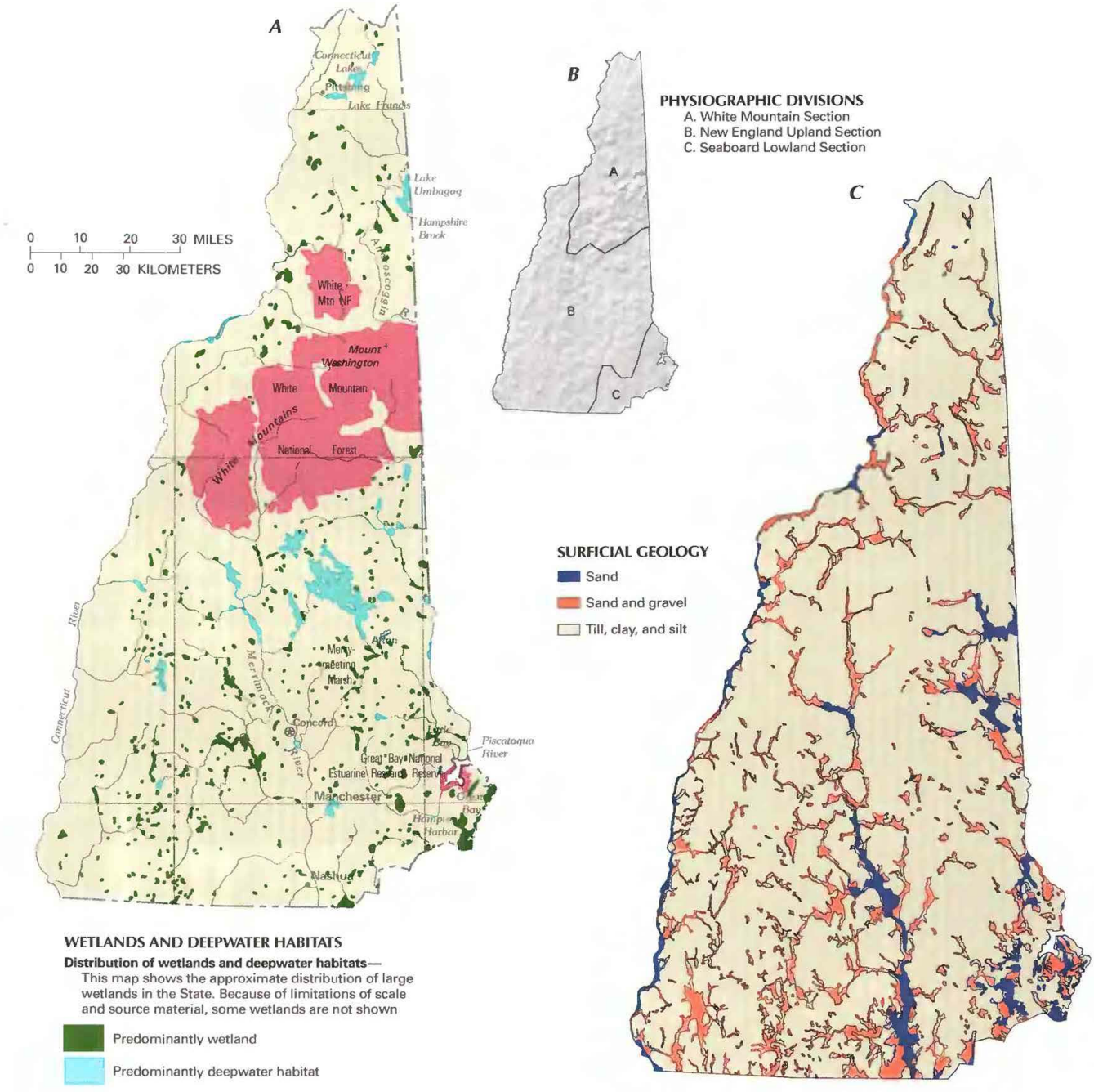

Figure 2. Wetland distribution and physical features that control wetland distribution in New Hampshire. ***A***, Distribution of wetlands and deepwater habitats. ***B***, Physiography. ***C***, Surficial geology. *(Sources: A, T.E. Dahl, U.S. Fish and Wildlife Service, unpub. data, 1991. B, Physiographic divisions from Fenneman, 1946; landforms data from EROS Data Center; C, Koteff, 1993).*

nities in bogs contain broad-leaved evergreen shrubs such as leatherleaf and labrador tea and stunted conifers such as black spruce and larch; and fens generally contain broad-leaved evergreen shrubs, broad-leaved deciduous shrubs, and northern white cedar. (Dan Sperduto, written commun., 1993).

