

Nebraska

Wetland Resources

Although wetlands occupy only 1.9 million acres in Nebraska, or about 4 percent of the State's area (Dahl, 1990), Nebraska's wetland resources are diverse in form, function, and value. Within the State, wetlands range from freshwater to saline and from acidic to alkaline. Many are sustained by ground water, whereas others depend on precipitation and the resulting runoff as a water source (Gersib, 1991).

Wetlands in Nebraska have many functions that are of value to humans. Wetlands control flooding, trap sediment, control erosion, retain nutrients, and sometimes recharge ground water. Wetlands are used recreationally for canoeing, fishing, hunting, and swimming. In addition to being of economic and social value to humans, wetlands are critical to the survival of certain wildlife.

Nebraska has three major wetland complexes of international importance (Gersib, 1991). The Rainwater Basin wetland complex (fig. 1) in south-central and southeastern Nebraska provides staging and migrational habitat for waterfowl and shore birds in the spring. The basins in this complex are focal points in the Central Flyway spring-migration corridor. The Big Bend Reach of the Platte River is a migrational habitat for sandhill cranes and the endangered whooping crane. This reach also is breeding habitat for the endangered least tern and the threatened piping plover. The Sandhills wetland complex in north-central and northwestern Nebraska provides migrational habitat for the whooping crane and bald eagle, as well as migrational and breeding habitat for other nongame birds and waterfowl (Gersib, 1991).

TYPES AND DISTRIBUTION

Wetlands are lands transitional between terrestrial and deep-water 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 Nebraska is shown in figure 2A; 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

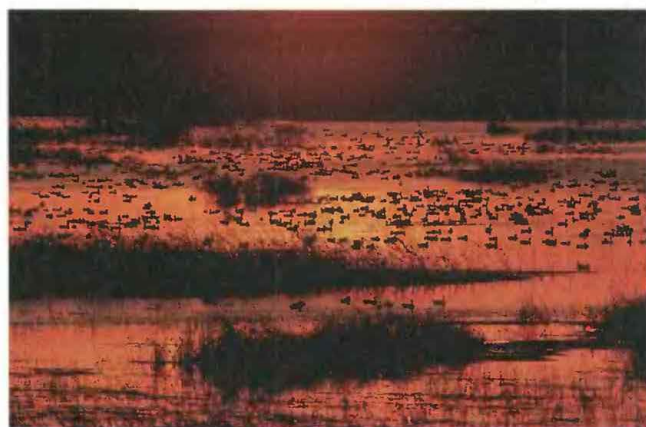


Figure 1. Waterfowl on a wetland in the Rainwater Basin wetland complex in south-central Nebraska at sunrise. This wetland complex is used by 5 to 7 million ducks and geese annually and has lost 78 percent of its original wetland acres. (Photograph courtesy of the Nebraska Game and Parks Commission.)

by Cowardin and others (1979), which is used by the U.S. Fish and Wildlife Service (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 Nebraska are described below.

System	Wetland description
Palustrine	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	Wetlands within an intermittently to permanently flooded lake or reservoir. Vegetation, when present, is predominantly nonpersistent emergent plants (nonpersistent-emergent wetlands), or submersed and (or) floating plants (aquatic beds), or both.
Riverine	Wetlands within a channel. Vegetation, when present, is same as in the Lacustrine System.

Although the FWS National Wetlands Inventory has wetland acreage statistics for most of the State, there is no statewide estimate of the wetland acreage within each of these systems. Gersib (1991) gives the approximate wetland acreage for six major wetland complexes in Nebraska: the Eastern Saline, the Rainwater Basin, the Missouri River, the Platte River Big Bend Reach, the North Platte River Lower Reach, and the Sandhills (fig. 2B). This estimate indicates that of the approximately 1.4 million acres of wetlands inventoried, 85 percent were palustrine, 13 percent were lacustrine, and 2 percent were riverine (Gersib, 1991). Documentation is not adequate for classification of other State wetlands.

