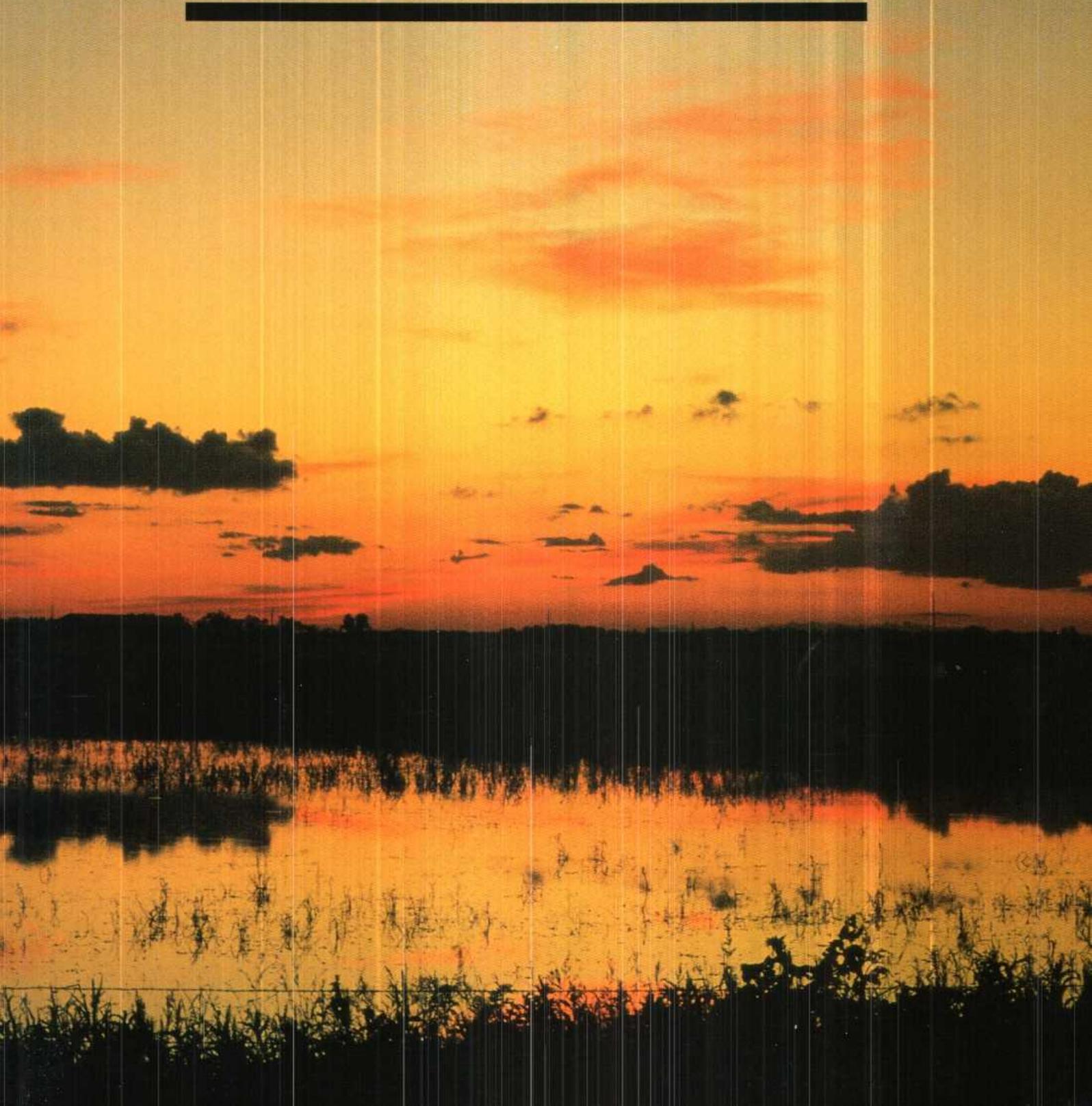


E A S T E R N

South Dakota Wetlands





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Early spring at the northern end of the Prairie Coteau in Marshall County, a landscape with many semipermanent wetlands

Foreword

Diverse and extensive wetland resources have always been familiar parts of the landscape to farmers, hunters, and residents of eastern South Dakota.

The journals and oral histories of adventurers, trappers, and natives and immigrants reveal how wetlands shaped the wildlife and the people who lived on and modified the land to meet their own needs.

The history of South Dakota wetlands parallels the history and interactions of people and wetlands elsewhere in North America and the world. This interaction can best be characterized as constant conflict. Driven primarily by economics, farmers the world over expended tremendous energy to "reclaim" and "rehabilitate" wet soils and wetlands. Their efforts alerted wildlife biologists, who sounded clear alarms in the 1950s about the loss of wetlands and about what that loss implied for the future of waterfowl and hunting. Eventually, farmers became aware that drainage districts, their costs, and their failures were adversely affecting farm families as often as they helped them.

This report deals with the present. It outlines the true abundance and characteristics of eastern South Dakota wetlands, whether still pristine, modified, or constructed by man. It provides a clear statement of the kinds and

numbers of wetlands and why they are important. It is a foundation for reasoned dialog about the future of wetlands.

The past decade has seen unprecedented public debate about wetlands, with issues of property rights and anti-government sentiment woven in. Underlying this heated public dialog is the knowledge that wetlands have tremendous values, ranging from financial returns to flood control and wildlife habitat. These values become real and measurable in South Dakota. If wetlands are eliminated and the land no longer can absorb excess snowmelt or precipitation, the water overruns the land here and then goes downstream to flood someone else. Constant drainage can kill the golden goose of economic returns from hunting and other recreation. Landowners and biologists are now trying to undo harmful wetland modifications of the past.

The future of many of these wetlands is still to be played out in eastern South Dakota and elsewhere. That future still holds the key to the majestic flights of waterfowl through future wet and dry cycles. Almost a million water bodies of all kinds are present in eastern South Dakota; this report is a powerful reminder of their dominant role in the lives of people and wildlife.

Rollin D. Sparrowe

Rollin D. Sparrowe
Director, Wildlife Management Institute



Beggar ticks are common annual plants in eastern South Dakota temporary wetlands

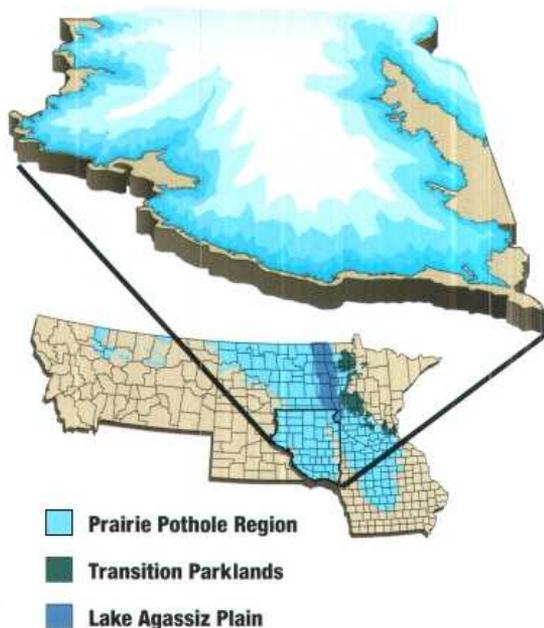


Eastern South Dakota Wetlands

Most of eastern South Dakota lies in the glaciated **prairie pothole region** of North America, and the landscape is dotted by wetlands sometimes numbering over 100 per square mile. An early settler recalled that as late as 1903:

.... low knolls are separated by saucer-like depressions, in which empounded water often stands the year around ... in the main rainwater which falls upon the uplands has to escape by seepage or evaporation. Little ponds and marshes are found in almost innumerable places scattered all over the county. (2)

The prairie pothole region of eastern South Dakota is the area covered most recently by glaciers and is where wetlands occur at the highest density.