Palustrine emergent wetlands, commonly referred to as marshes, are more common in southern New Hampshire. Most are small and associated with lacustrine or riverine wetlands. Marshes that have shallow water or saturated soils generally contain sedges, rushes, or grasses, whereas those in deeper water typically contain cattails.

Most of New Hampshire's lakes and rivers have areas of shallow water where aquatic vegetation has become established. These lacustrine and riverine wetlands are essential for the biological productivity of lakes and rivers. As a result of recent increases in beaver populations, many riparian (streamside) wetlands along smaller streams and rivers have been flooded behind beaver dams. Over time, this flooding promotes a cyclical change from riparian shrub swamps to small ponds and marshes to wet meadows and then back to shrub swamps (George Springston, Vermont Wetlands Office, written commun., 1993). Many State wildlife areas contain emergent wetlands in impoundments built for the improvement of waterfowl habitat. However, although flooding caused by beaver dams or manmade dams can create wetlands, it also can be detrimental to existing riparian wetlands.

Estuarine and marine wetlands along New Hampshire's 18-mile coastline are estimated at about 7,500 acres (New Hampshire Office of State Planning, 1989). Most of these wetlands are in or near Hampton Harbor, Great Bay, and Little Bay. Short (1992) determined that Great Bay estuary, which includes Great Bay, Little Bay, and the lower Piscataqua River, contains about 2,600 acres of aquatic beds, 1,200 acres of mud flats, and 1,000 acres of salt marsh. In general, salt marshes that are only occasionally flooded by tides are vegetated predominantly by saltmeadow cordgrass and black grass, whereas those that are regularly flooded are dominated by saltmarsh cordgrass.

HYDROLOGIC SETTING

Wetlands are hydrologic features that form where climate and physiography favor the retention of water. Wetlands are found along rivers, lakes, and estuaries where flooding occurs, in isolated depressions surrounded by upland where surface water collects, on slopes and surface drainageways, and where ground water discharges to the land surface in spring or seepage areas. Soil saturation favors the growth of wetland plants and development of hydric soils. Water either can flood wetlands, be present at the surface of wetlands, or keep underlying soils saturated near the surface with no surface water present (Tiner, 1991).

The timing and duration of the presence of water affects water chemistry, soil development, and plant-community structure in wetlands. Although degree of wetness is important in the determination of wetland type, many ecologic functions of wetlands also depend upon wetland size, position of the wetland in a drainage network, and sources of water (Brinson, 1993). Climate, physiography, and geology influence the hydrology and water quality of wetlands. The complex interactions of these variables with biotic factors and site history determine the type of wetland that develops in any particular setting.

New Hampshire's climate is conducive to wetland development. Precipitation exceeds potential evapotranspiration on an annual basis, and the excess moisture is available for formation and maintenance of wetlands. Climate varies with altitude and distance from the Atlantic Ocean. For example, from the coast to the White Mountains, average annual precipitation and average annual runoff increase, summer temperatures decrease, and the growing season becomes shorter (Hammond and Cotton, 1986). Wetland vegetation is influenced by these climatic differences. Wetlands in southern New Hampshire are dominated by plant communities similar to those of southern New England wetlands, whereas wetlands in northern New Hampshire are dominated by communities similar to those in Canadian wetlands.

The distribution of wetlands in New Hampshire also is partly determined by physiography, distribution of glacially derived sediments, and the geologic character of the underlying bedrock. Areas of steep topography do not retain water long enough for wetlands to develop. However, given favorable hydrologic conditions, wetlands can form on drainage divides and near mountaintops. For example, several ridge-top subalpine bogs occur on Mount Washington (Johnson, 1985). Most of New Hampshire's wetlands, however, are in lowlands, valleys, and depressions that have more favorable hydrologic conditions for wetlands.