HYDROLOGIC SETTING

The distribution of wetlands is determined by physiographic, climatic, and hydrologic factors. The eastern one-fourth of the State is generally characterized by low hills; the remainder is composed of dissected plains, high plains, and sandhills. Nebraska's climate is semiarid in the western part of the State and subhumid in the eastern part. Average annual precipitation from 1951 to 1980 ranged from less than 16 inches in the western panhandle to more than 32 inches in the southeastern corner of the State (Engel and Steele, 1986). Nebraska's average annual free-water-surface evaporation for 1956–70 ranged from about 42 inches in the northeastern part of the State to more than 52 inches in the southwest (Farnsworth and others, 1982). Average annual runoff differs considerably across the State, ranging from less than 1 inch in the west and southwest to about 6 inches in the southeast (Gebert and others, 1985).

Saline marshes (emergent wetlands) characterize the eastern saline wetland complex in southeastern Nebraska. These marshes have developed in areas where sandstone bedrock is at or near the land surface, and saline ground water seeps into streams or flood-

plain depressions (fig. 3A). Although seeps and springs contribute to the concentrations of dissolved solids in the saline marshes, surface runoff from precipitation and flooding along streams provide most of the wetlands' water supply and a substantial part of the dissolved solids (Farrar and Gersib, 1991). Most water loss is due to evapotranspiration, and this process has concentrated the dissolved minerals in the flood-plain soils and wetlands.

In south-central and southeastern Nebraska, overland runoff supplies nearly all water for wetlands within the Rainwater Basin wetland complex (Gilbert, 1989). This part of the State is characterized by nearly level to gently rolling loess plains; within these plains are depressions probably formed by wind erosion. Surface drainage is poorly developed, resulting in numerous closed basins in which all drainage is internal (Gersib, 1991). Most accumulated water is lost through evaporation, but some leaches through underlying materials and may produce chemical precipitates that result in a relatively impermeable layer below the land surface (Nebraska Game and Parks Commission, 1984) (fig. 3B). The water table generally is from 60 to 100 feet below the bottoms of most of these basins (Keech and Dreezen, 1968). The amount of water in the wetlands within the Rainwater Basin complex varies greatly and depends upon the rates of precipitation and evapotranspiration.

In the Missouri River wetland complex, wetlands form in and along the river (on alluvial islands, deep pools, marshes, and shallow-water areas), and isolated wetlands form within oxbows and

sloughs that have resulted from high flows that have changed the course of the river. Although shallow aquifers are associated with the Missouri River, the river is fed primarily by overland runoff (Kuzelka and others, 1993). Some water loss in the Missouri River wetlands is the result of evapotranspiration and seepage to the adjacent aquifers; however, much of the wetland loss is due to channelization and flood control along the river.

Along the Platte and North Platte Rivers, wet meadows (emergent wetlands) result from a combination of ground-water seepage, runoff from precipitation and snowmelt, and surface-water diversions and return flows (Hurr, 1983). During spring and early summer, snowmelt supplies water to the river, raising the river stage and causing a corresponding rise in ground-water levels in the adjacent flood plain (fig. 3C). Because of the high water table and surface soils that generally are saturated, precipitation often pools in the wet meadows in sloughs and swales (Currier, 1989). During summer and early fall, river stage is lower because of decreased runoff. Water loss from the associated wet meadows occurs by evapotranspiration and as a result of ground-water withdrawals that lower the water table in the river valley and induce infiltration from the river to the aquifer. Concurrently, water levels within the wet meadows associated with the river decline.

The Sandhills region of north-central and northwestern Nebraska contains the largest sand-dune area in the Western Hemisphere and one of the largest grass-stabilized dune regions in the