Whether called ponds, marshes, potholes, sloughs, swamps, or low spots, wetlands have been the subject of more legislative hearings, letters to editors, community debates, and disagreements among neighbors than any other feature of the landscape. Factual information is needed before citizens can make informed decisions about the role of wetlands in South Dakota in the next century.

This report summarizes the abundance and characteristics of eastern South Dakota wetlands—the potholes, impoundments, natural lakes, rivers, and other water bodies mapped by the National Wetlands Inventory (NWI). Earlier wetland inventories often underestimated wetland acreage because they focused on specific types of wetlands, for example, only those valuable for duck production or only those deep enough to hold water for a certain length of time.

The NWI mapped wetlands without regard to specific functions or size. Therefore, this report is based on the most comprehensive inventory of eastern South Dakota wetlands ever conducted.

When controversy erupts over wetlands, especially in agricultural regions like eastern South Dakota, sides are usually drawn over issues of property rights, economics, and wetland values. Some people, farmers who have a direct economic stake in how wetlands on their property are used, believe the most appropriate use is drainage followed by crop production. Others rally to preserve wetlands, but their arguments often are based on less quantifiable values.

During the early settlement period, wetlands were generally regarded as wastelands and impediments to agriculture and travel. Yet even then, wetland benefits were recognized.

The site of the first settlement in Kingsbury County was chosen because of nearby wetlands. A pioneer recalled that:

As we came from near New Ulm, Minn., and finding lots of sloughs lying between Lake Badger and Lake Thistad, and [as] these sloughs were covered with muskrat houses, [we] decided to locate here and build these dugouts and spent the winter here trapping. (4)

Agricultural drainage of eastern South Dakota's wetlands began in the late 1800s. One of the first cooperative drainage ditches was dug in 1886 by a group of Clay County farmers. A year later, construction of a similar ditch was blocked in court by farmers who objected to the ditch crossing their lands.

Drainage increased after WWII in conjunction with high crop prices and more mechanized farming. For many years, the U.S. Department of Agriculture (USDA) provided technical and financial assistance to help farmers drain wetlands.

As concerns increased about the effects of wetland drainage on wildlife, the U.S. Fish and Wildlife Service (USFWS) began paying landowners to preserve wetlands. Easements are a one-time payment to landowners who agree not to drain, burn, fill, or level their wetlands. The USFWS also purchased wetlands outright. As of 1997, revenue from federal duck stamp sales had purchased about 700 Waterfowl Production Areas (WPAs) and perpetual easements on about 25% of remaining eastern South Dakota wetlands, all from willing sellers.



Over the years, attempts have been made to drain millions of acres of wetlands

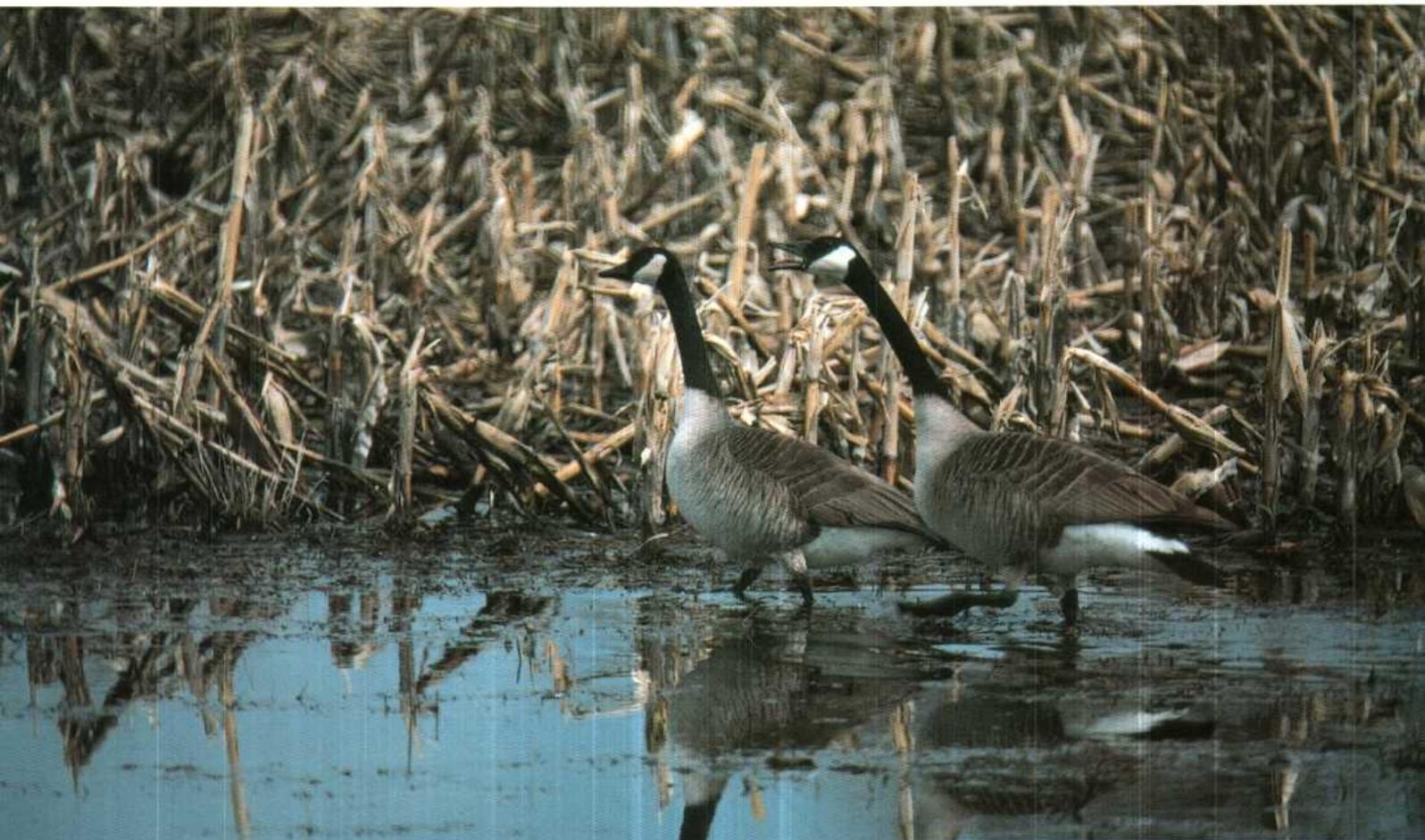
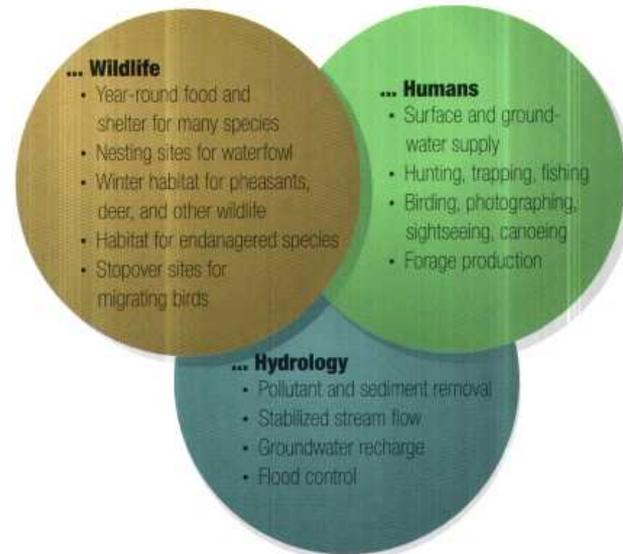
Confusion about the importance of wetlands is understandable. For years, one department of the government paid for wetland drainage while another paid to prevent it.

