Idaho
Wetland Resources

Although Idaho's wetlands account for less than 1 percent of the State's area, its many small and isolated wetlands are essential to the functioning of diverse ecosystems in deserts, plains, and mountains (fig. 1). Wetlands provide vital habitat for waterfowl, migratory birds, fish, and other wildlife. More than 75 percent of Idaho's wildlife depend on wetlands during some part of their life cycle (Idaho Department of Fish and Game, 1990). Wetlands enhance the water quality of lakes and streams by removing nutrients and pollutants from influent water. During floods, wetlands store floodwater temporarily, slow water velocities, and reduce bank erosion.

Cities, small communities, and farms commonly were settled next to or near riparian (streamside) wetlands because of the availability of water and shade. Wetland vegetation generally is more lush and productive than that in uplands; livestock benefit from shade and forage provided by healthy wetlands. Idaho's development was enhanced by extracting large quantities of gold and other metals from streambeds and riparian zones along streams. Idaho's wetlands benefit an increasing population and a large tourism industry by providing unique scenery and recreational opportunities.

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 Idaho 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 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 Idaho are described below.

Figure 1. The Tules, a wetland in an abandoned meander channel of the Owyhee River. Tules is a name commonly used for stands of bulrush or cattail. *(Photograph by R.K. Moseley, Idaho Department of Fish and Game.)*

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.

Dahl (1990) estimated that wetlands occupy about 386,000 acres in Idaho. Most of the State's wetlands are in flood plains and riparian areas along streams and other water bodies. These are palustrine wetlands that include swamps (forested wetland); scrub-shrub wetlands that also contain smaller acreages of marsh, wet meadow, and seeps (emergent wetlands); and a few small ponds.

Many of the State's wetlands are in National Wildlife Refuges managed by the FWS. The Bear Lake National Wildlife Refuge (NWR) in southeastern Idaho includes about 17,600 acres of wetland-upland complex consisting of marsh, open water, and grasslands. Other wetlands in southeastern Idaho—Oxford Slough in the Bear River Basin and Grays Lake in the Snake River Basin—also have extensive emergent wetlands; about 13,000 acres of the original lakebed at Grays Lake NWR is being restored to marsh by the FWS. Camas NWR and State refuges at Market and Mud Lakes in eastern Idaho also have marshes. Other refuges in the Snake River Basin are Minidoka NWR, which predominantly consists of scrub-shrub wetlands along the shores of Lake Walcott on the Snake River; Deer Flat NWR, which includes Lake Lowell Reservoir (about 11,600 acres of wetlands and deepwater habitat); and 109 islands in the Snake River. Notable emergent wetlands are at Camas Prairie Centennial Marsh and C.J. Strike Reservoir. In the northern Rocky Mountains, the Kootenai NWR contains about 2,800 acres of wetlands on the flood plain of the Kootenai River. The mud flats along the Pack River and delta marshes along the Clark Fork are among the larger wetlands in northern Idaho. Small bogs, which are emergent wetlands that have organic soils and receive moisture only from precipitation, also are present in northern Idaho (Bureau of Reclamation, 1992).

Wetlands in Idaho's mountains are mostly alpine meadows (emergent wetlands) in flood plains and small shallow lakes and marshes in intermontane basins. In Idaho's plains, most wetlands are associated with river systems, although locally, high water tables sustain small wetlands, and during wet years, playas can be filled by surface-water runoff. Lacustrine wetlands are present in Idaho's lakes and reservoirs; riverine wetlands are present in river channels.