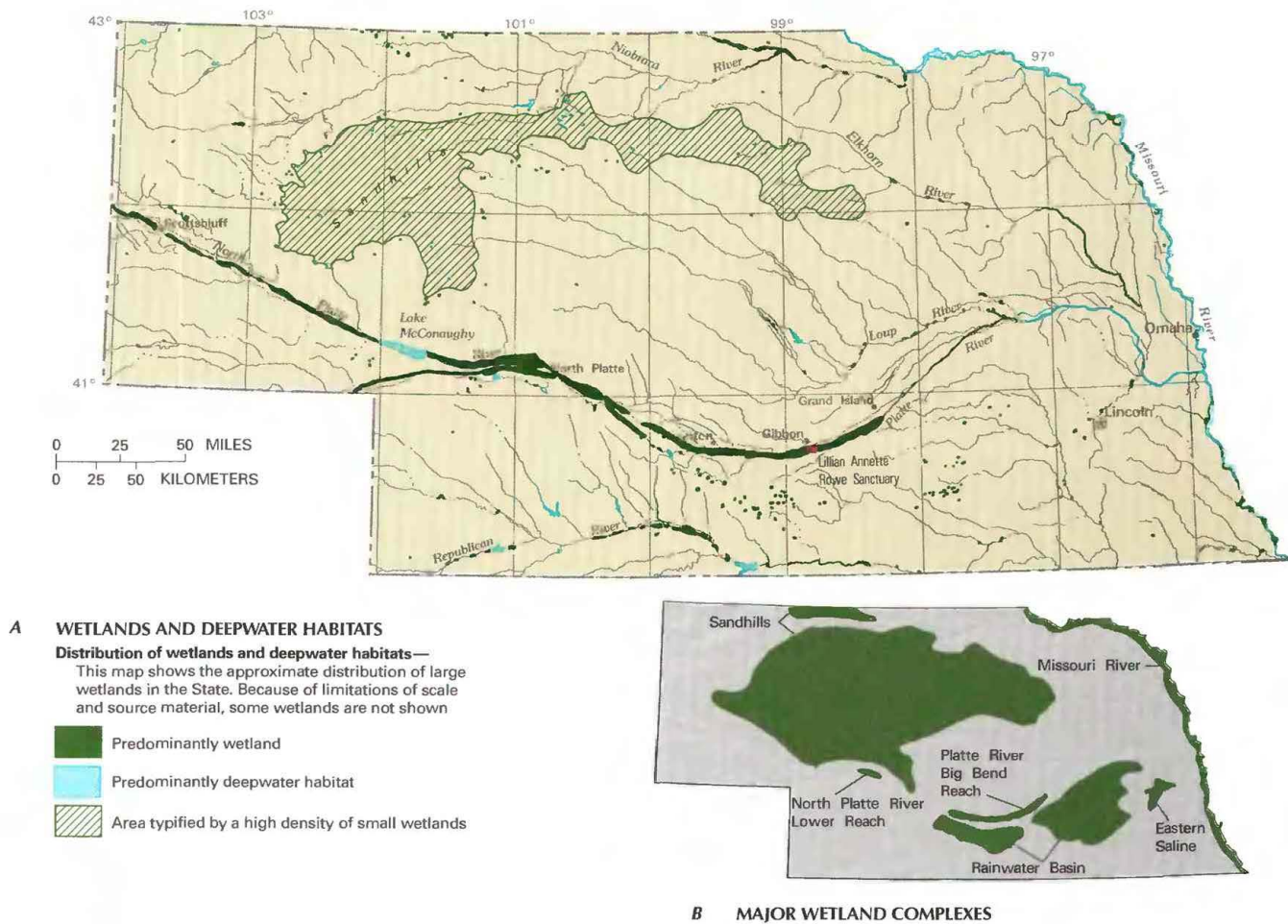


Figure 2. Distribution of wetlands and deepwater habitats and major wetland complexes in Nebraska. **A**, Distribution of wetlands and deepwater habitats. **B**, Major wetland complexes. (Sources: A, T.E. Dahl, U.S. Fish and Wildlife Service, unpub. data, 1991. B, Gersib, 1991.)