Today, we know much more about how wetlands help maintain a healthy environment for humans and wildlife, and both agricultural and nonagricultural interests are beginning to appreciate the role wetlands play in the eastern South Dakota landscape.

That role often is divided into three critical segments:

- (1) benefits to wildlife,
- (2) benefits to humans, and
- (3) contributions to the normal movements of water throughout the landscape, known as hydrology.

Contributions of wetlands to ...



Canada geese and other wildlife use wetlands in cropland



Mallards, the most abundant duck species in the prairie pot-hole region



Muskrats create openings in wetland vegetation that benefit other wildlife



Damselflies

Wetlands and wildlife

When explorers and settlers first crossed the wet prairies of eastern South Dakota they were greeted by clouds of waterfowl that had depended on the region for breeding and migration for more than 10,000 years.

The most productive duck nesting grounds of all - an area that often produced twenty or more broods to the square mile - were the glaciated grasslands of the northern Great Plains, studded with potholes, sloughs, and shallow marshes that made ideal habitat for mallards, pintails, canvasbacks, and other ducks of more than a dozen species The spring and autumn migrations of the waterfowl were awe-inspiring sites to the first explorers who saw them. From the ... prairie sloughs and potholes still unseen by white men, swans, geese and ducks ... streamed southward each fall to concentrate by the millions on the bays, marshes, and rivers of the South. (5)

Despite extensive wetland drainage and loss of upland nesting cover, the prairie pothole region of eastern South Dakota remains one of the most productive waterfowl breeding areas of North America. It is the **combination** of small and shallow wetlands with larger and deeper wetlands that makes eastern South Dakota so attractive to breeding ducks.

Temporary and seasonal wetlands, most less than half an acre in size, thaw quickly in the spring. Pairs of dabbling ducks—species such as mallards, pintails, and blue-winged teal—will seek seclusion from other members of their species when they are preparing to nest. They find this privacy on small wetlands. These small wetlands also provide a rich source of aquatic insects, snails, and other invertebrates. Hens need this protein-and calcium-rich food to produce eggs.

A series of wet years on the prairies, when small, shallow wetlands hold water throughout the breeding season, can result in continental duck population explosions.



Western grebes nest on floating platforms in large semipermanent wetlands

Deeper wetlands, that thaw later and hold water throughout the summer in most years, attract different ducks. These deeper wetlands provide breeding habitat for diving ducks such as canvasbacks and redheads.

Later in the season, many dabbling ducks will lead their broods to these deeper wetlands. And in the fall, migrating ducks and geese interrupt their southward journey to rest and feed on these wetlands, making eastern South Dakota a waterfowl management area of international importance and a paradise for waterfowl hunters.

Besides ducks, over 100 fish, 80 bird, 25 mammal, 17 amphibian, and 10 reptile species depend on eastern South Dakota wetlands. Some upland wildlife, such as ring-necked pheasants and white-tailed deer, use wetlands during the winter to survive prolonged cold and blizzards. Winter wind velocities in wetlands may be 95% less than in nearby shelterbelts, making wetlands valuable winter cover for many resident wildlife species.



Yellow-beaded blackbird



Leopard frog



Blue-winged teal feed on invertebrates in shallow wetlands



Wetlands, important winter habitat for resident wildlife



Over 220 species of fish and wildlife, like these western painted turtles, inhabit eastern South Dakota wetlands

Wetlands provide habitat for more than 200 species of wildlife that live in or migrate through eastern South Dakota. Some species are listed below (a number in () indicates the number of species or subspecies).

Birds

Mallard	Gadwall	Blue-winged teal	Pintail
Wood duck	Shoveler	Wigeon	Green-winged teal
Redhead	Canvasback	Lesser scaup	Greater scaup
Bufflehead	Ring-necked duck	Common goldeneye	Ruddy duck
Hooded merganser	Common merganser	Canada goose (4)	Tundra swan
White-fronted goose	Snow goose	Ross's goose	Ring-necked pheasant
Osprey	Northern harrier	Bald eagle	Horned grebe
Eared grebe	Red-necked grebe	Western grebe	Pied-billed grebe
Black-crowned night heron	Little blue heron	Cattle egret	Snowy egret
Great egret	Yellow-crowned night heron	Green-backed heron	Great blue heron
Least bittern	Sora	White-faced ibis	American bittern
Sandhill crane	Whooping crane	Virginia rail	American coot
Black tern	Common tern	Least tern	Forster's tern
Ring-billed gull	Franklin's gull	Caspian tern	Herring gull
Black-bellied plover	Semipalmated plover	Bonaparte's gull	Killdeer
Greater yellowlegs	Solitary sandpiper	Piping plover	Lesser yellowlegs
Marbled godwit	Hudsonian godwit	Spotted sandpiper	Willet
Common snipe	Sanderling	American avocet	Ruddy turnstone
Least sandpiper	White-rumped sandpiper	Semipalmated sandpiper	Western sandpiper
Pectoral sandpiper	Short-billed dowitcher	Dunlin	Baird's sandpiper
Stilt sandpiper	Marsh wren	Long-billed dowitcher	Spotted sandpiper
Red-necked phalarope	Red-winged blackbird	Sedge wren	Wilson's phalarope
Double-crested cormorant	Le Conte's sparrow	Yellow-headed blackbird	White pelican
Bank swallow	Savannah sparrow	Swamp sparrow	Belted kingfisher
Common yellowthroat	Rough-winged swallow	Common grackle	Willow flycatcher