Many of the low-lying areas of New Hampshire are covered by stratified sand, gravel, clay, and silt deposited by glacial meltwater and by modern streams in the time since glaciation (fig. 2*C*). Most uplands are underlain by bedrock mantled by glacial till, a mixture of clay, silt, sand, gravel, and boulders. Both till and fine-grained sediments can restrict drainage and retain surface water. Wetlands form over till in many small depressions in New Hampshire uplands, over silty, clayey sands in some valleys in northern New Hampshire, over fine-grained glacial-lake deposits in parts of the Merrimack and Connecticut River valleys, and over fine-grained marine deposits along the coast. In seep areas near streams or depressions that intersect the water table, coarse-grained glacial deposits can transmit ground water to overlying wetlands (Motts and O'Brien, 1981). Some glacial landforms, such as ridges, hills, and depressions can create conditions favorable for wetland formation by attenuating runoff or retaining water. For example, kettles, which are depressions that formed when glacial ice that had been buried by outwash melted, have either filled with water to form ponds or passed through several successional stages of infilling to become bogs.

Contrasts in the interactions between hydrology and vegetation in different settings can be illustrated by peatlands and coastal pondshore wetlands. In peatlands, vegetation patterns are determined largely by water chemistry and movement (Damman and French, 1987). For example, bogs receive little input from runoff or ground water and rely on precipitation (including fog) and windblown dust as sources for water, nutrients, and minerals. Vegetation in bogs commonly grows in a concentric pattern because of the scarcity of nutrients and minerals in the center of the bog and the increased availability of nutrients and minerals along bog margins. Bogs are seldom flooded; even quaking (floating-mat) bogs surrounding open water in ponds are rarely flooded because the bog mat fluctuates with changes in water level. Fens also receive inputs from precipitation but rely principally on ground water and overland flow for inputs of minerals and nutrients; like bogs, fens seldom are flooded.

In contrast, flooding is the major hydrologic influence in pondshore wetlands. Coastal ponds occur largely in sandy glacial outwash, and pond water levels reflect seasonal and annual fluctuations in ground-water levels. Pondshore wetlands can be flooded or saturated for much of the year. Wetland plant communities are concentrically zoned around the pond along a gradient from the longest to the shortest duration of flooding (Dan Sperduto, written commun., 1993).

TRENDS

Wetlands once were much more extensive in New Hampshire. In the 1800's and early 1900's, timber harvesting and clearing and draining of wetlands for crops and grazing resulted in the loss or

degradation of many wetlands, particularly in the major river valleys and along the coastline. Some of those areas reverted to wetlands as pasture land was abandoned. In some cases, the character of the wetlands has changed. For example, most of New Hampshire's Atlantic white cedar bogs were altered by logging or flooding, and many have revegetated with red maple. As much as 7,500 acres of tidal marsh have been lost since settlement by Europeans (New Hampshire Office of State Planning, 1989). Although several Federal and State regulations focus on minimizing wetland loss, many wetlands remain vulnerable.

Development in and near wetlands due to urbanization is a major cause of wetland loss or degradation. Other factors that can destroy wetlands or affect wetland functions include farming, peat harvesting, timber harvesting, road building, inadequate bridge-support spacing and culvert diameter, all-terrain vehicle use, reservoir construction, hydropower releases, navigation impoundments, ground-water pumping, and air or water pollution.

CONSERVATION

Many government agencies and private organizations participate in wetland conservation in New Hampshire. The most active agencies and organizations and some of their activities are listed in table 1.

Federal wetland activities.—Development activities in New Hampshire wetlands are regulated by several Federal statutory prohibitions and incentives that are intended to slow wetland losses. Some of the more important of these are contained in the 1899 Rivers and Harbors Act; the 1972 Clean Water Act and amendments; the 1985 Food Security Act; the 1990 Food, Agriculture, Conservation, and Trade Act; the 1986 Emergency Wetlands Resources Act; and the 1972 Coastal Zone Management Act.