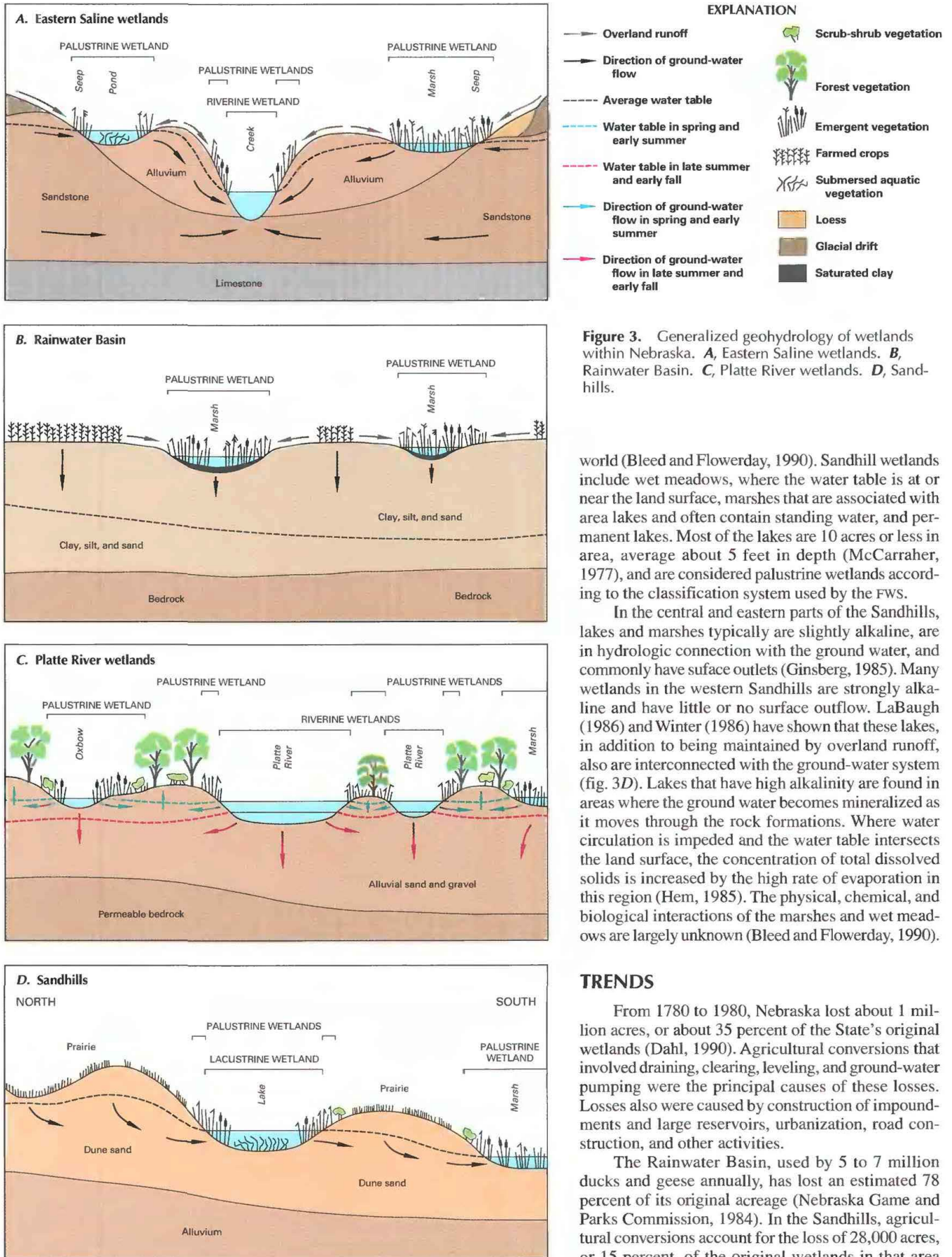


Figure 3. Generalized geohydrology of wetlands within Nebraska. **A.** Eastern Saline wetlands. **B.** Rainwater Basin. **C.** Platte River wetlands. **D.** Sandhills.

world (Bleed and Flowerday, 1990). Sandhill wetlands include wet meadows, where the water table is at or near the land surface, marshes that are associated with area lakes and often contain standing water, and permanent lakes. Most of the lakes are 10 acres or less in area, average about 5 feet in depth (McCarragher, 1977), and are considered palustrine wetlands according to the classification system used by the FWS.