Mammals

Muskrat	Beaver	Mink	Raccoon
White-tailed deer	Coyote	Red fox	Long-tailed weasel
Least weasel	Striped skunk	Cottontail	Short-tailed shrew
Masked shrew	Pygmy shrew	Arctic shrew	Water shrew
Southern bog lemming	Western harvest mouse	Meadow vole	Prairie vole
Meadow jumping mouse	Deer mouse	Southern red-backed vole	Grasshopper mouse
White-footed mouse			

Reptiles and Amphibians

Western painted turtle	Snapping turtle	False map turtle	Blanding's turtle
Plains spadefoot toad	Softshell turtle (2)	Garter snake (3)	Northern water snake
Chorus frog (2)	Canadian toad	American toad	Woodhouse's toad
Tiger salamander (3)	Great Plains toad	Crickit frog	Gray tree frog
Mudpuppy	Leopard frog (2)	Wood frog	Bullfrog

Fish

Sturgeon (2)	Paddlefish	Gar (2)	American eel
Herring (2)	Gizzard shad	Goldeye	Mooneye
Stoneroller	Carp (3)	European rudd	West silvery minnow
Brassy minnow	Plains minnow	Chubs (6)	Shiners (13)
Suckermouth minnow	Bluntnose minnow	Fathead minnow	Dace (4)
Buffalo (3)	River carpsucker	Quillback	Suckers (3)
Black bullhead	Shorthead redhorse	Northern hog sucker	Blue catfish
Stonecat	Yellow bullhead	Brown bullhead	Channel catfish
Burbot	Tadpole madtom	Flathead catfish	Trout-perch
White bass	Banded killifish	Plains topminnow	Brook stickleback
Bluegill	Rock bass	Green sunfish	Orangespotted sunfish
Black crappie	Smallmouth bass	Largemouth bass	White crappie
Sauger	Darters (3)	Logperch	Walleye
Chinook salmon	Yellow perch	Freshwater drum	Coho salmon
Rainbow smelt	Brown trout	Rainbow trout	Lake whitefish
Central mudminnow	Northern pike	Muskellunge	Grass pickerel

Endangered and Threatened Species

Piping plover	Least tern	Osprey	Bald eagle
Whooping crane	Blanding's turtle	False map turtle	Topeka shiner



Wetlands and people

Surveys show that about 99% of South Dakotans enjoy wildlife-related recreation.

On average, about 99,000 South Dakotans hunt annually, and another 48,000 nonresidents come to the state to hunt each year. Over one fourth hunt ducks and geese.

South Dakotans spend over \$80 million on hunting each year, and nonresidents contribute another \$25 million to the state's economy in hunting-related travel expenses. A recent national survey showed that wildlife-related recreation contributed over \$231,000,000 to South Dakota's economy in a single year.

Throughout the cold months, when furs are prime, trapping is an important source of income for many South Dakota families. Main furbearers trapped in wetlands include muskrats, mink, raccoons, and beaver. Foxes and coyotes also inhabit wetlands during the winter.

South Dakota trappers and predator hunters recently took over \$500,000 in furs during a single season. The average annual harvest is over 30,000 muskrats, 22,000 raccoons, and 3,000 mink.

An increasing number of people also enjoy "nonconsumptive" wildlife recreation. About

228,000 South Dakotans over age 16—or 43% of the population—view, photograph, and feed wildlife. To do that, they spend about \$40 million per year for equipment, feed, and travel.

Some landowners sell hay from wetlands to supplement their incomes, or they harvest wetland hay to feed to their own livestock, particularly during drought years.

Wetland hay is valuable. Yields may be more than twice as high as typical upland grass stands, and forage quality is often comparable to native and tame grass, but lower than alfalfa. Wetlands on eastern South Dakota farms may produce from 2 to 12 tons of hay/acre. Wetlands can be managed for forage production without losing their other values.

Wholesale and retail sales of minnows in South Dakota total about \$2 million each year. In neighboring Minnesota, the retail value of fathead minnows in some years is over \$12 million. Many of these are captured in South Dakota. Fathead minnows are sold throughout the U.S. under the name "*South Dakota Toughies*" because of their ability to withstand long-distance travel to bait dealers.



Bait minnows harvested from wetlands

Left: Labrador retriever with a green-winged teal



Grazing wetlands benefits both agriculture and some wildlife

Wetlands and water movement

Wetlands play an important role in the natural movement of water both above and below ground. When water from melting snow or rain runs into a wetland, it is stored there until it evaporates or soaks into the ground. Because wetlands release water slowly, one of the best known hydrologic benefits of wetlands is flood control.

Wetlands usually lie within deeper depressions that are only filled during very wet years. If a wetland is drained, water from the depression may have nowhere to collect and will spill into streams and spread over low-lying properties.

About 16,500 wetlands out of 50,200 (33%) in the Vermillion River watershed in southeastern South Dakota flow into artificial drainage ditches. Restoring these drained wetlands could store an

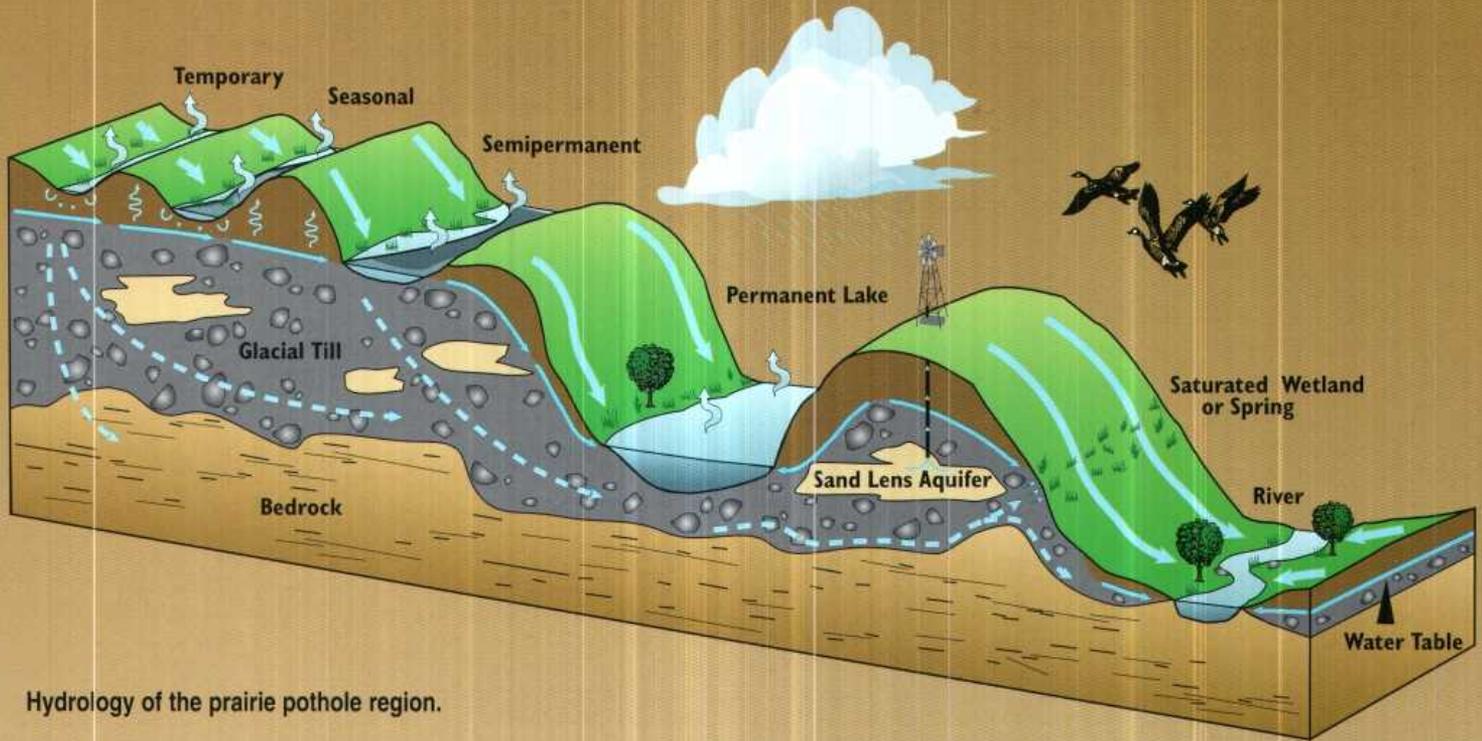
amount of water roughly equal to half the annual flow on the flood-prone Vermillion River in a wet year.