HYDROLOGIC SETTING

Wetlands are present where there is a persistent water supply at or near the land surface. The location and persistence of the supply are functions of interdependent climatic, physiographic, and

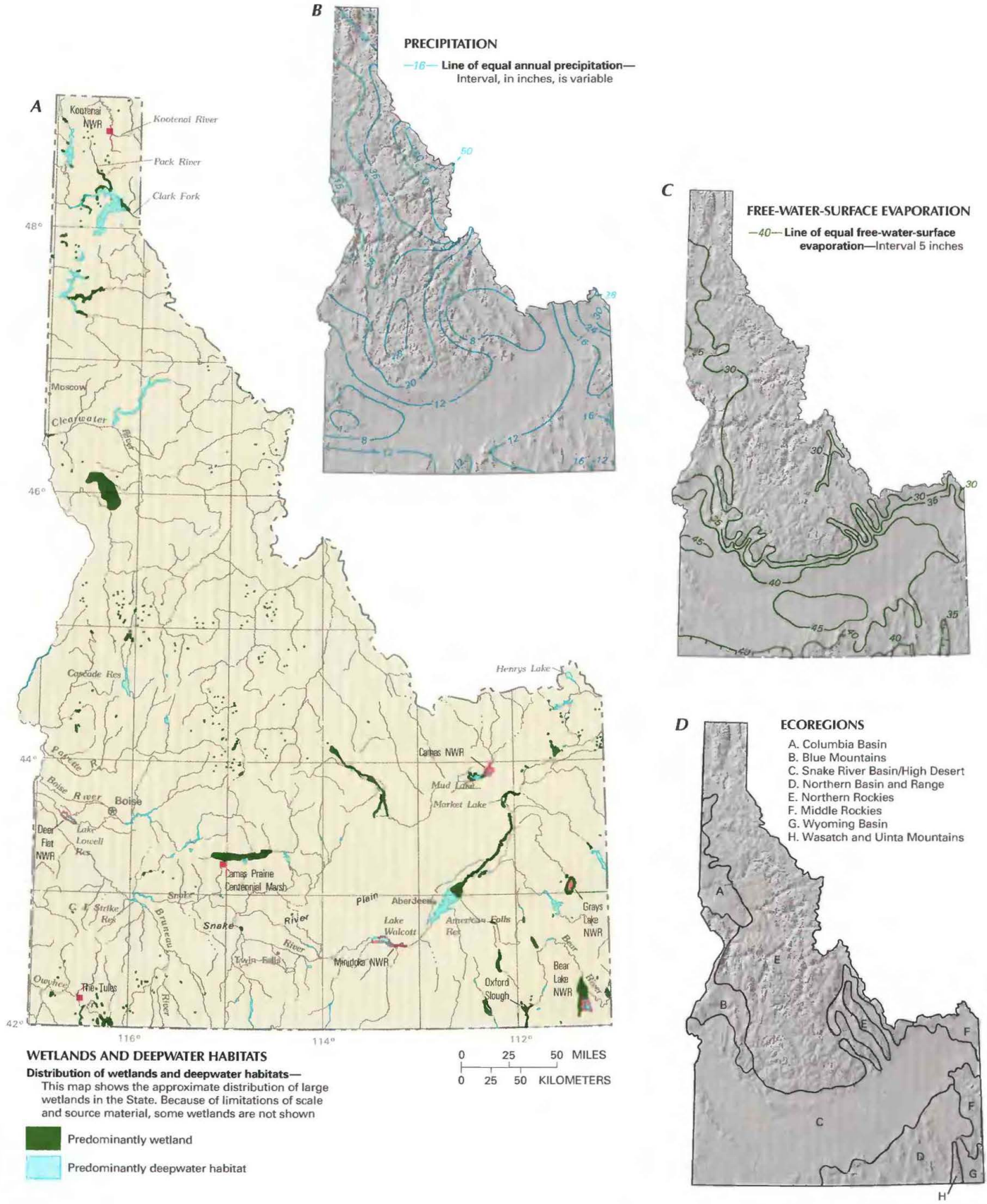

Figure 2. Wetland distribution in Idaho and physical, climatological, and ecological features that control wetland distribution in the State. ***A***, Distribution of wetlands and deepwater habitats. ***B***, Precipitation. ***C***, Annual free-water-surface evaporation. ***D***, Ecoregions. *(Sources: A, T.E. Dahl, U.S. Fish and Wildlife Service, unpub. data, 1991. B, Kjelstrom, 1986. C, Farnsworth and others, 1982. D, Omernik, 1987; landforms data from EROS Data Center.)*

hydrologic factors such as precipitation and runoff patterns, evaporation potential, topography, and configuration of the water table. Surface water collects in topographic lows, which can be either ground-water recharge or discharge areas. Soil composition determines the rate at which water is recharged or discharged.