In the central and eastern parts of the Sandhills, lakes and marshes typically are slightly alkaline, are in hydrologic connection with the ground water, and commonly have surface outlets (Ginsberg, 1985). Many wetlands in the western Sandhills are strongly alkaline and have little or no surface outflow. LaBaugh (1986) and Winter (1986) have shown that these lakes, in addition to being maintained by overland runoff, also are interconnected with the ground-water system (fig. 3D). Lakes that have high alkalinity are found in areas where the ground water becomes mineralized as it moves through the rock formations. Where water circulation is impeded and the water table intersects the land surface, the concentration of total dissolved solids is increased by the high rate of evaporation in this region (Hem, 1985). The physical, chemical, and biological interactions of the marshes and wet meadows are largely unknown (Bleed and Flowerday, 1990).

TRENDS

From 1780 to 1980, Nebraska lost about 1 million acres, or about 35 percent of the State's original wetlands (Dahl, 1990). Agricultural conversions that involved draining, clearing, leveling, and ground-water pumping were the principal causes of these losses. Losses also were caused by construction of impoundments and large reservoirs, urbanization, road construction, and other activities.

The Rainwater Basin, used by 5 to 7 million ducks and geese annually, has lost an estimated 78 percent of its original acreage (Nebraska Game and Parks Commission, 1984). In the Sandhills, agricultural conversions account for the loss of 28,000 acres, or 15 percent, of the original wetlands in that area

(Nebraska Game and Parks Commission, 1972).

Channelization of the Missouri River has enabled agricultural, urban, and industrial development of its flood plain, including the wetland areas. Wetland losses in the unchannelized reaches of the Missouri River also have been substantial owing to operation of dams on the main stem.

Williams (1978) showed that the North Platte and Platte Rivers have had channel-width decreases of 80 to 90 percent from the Wyoming–Nebraska State line to Overton between 1860 and 1965. From Overton to Grand Island, channel-width reductions of 60 to 70 percent have occurred.

CONSERVATION

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

Federal wetland activities.—Development activities in Nebraska 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; and the 1986 Emergency Wetlands Resources 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 U.S. Environmental Protection Agency (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 encourages wetland protection through funding incentives. The 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.

In addition to regulatory responsibilities, the EPA provides financial assistance for special studies, development of wetland in-

Table 1. Selected wetland-related activities of government agencies and private organizations in Nebraska, 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 Defense						
Army Corps of Engineers	●	●	●	●	●	●
Department of the Interior						
Bureau of Land Management	●	●	..
Bureau of Reclamation	●	..	●	●	●	..
Fish and Wildlife Service	●	..	●	●	●	●
Geological Survey	●	..
National Biological Service	●	..
National Park Service	●	..
Environmental Protection Agency	●	●	●
STATE						
Department of Environmental Quality	●	●	●
Department of Roads	●	●	●	●
Department of Water Resources	●	●	..
Forest Service	●	..
Game and Parks Commission	●	..	●	●	●	●
Natural Resources Commission	●	●
Water Resources Center	●	..
University of Nebraska						
Conservation and Survey Division	●	●
Other State-university programs	●	..
COUNTY AND LOCAL						
Some county and local governments	●	●	●
Natural Resources Districts	●	●	●	●	..
PRIVATE ORGANIZATIONS						
Ducks Unlimited	●	..	●	●	●	●
Nebraska Audubon Society	●	..	●	●	●	●
Platte River Whooping Crane						
Habitat Maintenance Trust, Inc.	●	..	●	●	●	●
Preserve Our Water Resources Association	●	●
The Nature Conservancy	●	..	●	●	●	●

ventories, and other resource-management tools. Technical assistance is available for wetland-delineation training, project consultation, and public education. The EPA oversees the development and implementation of water-quality standards that apply to surface waters, including wetlands, and a nonpoint-source pollution-control program that can include the restoration and maintenance of wetlands.

Other Federal agencies have active nonregulatory wetland policies. The U.S. Forest Service (FS) is involved primarily in research of riparian wetlands and in managing wetlands in the national forests in Nebraska. In addition, the FS is developing a program to integrate livestock grazing and wetland maintenance and is working with Ducks Unlimited, a private conservation organization, to develop habitat for waterfowl.