The water in wetlands that soaks into the soil recharges ground water supplies, providing water for farm and home use. In fact, in the clay-rich soil areas in eastern South Dakota, the only significant source of ground water recharge may be wetlands. Ground water also may move upward, maintaining soil moisture during dry periods, thereby protecting crops, lawns, and other vegetation during drought.

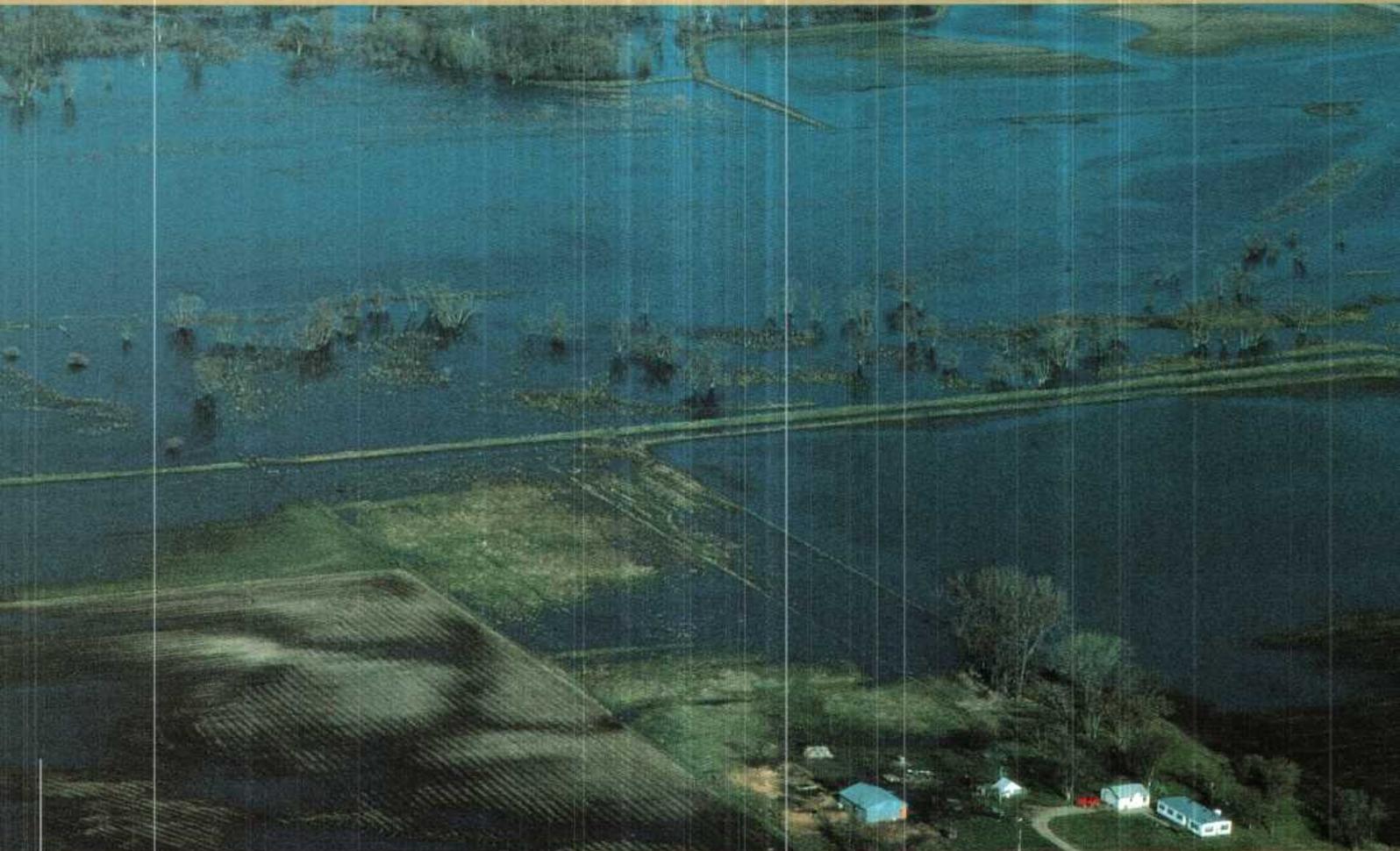
Wetlands have other hydrologic functions, such as stabilizing stream flows and reducing pollutants entering rivers and lakes. About 239 South Dakota cities and towns use created wetlands for secondary or tertiary sewage treatment.

Wetlands store water and may help reduce flooding





Hydrology of the prairie pothole region.