Precipitation is affected by topography and ranges statewide from less than 10 inches per year on much of the Snake River Plain in southern Idaho to more than 60 inches per year in mountainous areas that are headwaters of the Clearwater River (fig. 2*B*). Greater precipitation in the mountains accounts in large part for the greater wetland acreage in the intermontane basins than on the plains in southern Idaho. Most of the water that supplies wetlands is from spring snowmelt, either as direct runoff or indirectly as recharge to the ground-water system. The timing and volume of runoff affect the establishment and functions of wetlands. Although mountainous areas have sufficient precipitation to supply wetlands, steep topography and shifting stream channels can prevent wetland development. Runoff in the Snake River Basin in southern Idaho is highly regulated by dams; runoff in most other river basins is regulated to some degree (Kjelstrom, 1986). Storage has decreased spring floodflows downstream from reservoirs, and wetland vegetation on the flood plain that normally receives moisture during floods must rely mostly on precipitation and shallow ground water for moisture. Diversions and scant precipitation deplete streamflow; as a result, water quality could be degraded, possibly resulting in changes in wetland functions and wildlife value (Kjelstrom and others, 1991).

Evaporation in the State generally increases from north to south (fig. 2*C*). Superimposed on this pattern are topographic complexities that cause evaporation to decrease with altitude. Evaporation from surface water ranges from 25 to 35 inches during the growing season and from 30 to 45 inches annually (Farnsworth and others, 1982). In Idaho, except for some high mountainous areas, potential evaporation exceeds precipitation during the growing season and wetland development is inhibited. The moisture deficit generally prevents the formation of bogs.

The hydrologic setting and functions of wetlands in Idaho differ regionally because of differences in climate, soils, geology, vegetation, and physiography. Omernik (1987) related these characteristics in order to develop regional patterns that were used to define ecoregions (fig. 2*D*).

In the Middle and Northern Rockies Ecoregions, mountain ranges are separated by valleys and, in places, broad basins (Pacific Northwest River Basins Commission, 1969; Omernik and Gallant, 1986). The alluvial and outwash deposits in the valleys are porous and permeable and can store and yield large volumes of water. Wetlands appear where less permeable rocks crop out or trap water and establish springs and seeps.

The Snake River Basin/High Desert Ecoregion (fig. 2*D*) is a gently sloping, semiarid plain that contains small wetlands and playas. Most wetlands are along the banks of the Snake River and its tributaries; many are emergent wetlands vegetated by sedges and rushes or are forested and scrub-shrub wetlands dominated by alder, willow, and cottonwood (Omernik and Gallant, 1986).

The Snake River and southern tributaries, such as the Bruneau and Owyhee Rivers, have cut deep canyons into the plain and generally are at a lower altitude than the regional water table; therefore, the river and its tributaries receive perennial inflow from ground water (Kjelstrom, 1992). Small streams are generally at a higher altitude than the regional water table and flow intermittently in response to surface runoff from precipitation and snowmelt. Shrub and grassland vegetation extends to the banks of intermittent and ephemeral streams. Water held near the surface by low-permeability rock can maintain small wetlands. Where the Snake River first crosses the Idaho–Oregon border, broad valleys have developed along the Snake, Boise, and Payette Rivers. Wetland acreage has increased in the broad river valleys because cropland irrigation recharges aquifers and ground water maintains summer and fall base flows in streams and drains.