Section 10 of the Rivers and Harbors Act gives the U.S. Army Corps of Engineers (Corps) authority to regulate certain activities in navigable waters. Regulated activities include diking, deepening, filling, excavating, and placing of structures. The related section 404 of the Clean Water Act is the most often-used Federal legislation protecting wetlands. Under section 404 provisions, the Corps issues permits regulating the discharge of dredged or fill material into wetlands. Permits are subject to review and possible veto by the EPA, and the FWS has review and advisory roles. Section 401 of the Clean Water Act grants to States and eligible Indian Tribes the authority to approve, apply conditions to, or deny section 404 permit applications on the basis of a proposed activity's probable effects on the water quality of a wetland.

Most farming, ranching, and silviculture activities are not subject to section 404 regulation. However, the "Swampbuster" provision of the 1985 Food Security Act and amendments in the 1990 Food, Agriculture, Conservation, and Trade Act discourage (through financial disincentives) the draining, filling, or other alteration of wetlands for agricultural use. The law allows exemptions from penalties in some cases, especially if the farmer agrees to restore the altered wetland or other wetlands that have been converted to agricultural use. The Wetlands Reserve Program of the 1990 Food, Agriculture, Conservation, and Trade Act authorizes the Federal Government to purchase conservation easements from landowners who agree to protect or restore wetlands. The Consolidated Farm Service Agency (formerly the Agricultural Stabilization and Conservation Service) administers the Swampbuster provisions and Wetlands Reserve Program. The Natural Resources Conservation Service (formerly the Soil Conservation Service) determines compliance with Swampbuster provisions and assists farmers in the identification of wetlands and in the development of wetland protection, restoration, or creation plans.

The 1986 Emergency Wetlands Resources Act and the 1972 Coastal Zone Management Act and amendments encourage wetland protection through funding incentives. The Emergency Wetland Resources Act requires States to address wetland protection in their Statewide Comprehensive Outdoor Recreation Plans to qualify for Federal funding for State recreational land; the National Park Service (NPS) provides guidance to States in developing the wetland component of their plans. Coastal States that adopt coastal-zone management programs and plans approved by the National Oceanic and Atmospheric Administration (NOAA) are eligible for Federal funding and technical assistance through the Coastal Zone Management Act.

Some of New Hampshire's wetlands are managed by Federal agencies. The FWS manages wetlands in waterfowl-protection areas, National Fish Hatcheries, and National Wildlife Refuges. Also, the FWS administers wetland-acquisition programs such as the Partners for Wildlife Program, which helps restore wetlands on private lands,

Table 1. Selected wetland-related activities of government agencies and private organizations in New Hampshire, 1993

[Source: Classification of activities is generalized from information provided by agencies and organizations. •, agency or organization participates in wetland-related activity; .., agency or organization does not participate in wetland-related activity. MAN, management; REG, regulation; R&C, restoration and creation; LAN, land acquisition; R&D, research and data collection; D&I, delineation and inventory]

Agency or organization	MAN	REG	R&C	LAN	R&D	D&I
FEDERAL						
Department of Agriculture						
Consolidated Farm Service Agency	...	•	...	...	..	...
Forest Service	•	...	•	•	•	•
Natural Resources Conservation Service	..	•	•	...	•	•
Department of Commerce						
National Oceanic and Atmospheric Administration	•	•	•	•	•	•
Department of Defense						
Army Corps of Engineers	•	•	•	•	•	•
Military reservations	•	..	...	...	...	...
Department of the Interior						
Fish and Wildlife Service	•	...	•	•	•	•
Geological Survey	...	...	..	...	•	•
National Biological Service	..	...	..	...	•	...
National Park Service	•	...	•	•	•	•
Environmental Protection Agency	...	•	...	...	•	•
STATE						
Department of Environmental Services	...	•	...	...	..	...
Waste Management	•	•	...	...	...	..
Water Resources Division	•	•	•	•	•	•
Water Supply and Pollution Control	•	•	..	...	...	...
Department of Resources and Economic Development	...	•	...	...	...	..
Division of Forests and Lands	•	•	...	•	..	...
Division of Parks and Recreation	...	...	...	•	...	...
Natural Heritage Inventory	•	•	...	...	...	•
Department of Safety	..	•	...	...	...	...
Department of Transportaiton	..	•	...	•	...	...
Fish and Game Department	•	•	•	•	•	•
Office of State Planning	•	•	•	•	..	•
State educational institutions	...	..	...	•	•	•
Wetlands Board	..	•	..	...	..	...
COUNTY AND LOCAL						
Conservation Commissions	...	•	...	•	...	...
Soil and Water Conservation Districts	...	..	•	...	...	•
Some county and local governments	•	•	•	•	..	..
PRIVATE ORGANIZATIONS						
Audubon Society of New Hampshire	•	...	...	•	•	...
Ducks Unlimited	•	..	..	•	..	...
New England Wildflower Society	•	...	...	•	..	...
Private colleges and other educational institutions	•	...	...	•	•	•
Society for the Protection of New Hampshire Forests	•	...	...	•	...	•
The Nature Conservancy	•	...	...	•	...	...