The National Wetlands Inventory

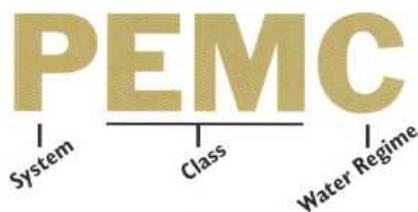
An increasing awareness of the benefits provided by wetlands prompted Congress to mandate that the USFWS conduct a comprehensive inventory of the nation's wetlands. The result was the National Wetlands Inventory (NWI), which began in 1978. The classification system (Cowardin *et al.* 1979) adopted by the NWI defines wetlands as

... lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water ... (1)

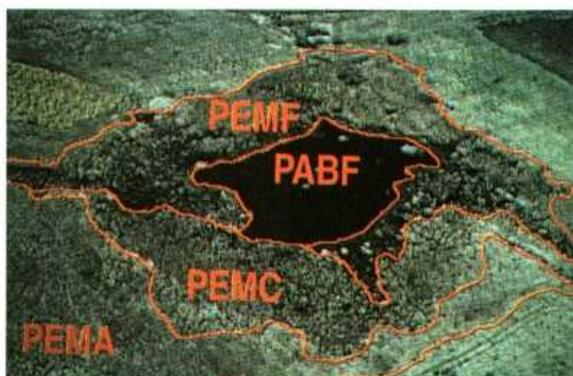
The definition goes on to say in technical terms that wetlands are areas that are ponded with surface water or saturated long enough during the growing season to develop wetland soils and wetland plant communities.

Wetlands are delineated and classified by the NWI on color infrared aerial photographs taken in years when most wetlands are ponded, which allows for the highest possible accuracy in delineating the typical distribution of wetlands. Field and laboratory quality control procedures ensure that NWI maps are as accurate as possible.

Elements of the Cowardin *et al.* (1) classification system.



Boundaries within potholes were eliminated for this report. This pothole would be classified as semipermanent because of the deep center ringed by cattails.

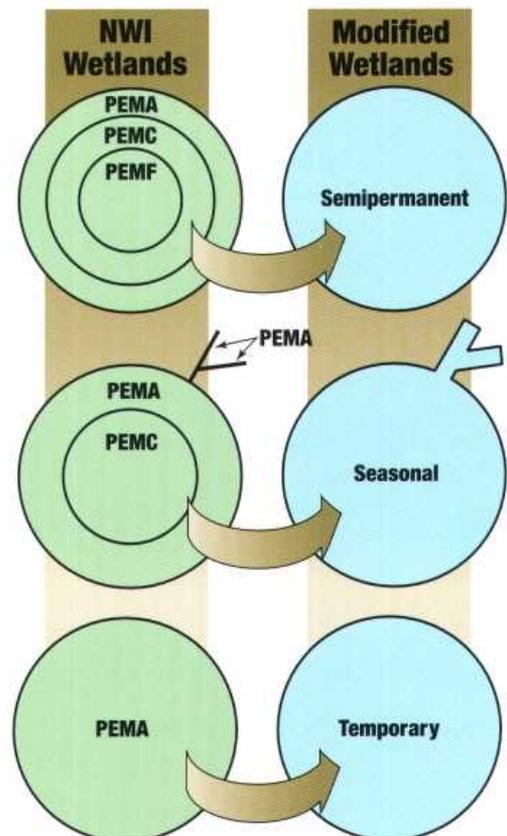


However, wetlands are a dynamic resource; the amount of water that they contain increases and decreases as precipitation and evaporation conditions change. NWI maps are a "snapshot in time" intended to depict the distribution of wetlands under typical conditions.

For detailed information on NWI classification or mapping systems, consult Cowardin *et al.* (1) or NWI users' guides like *NWI Maps Made Easy* (6). Johnson and Higgins (3) published a technical summary of eastern South Dakota wetlands as classified by the NWI.

For this report, a computer was used to modify NWI digital data to create maps showing the perimeter of potholes, lakes, impoundments, and excavated wetlands, classified by the most permanently ponded area they contain. River channels were also included. The data are not directly comparable to estimates from original NWI maps because of these modifications.

NWI wetlands were generalized for this report.





High altitude CIR photo of the northeast Missouri Coteau before ...

... and after wetland delineation and classification by the NWI

Temporary wetlands pond water for brief periods during the growing season. The water table (the ground water surface) is usually well below the soil surface when the wetland is not ponded.

When temporaries are not tilled, they commonly contain a mixture of upland and wetland species, including wetland grasses, such as creeping foxtail, blue joint, and reed canary grass, and other species, including dock, fine sedges, and some smartweeds.

Seasonal wetlands are usually ponded for extended periods (commonly through June or later) during the growing season. When not ponded, the water table is usually at or near the ground surface.



Foxtail barley, a common native grass in temporary wetlands

Vegetation in seasonals is often robust sedges, whitetop, spike rushes, rushes, arrowhead, plain-tain, smartweeds, cattails, and bulrushes.

Every midwestern duck hunter is familiar with **semipermanent wetlands**. They take their name from the fact that they hold water throughout the year in most years, although they may dry up during prolonged droughts.

In South Dakota, the most common plant species in semipermanents are cattails, bulrushes, and floating or submersed vegetation like duckweed, bladderwort, coontail, or water milfoil.

As their name implies, **permanent wetlands** typically hold water throughout every year, although included in this group are some potholes and lakes that may dry up during extreme drought.

Only submersed plants like those listed for semipermanents are common, although emergent plants such as cattails or bulrushes may grow around the shoreline.

Rivers may contain water throughout the year or for brief periods following snow melt or rain. Rivers flow within channels which lack trees, cattails, or similar emergent vegetation.



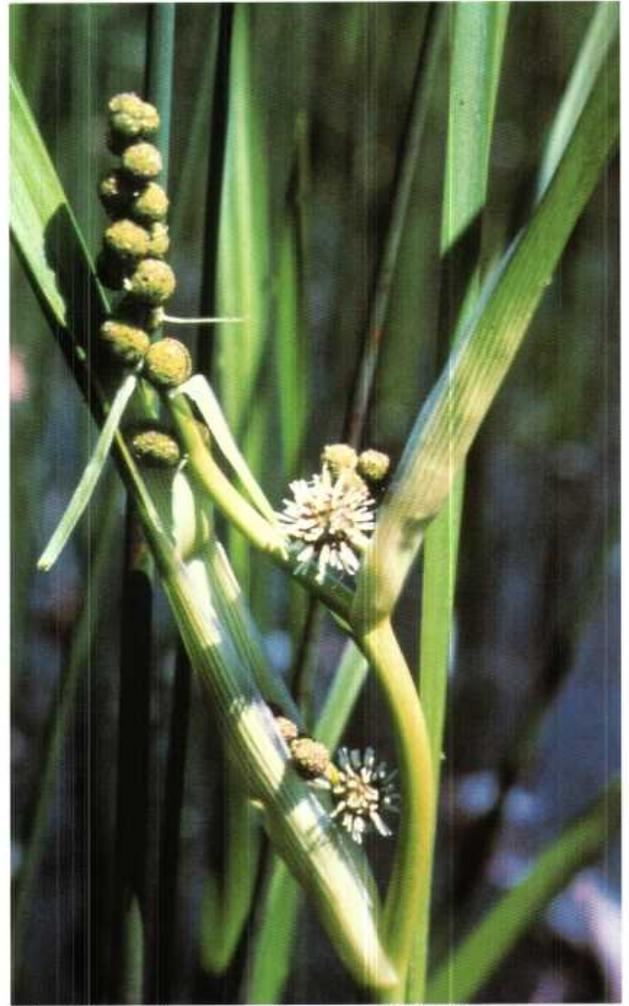
Temporary wetland in a crop field



Seasonal wetland



Water plantain, a common emergent plant in seasonal wetlands



Giant Burreed, a common emergent plant in semipermanent wetlands



Gary Creek



Permanent wetland

Overview of Wetland Resources

There are 947,652 wetlands—potholes, dugouts, reservoirs, and natural lakes—in eastern South Dakota. These wetlands occupy a total of 2,137,929 acres. Rivers and streams account for another 69,300 acres. These estimates represent the number and area of wetlands under “**typical**” conditions.