In the Columbia Basin and Blue Mountains Ecoregions, wetlands receive ground water from glacial outwash and alluvial deposits along streams. However, these types of deposits commonly are higher in altitude than the water table and thus cannot retain sufficient moisture for wetland development. Wetlands also could develop where loess and other windblown deposits are present, but wetland growth is inhibited because the soil is easily eroded. At lower altitudes, wetlands are grazed by livestock; wet meadows on the upper mountain slopes are summer grazing grounds (Pacific Northwest River Basins Commission, 1969).

The Northern Basin and Range Ecoregion in southeastern Idaho consists of broad basins between low mountain ranges. Hundreds of springs throughout the area provide water for many wetlands. Large wetland areas along the Bear River and most of its tributaries are generally in direct hydraulic connection with ground water (Kjelstrom, 1986). Most of the desert shrubland is grazed or cleared and used for irrigated agriculture, which has decreased wetland vegetation and degraded water quality of nearby wetlands.

TRENDS

Starting in 1805, explorers, pioneers, and trappers followed the waterways through Idaho. The first effects on wetlands occurred between 1818 and 1827 when beaver were virtually eliminated by trapping (Idaho Department of Fish and Game, 1990). Storage of water behind beaver dams creates wetlands, provides water for vegetation during dry periods, and decreases downstream bank erosion. Since about 1860, when mining and farming activities began, wetlands in Idaho have decreased 56 percent—from about 877,000 acres to about 386,000 acres (Dahl, 1990). In Idaho, agricultural practices account for most of the human-caused wetland losses; residential and commercial development accounts for most of the remaining losses (Idaho Department of Parks and Recreation, 1987). Of the 19.5 million acres of non-Federal land in Idaho—about one-third of the State—approximately 33 percent is cropland. Cropland increased by about 400,000 acres from 1967 to 1982. During that time, nearly 10,000 acres of farmland per year were converted to urban uses (Soil Conservation Service, 1984). Many small wetlands within farmlands were filled for urban use. In agricultural areas, conversion to cropland, dewatering for irrigation purposes, contamination from nutrients in irrigation-return flow, and overgrazing by livestock contributed to wetland loss or degradation. Livestock grazing in wetlands is a complex issue because most of the public land is grazed, and, although much of the riparian area on public lands has been adversely affected, riparian areas are commonly the primary and sometimes the only water supply for livestock that graze on arid rangeland. Results of an inventory of about 250 miles of National Forest riparian areas indicated that no single grazing strategy was effective for all areas (Clary and Webster, 1989). In urban areas, wetland losses are attributable to encroachment by residential and commercial construction, channelization for drainage, and dewatering for municipal and industrial purposes.

Loss of wetlands also can be attributed to dam and reservoir construction, mining activities, ground-water pumping, river channelization, erosion and sedimentation, and road and railroad construction. From 1860 to the 1930's, placer mining along many miles of streambeds damaged adjacent wetlands. Tailings from hard-rock mining and toxic acidic or alkaline drainage have degraded other wetlands.

Short-term causes of wetland degradation are wildfires, plant diseases, extremes in weather, and defoliation by cyclic species such as jackrabbits, tent caterpillars, and grasshoppers (Thomas, 1986). Prolonged droughts, such as the one from 1987 to 1992, have tem-

porarily reduced the area or functions of some wetlands.

Some land-use practices have created new wetlands or enlarged existing ones. Leaking irrigation ditches, uncapped flowing wells, seeps, irrigation tailwater, and irrigation-return flows have increased wetland acreage and improved wetland habitat, notably in southern Idaho. Excavation of gravel pits and construction of reservoirs also have increased wetland acreage. However, such increases are small compared to losses.

Ratti and Kadlec (1992) estimated that about 91,000 acres of wetlands are protected in the National Wildlife Refuge system or by the State. Federal laws and State and local planning and regulatory programs are being used to identify and protect the remaining wetlands.