and the North American Waterfowl Management Plan, a cooperative program that provides funding for purchasing wetlands and associated uplands. The FWS also has funded research on peatland ecology (Damman and French, 1987). The NPS has designated 11 sites in New Hampshire as National Natural Landmarks, at least 4 of which contain significant wetlands. Some of these are owned by the State, and others are protected voluntarily by individual landowners. The U.S. Forest Service manages a small number of wetlands in the White Mountain National Forest. The Great Bay National Estuarine Research Reserve is supported by NOAA in cooperation with the New Hampshire Fish and Game Department. The EPA, through a grant program under the Clean Water Act, has provided funding to the New Hampshire Wetlands Board and the New Hampshire Department of Resources and Economic Development's Natural Heritage Inventory Program. The EPA also is providing additional funds through the Merrimack River Initiative to identify and protect important resources and habitats of the Merrimack River, including wetlands. The Corps is investigating the effectiveness of wetlands on storage and regulation of flood flows along the Connecticut River and the effect of development within the basin on natural valley storage. The U.S. Geological Survey, together with the New Hampshire Department of Environmental Services, is mapping marsh and peat deposits in the State.

State wetland activities.—New Hampshire regulates wetlands primarily through State law and the rules of the Wetlands Board. The Wetlands Board consists of 12 members who represent government and industry. Administrative support to the Wetlands Board is provided largely by the Wetlands Bureau of the Department of Environmental Services' Water Resources Division and by the New Hampshire Office of State Planning's Coastal Zone Management Program. In New Hampshire, wetland regulations require permits to dredge, fill, or place structures in tidal or nontidal wetlands and waterways. The highest value has been placed on coastal wetlands, which were first protected by State statute in 1967. To enhance habitat values in adjacent tidal wetlands and to protect tidal environments from potential sources of pollution, the Board also emphasizes the preservation of tidal buffer zones. For freshwater wetlands, emphasis is placed on bogs and marshes, with priority based on the rarity of the habitat type, the difficulty of restoration, and the wetland's functions (New Hampshire Wetlands Board, 1993).

Projects that will alter wetlands are categorized as major-, minor-, and minimum-impact projects and projects not requiring a permit. All wetlands are regulated regardless of size. In addition to the size and type of the disturbance allowed in each category, the evaluation criteria include (1) the history of disturbance at the site and related projects elsewhere in the wetland or wetland complex (cumulative impact), (2) whether the wetland has been identified by the Natural Heritage Inventory Program as an exemplary natural community or whether there are documented occurrences of State or federally listed endangered or threatened species, (3) the function and value of the area, and (4) whether the wetland is designated a "Prime Wetland" by the local community under State guidelines. The Wetlands Board may not grant a permit for projects in or adjacent to an area designated as "prime" without a public hearing and without evidence in the record that there will be no significant net loss of values as a result of the project or activity associated with the project. Because the State's regulations are more inclusive than section 404 of the Clean Water Act, the Corps has issued a New Hampshire State Programmatic General Permit that allows as much as 95 percent of the permit applications in New Hampshire that normally would require a Corps permit to be approved through the New Hampshire Wetlands Board permitting process after Corps review (K.N. Kettenring, written commun., 1993).

The Department of Environmental Services administers section 401 of the Federal Clean Water Act, which requires State water-quality certification before a section 404 permit may be issued. The Department of Environmental Services' Water Resources Division also protects some wetlands through regulations of activities in rivers and lakes. The New Hampshire Department of Resources and Economic Development's Division of Forests and Lands establishes and enforces acceptable management practices for logging and erosion control near surface-water bodies and wetlands.