The Bureau of Land Management (BLM) manages 6,600 acres of public land in Nebraska. Some of these lands have been inventoried, and none have been identified as wetlands. If wetland areas are identified on BLM-administered lands, appropriate management actions and protective requirements for wetland habitats will be applied (Bureau of Land Management, 1992).

The Bureau of Reclamation (BOR) mitigates for degraded or destroyed wetlands through restoration of degraded wetlands and creation of new wetlands. The BOR, as stated in their wetland initiative, is responsible for the management of wetland resources that

occur on Federal property purchased for project purposes.

State wetland activities.—Nebraska has no laws specifically for the protection of wetlands. The Nebraska Department of Environmental Quality is responsible for the Clean Water Act section 401 certification process, which considers the effects of dredge or fill activities on water quality to determine compliance with State water-quality standards. An antidegradation clause within the standards protects present water-quality conditions and has been applied to wetlands.

The Nebraska Department of Roads must identify wetlands that might be degraded by road construction. If wetland degradation or destruction is unavoidable, the Department must, through the process of mitigation, restore former wetlands or create new wetlands. A mitigation bank for use by the Nebraska Department of Roads is being developed with the Corps, the FWS, the EPA, the Nebraska Game and Parks Commission, and the Nebraska Department of Environmental Quality.

The Nebraska Game and Parks Commission's involvement in wetlands includes the acquisition, restoration, and management of State-owned wetlands. The Commission also provides technical assistance for wetlands management to private owners and sponsors the Wetland Initiative Program. The Commission acts as an advisory agency for the section 404 permit process administered by the Corps. As a nonregulatory agency, the Commission has inventoried wetlands within the State but is not involved with the delineation of wetlands. The Nebraska Natural Heritage data base, now administered by the Commission, is the only existing comprehensive system for identifying the ecologically significant components of Nebraska's natural diversity (Clausen and others, 1989).

The Nebraska Department of Water Resources regulates construction in wetland areas through the flood-plain permit process within counties that do not assert jurisdiction. The Department also conducts wetland research, data collection, and education. Other State agencies that are involved in these activities are the Nebraska Natural Resources Commission, the Nebraska Forest Service, the Nebraska Water Resources Center, and the Conservation and Survey Division of the University of Nebraska.

County and local wetland activities.—Some county and local governments regulate construction in wetlands through flood-plain permits. The Nebraska Natural Resources Districts also are involved in conservation at the local level. The roles of the Districts differ with location. Many participate in the Wildlife Habitat Improvement Program, a cooperative program with the Nebraska Game and Parks Commission. Other Districts are active in wetland acquisition, restoration, creation, and management.

Private wetland activities.—Within Nebraska, numerous private organizations are involved in wetlands. The Nebraska chapter of The Nature Conservancy has purchased 1,750 acres of land at four different sites in the Platte River Big Bend Reach wetlands complex and about 500 acres within the Rainwater Basin wetlands complex. The Nature Conservancy and the Platte River Whooping Crane Habitat Maintenance Trust, Inc., a private organization, cooperatively manage most of that land.

Between 1979 and 1992, the Platte River Whooping Crane Habitat Maintenance Trust, Inc., acquired 8,600 acres of habitat in and along the Platte River; 1,200 acres are under perpetual conservation easement. The Trust's principal charge is the acquisition and management of wildlife habitat, but it also has the authority to conduct research and acquire interests in water and has the responsibility to protect the biologic and hydrologic integrity of the habitat.

The National Audubon Society owns and manages wetlands in Nebraska, including the 1,200-acre Lillian Annette Rowe Sanctuary near Gibbon. Local chapters of the National Audubon Society have diversified involvement in wetlands. Many chapters have wetland-education and wetland-identification programs but generally do not own or manage wetlands.

Ducks Unlimited has cooperative programs with government agencies and private organizations and will provide as much as 50-percent cost-share funding for wetland acquisition and development. Ducks Unlimited also is active in the creation and restoration of wetlands on land owned by the organization.

The Preserve Our Water Resources Association promotes the restoration and creation of wetlands and monitors the success of mitigation. Other private organizations participating in wetland activities include the Nebraska Sierra Club, The Nebraska Wildlife Federation, and Pheasants Forever.

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