CONSERVATION

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

Federal wetland activities.—Development activities in Idaho 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) (NRCS) 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.

The U.S. Forest Service manages about 20 million acres of National Forest in Idaho and is assessing a process to evaluate the value and function of each wetland (Bureau of Reclamation, 1992). From 1964 to 1980, forested wetlands were further protected by the designation of about 4 million acres as wilderness areas.

The Bureau of Land Management (BLM) manages about 12 million acres, of which about 69,000 acres are riparian wetlands (Bureau of Reclamation, 1992). Waterfowl-habitat management areas have been designated on 68 sites within BLM lands, and habitat-improvement projects have been completed on 2,000 acres. In the 1970's, the BLM began protecting riparian areas by fencing stream segments, planting willows and other woody species, building check dams, and introducing beavers (Thomas, 1988). Intensive inventories of conditions, objectives, plans, and restoration will be made on 10,400 acres from 1991 to 1995 (Bureau of Land Management, 1991).

The FWS manages six National Wildlife Refuges and one waterfowl-production area. The agency is conducting numerous research and education projects involving wetland enhancement and conservation.

The NPS manages about 85,000 acres in Idaho. To date (1993), no estimates of wetland acreage on those lands have been made.

The Bureau of Reclamation (BOR) is carrying out cooperative research projects that demonstrate how wetlands and riparian habitat can be preserved and enhanced as part of an overall water-resources management plan. Most BOR wetland-restoration and development projects are multipurpose, but all projects enhance waterfowl habitat in accordance with the North American Waterfowl Management Plan of 1986. Research projects near American Falls Reservoir are designed to determine the effectiveness of small wetland-area im-

Table 1. Selected wetland-related activities of government agencies and private organizations in Idaho, 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	•	•	•		•	•
Military reservations	•					
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 Agriculture					•	
Department of Fish and Game	•	•	•	•	•	•
Department of Health and Welfare						
Division of Environmental Quality	•	•			•	
Department of Parks and Recreation	•				•	•
Department of Transportation			•		•	•
Department of Water Resources	•	•				
SOME COUNTY AND LOCAL GOVERNMENTS		•				
PRIVATE ORGANIZATIONS						
Ducks Unlimited			•	•		
The Nature Conservancy	•		•	•		

poundments on wetland plant communities, to improve quality of irrigation-return flow, and to enhance waterfowl habitat by developing a large wetland area on the north side of the reservoir (Bureau of Reclamation, 1992).

The NRCS will provide technical assistance to the BOR in the design and operation of a nutrient and sediment-control system adjacent to Cascade Reservoir (P.H. Calverley, Soil Conservation Service, written commun., 1992). Three shallow, vegetated wetland cells and one deepwater pond will be used to improve the water quality of irrigation-return flow. The NRCS Aberdeen Plant Materials Center, in cooperation with several Federal and State agencies, will conduct a long-term project to assemble, evaluate, select, and release for commercial production several improved varieties of riparian wetland plant species (P.H. Calverley, Soil Conservation Service, written commun., 1992).

The National Water Quality Assessment study of the upper Snake River Basin by the U.S. Geological Survey will address the effects of long-term water use on ground- and surface-water quality. Several wetland areas are within the basin.

State wetland activities.—The Idaho State Water Plan states that, insofar as is possible, the State should assume responsibility for wetland management and protection (Idaho Water Resource Board, 1992). Policy plans made by the Idaho Department of Fish and Game for 1991–2005 focus land-acquisition efforts on wetland areas where habitat protection is critical. Some activities administered by the department in the last 5 years include (1) the development or protection of about 500 blocks of wetland habitat and nearly 1,500 waterfowl nesting structures (Habitat Improvement Program); (2) mitigation for about 11,000 acres of wetland area lost to construction of several reservoirs (Wildlife Mitigation Program); (3) acquisition of about 4,300 acres of wetland habitat by use of waterfowl-stamp funds (State Duck Stamp Program); (4) identification of more than 200 valuable wetlands for protection (Idaho National Heritage Program); (5) encouragement of local participation and volunteer efforts to address nonpoint sources of pollution (Antidegradation Program); and (6) the publication and dissemination of several leaflets and guides dealing with waterways, riparian areas, wetlands, and aquatic biota (Aquatic Education Program) (Groen, 1991).