Other legislation designed to protect ecologically sensitive habitats such as wetlands includes the New Hampshire Native Plant Protection Act of 1987, which requires all State agencies and departments to cooperate in preserving and protecting endangered and threatened plants. In addition, the New Hampshire Legislature has enacted a Current Use Taxation law to reduce development pressures on recreational, scenic, and ecologically important open spaces. This law uses a property tax abatement program on tracts of land larger than 10 acres to encourage preservation of open space, farm land, forest land, wild land, and recreation land, including wetlands and flood plains (New Hampshire Office of State Planning, 1989).

Several State agencies own or manage wetlands or are involved in other aspects of wetland protection. The Department of Fish and Game acquires and protects wetlands through wildlife-management programs. Wetlands are purchased with funds received from the sale of wildlife emblems and migratory-waterfowl stamps, as well as from accounts set up for management of nongame and endangered species (New Hampshire Office of State Planning, 1989). The Department owns about 35,000 acres, more than one-half of which is wetland. Most of these wetlands are part of wildlife-management areas. Merrymeeting Marsh is one example. The Natural Heritage Inventory Program has documented New Hampshire's natural communities and rare and endangered species and their habitats. The Program also develops plans for the protection of endangered and threatened plant species and reviews State projects and permit applications for activities that could affect wetlands. The Office of State Planning is responsible for producing the wetland component of the New Hampshire Statewide Comprehensive Outdoor Recreation Plan, which describes the State's wetland-protection plans. Wetland losses due to roadbuilding are minimized through close cooperation between the New Hampshire Department of Transportation, the Wetlands Board, and Federal agencies.

County and local wetland activities.—Local conservation commissions have an advisory role in local wetland protection through oversight of the designation of Prime Wetlands and review of wetland permit applications. Under the Prime Wetlands law, municipalities may adopt what resembles a zoning overlay district (New Hampshire Office of State Planning, 1989). The adoption of the Prime Wetlands designation allows for protection of wetlands that have high local value even if they are not regionally or nationally significant. Conservation commissions must use inventory and evaluation methods accepted by the Wetlands Board for this process, such as those of Ammann and Stone (1991) and Cook and others (1993). As of 1993, Prime Wetlands designations had been adopted and submitted to the Wetlands Board by 20 of New Hampshire's 234 towns, and many others are in process (Marjorie Swope, New Hampshire Association for Conservation Commissions, oral commun., 1993).

Private wetland activities.—During 1987–83, through a partnership between the privately funded Trust for New Hampshire Lands and the publicly funded New Hampshire Land Conservation Investment Program, New Hampshire spent $46.4 million to protect 385 parcels of land totaling 100,897 acres, including diverse wetlands. These lands were acquired through purchases and donations or protected through the use of conservation easements. The Society for the Protection of New Hampshire Forests is compiling an inventory of the wetland acreage acquired by the program, which will be available through the Complex Systems Research Center at the University of New Hampshire.

Private organizations provide complementary functions that cannot readily be accomplished by governmental agencies. For example, private organizations such as The Nature Conservancy can more easily purchase property. The Nature Conservancy manages 14 preserves in New Hampshire, 8 of which include wetlands, and has protected 12 additional wetland sites by easement, management agreement, legal assistance, or purchase and transfer. The Audubon Society of New Hampshire monitors threatened and endangered species that use wetlands and offers educational workshops to promote the use of the New Hampshire Method (Ammann and Stone, 1991; Cook and others, 1993) for the evaluation of wetlands. The New Hampshire chapter of Ducks Unlimited has worked in cooperation with the State to purchase about 354 acres of wetland and surrounding upland habitat. The Society for Protection of New Hampshire Forests owns 83 properties and holds conservation easements on 309 properties, many of which include wetlands. Other wetlands are owned or protected by local land trusts, The New England Wildflower Society, the Appalachian Mountain Club, and many others. Individuals, timber companies, towns, and other private landowners own most of New Hampshire's wetlands, and many actively pursue wetland conservation.

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