Wetlands cover about 9.8% of the total landscape of eastern South Dakota. Extremes are Lincoln County (4.6%) and Sanborn County (15.6%).

Most eastern South Dakota wetlands are small; about 60% are less than half an acre, and almost 75% are smaller than an acre.

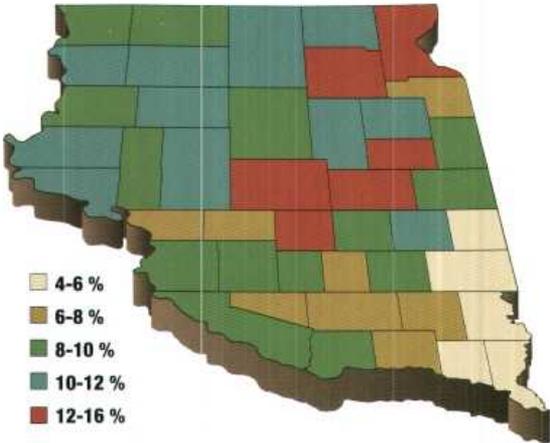
About 83% of temporaries, 55% of seasonals, and 21% of semipermanents are smaller than 1 acre. In fact, less than 5% of all wetlands are larger than 5 acres.

Legislation and government programs that protect only wetlands larger than 1 acre put most eastern South Dakota wetlands at risk of being drained. About 465,500 wetlands—about half of all eastern South Dakota wetlands—are jeopardized by proposals to eliminate protection for frequently farmed wetlands and wetlands smaller than 1 acre.

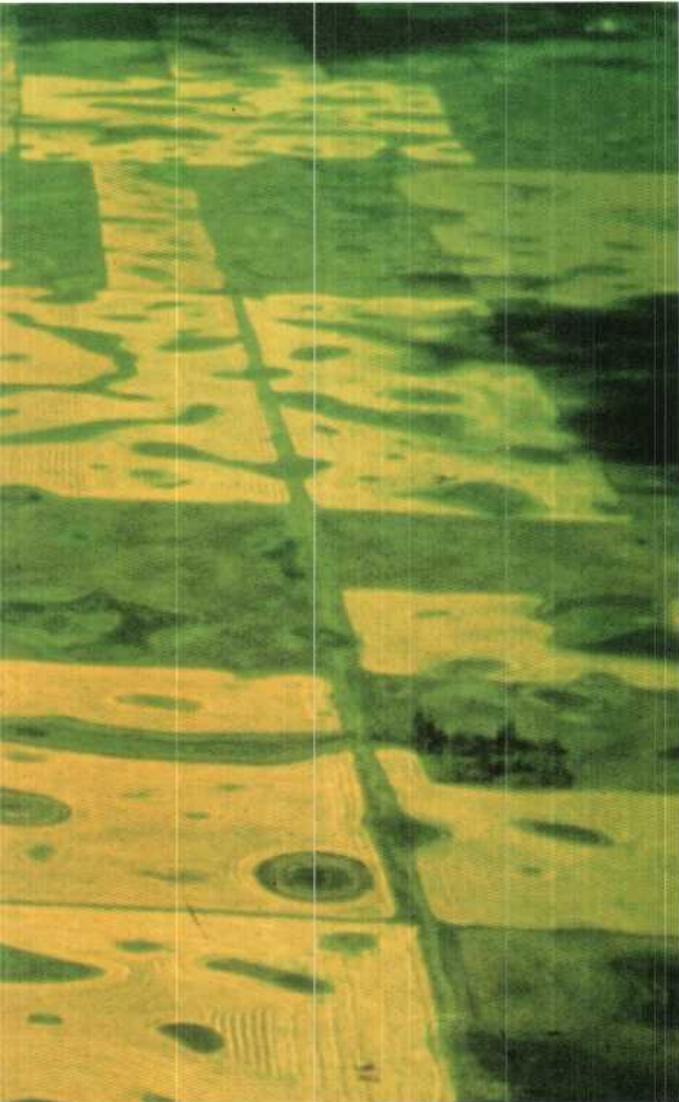
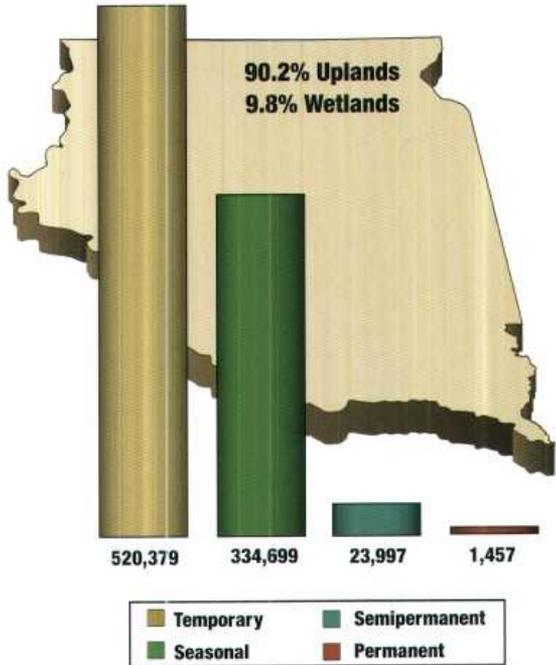


High densities of temporary and seasonal wetlands occur in the central part of eastern South Dakota

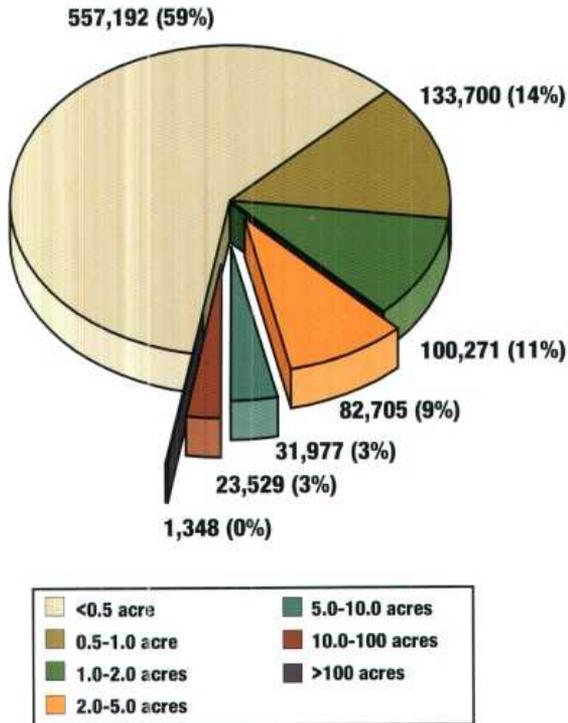
Percent of total county area in wetlands.