The Division of Environmental Quality of the Department of Health and Welfare reviews section 404 permit applications to ensure compliance with State water-quality laws. A permit is not issued by the Corps without certification of compliance by the division. Pursuant to section 305(b) of the Clean Water Act, the division submits to the EPA and the U.S. Congress a biennial assessment of the State's surface-water quality, including that in wetlands.

Idaho's Statewide Comprehensive Outdoor Recreation Plan was completed by the Department of Parks and Recreation and adopted by the Governor in January 1988. The Department is responsible for maintaining lists of wetlands and endangered plant species under the plan. The Idaho Wetlands Conservation Priority Plan, prepared by the Department, calls for the identification of wetlands warranting priority consideration for protection (Howard, 1991). One of the wetlands identified for priority protection is The Tules (fig. 1), which consists of about 160 acres in an abandoned meander channel of the Owyhee River. The Department also manages about 580 miles of nationally designated wild and scenic rivers that include riparian wetland.

The Idaho Department of Water Resources issues and manages surface- and ground-water rights and administers diverse activities that can affect wetlands. The Idaho Department of Transportation analyzes alternative roadway locations and uses construction techniques to lessen the degradation or loss of wetlands. When loss or degradation occurs, mitigation in the form of restoration or other compensation is required. A wetland bank in Idaho (Tiedemann, 1991) may be used when mitigation of unavoidable impacts caused by construction is not possible; compensation may be made by the offsite creation, restoration, or enhancement of wetlands. The University of Idaho and the Idaho Water Resources Research Institute are conducting projects to assess the effectiveness of constructed wetlands supplied by irrigation-return flow near Twin Falls and by sewer effluent from an aquaculture facility near Moscow. Also, the institute, in cooperation with the Idaho Bureau of Mines, is conducting projects to evaluate wetland design for the reduction of heavy metals in runoff from mine-waste sites. The University of Idaho's Cooperative Extension System is conducting research on pollutant and sediment runoff from several small parcels of land on which different grazing practices are used.

County and local wetland activities.—Most development in Idaho's wetlands is regulated by Federal and State laws. However, some city and county governments have ordinances and planning and zoning regulations that protect wetland areas and functions. Guidance and assistance to farmers and other landowners for wetland conservation are provided by the University of Idaho's Cooperative Extension System.

Private wetland activities.—The Nature Conservancy and Ducks Unlimited have participated in several projects involving acquisition and restoration of wetlands. Other organizations that participate in wetland-protection activities in the State include The National Wetlands Policy Forum, National Wildlife Federation, Wildlife Council, National Audubon Society, Pheasants Forever, Sierra Club, and Idaho Conservation League. Many other groups have formed to restore and preserve specific wetland areas. For example, the Henrys Lake Foundation was formed by summer homeowners, local ranchers, and business owners to restore the fishery in Henrys Lake. Money was raised to exclude livestock from the riparian area along a tributary stream (Chaney and others, 1990). In 1986, a group of ranchers in south-central Idaho formed the Beaver Committee with the aim of restoring riparian wetlands, reducing soil erosion, and improving the productivity of land for livestock grazing. About 100 beavers have been relocated to 25 creeks (High Country News, Paonia, Colo., August 24, 1992, p. 1, 10–12). In Boise, citizen groups protested the residential development of a riparian area in the Boise foothills. As a result, a land exchange between the city of Boise and the developer will preserve 100 acres of wetlands.

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