Number of wetlands by water regime.



Size structure of eastern South Dakota wetlands.



Wetland distribution in eastern South Dakota

Eastern South Dakota wetlands were formed by retreating glaciers, so wetlands tend to be most common in areas covered by the last glaciers. The landscape of eastern South Dakota is geologically too young for rivers and streams to be well developed. About 80% of the landscape in many areas of eastern South Dakota drained into wetlands before European settlement.

Watershed size and terrain, average annual precipitation and evaporation, soil type, and ground water interactions all determine a wetland's water permanence (water regime).

High-relief landscapes with deep depressions, sometimes called knob-and-kettle terrain (as in parts of Marshall County), often contain many semipermanent wetlands. Shallow temporary and seasonal wetlands are usually most abundant in low-relief terrain like that in Beadle, Spink, and Brown counties.

Eastern South Dakota counties, permanent wetlands, and rivers.



Natural wetlands

The 520,379 **temporary** wetlands in eastern South Dakota cover just over 390,000 acres. They are the most common type of wetland in the region, making up 55% of the total number of wetlands.

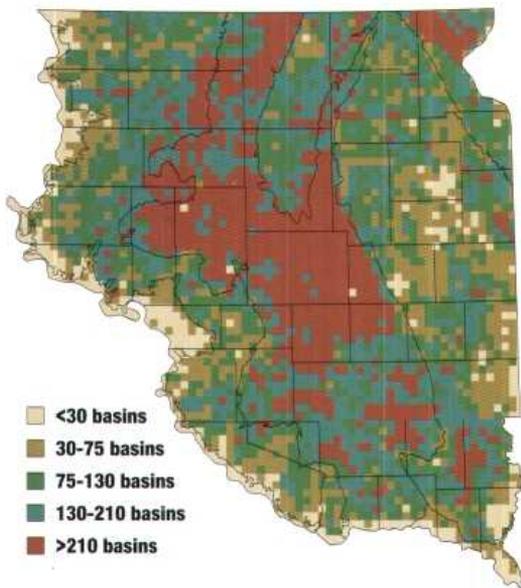
Temporaries are most common in Beadle, Brown, Spink, and Hand counties where their combined number is over 146,000. Temporaries are least common outside the area covered by the last glaciers, such as in Buffalo and Union counties where they total only about 4,300.

About 77%, or 399,000 temporary wetlands, are in cropland. Location, coupled with ease of drainage, makes them vulnerable to loss.

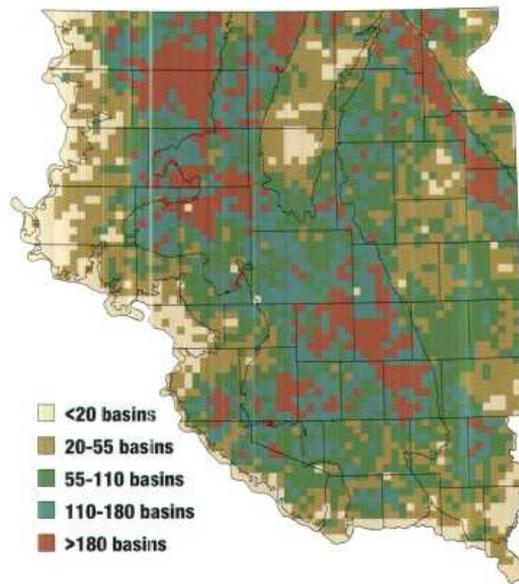
A total of 334,699 **seasonal** wetlands in eastern South Dakota cover over 553,500 acres. They are abundant in scattered localities, but are particularly common in an 80 mile-wide band that runs diagonally from Eureka in McPherson County southeastward to Salem in McCook County.

Edmunds County alone contains 22,225 seasonal wetlands. The fewest seasonals—only 998—are found in Union County.

Number of temporary wetlands/10mi².



Number of seasonal wetlands/10mi².



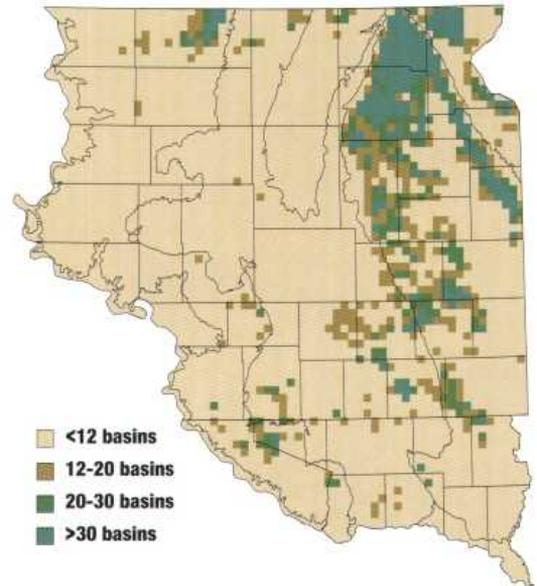
A temporary wetland filled by runoff from melting snow. Without rain, this wetland will be dry within a few weeks after the soil thaws. Until then it may provide habitat for ducks and shorebirds.

Semipermanents, with their typical mix of cattails and open water, are what first comes to mind when many people picture “wetlands.” Actually, semipermanents are uncommon—they number only 23,997 and occupy about 377,600 acres. All together, they make up only about 2.5% of all wetlands in eastern South Dakota.

Semipermanents are most often found in a few areas of northeastern South Dakota including the counties of Marshall, Day, Roberts, Grant, and Deuel. The number of semipermanents in these counties total 11,828—almost half the total number of all semipermanents in eastern South Dakota. The smallest number of semipermanents, 22, occurs in Hughes County.

Permanent wetlands are the least common type of natural wetlands; there are only 603 east of the Missouri River. However, these wetlands are large and cover over 194,000 acres.

Number of semipermanent wetlands/10mi².



Semipermanent wetland in summer

The highest density of large permanent wetlands (lakes) occurs along the west side of the Big Sioux River from Day County south to Lake County. Lake Poinsett in Brookings and Hamlin counties, at 10,100 acres is the largest natural permanent wetland in South Dakota.

Sometimes large semipermanent wetlands fill up and function as lakes, but the water eventually recedes and they once again become dominated by cattails or similar vegetation, something that rarely happens to lakes. Lake Thompson in Kingsbury County is a good example. It has repeatedly filled up and then dried up in the past. In the mid-1980s and 1990s Lake Thompson swelled to nearly 20,000 acres, making it the largest natural “lake-like” body of water in the state. Although the changes are usually not as dramatic, small wetlands also are very dynamic.

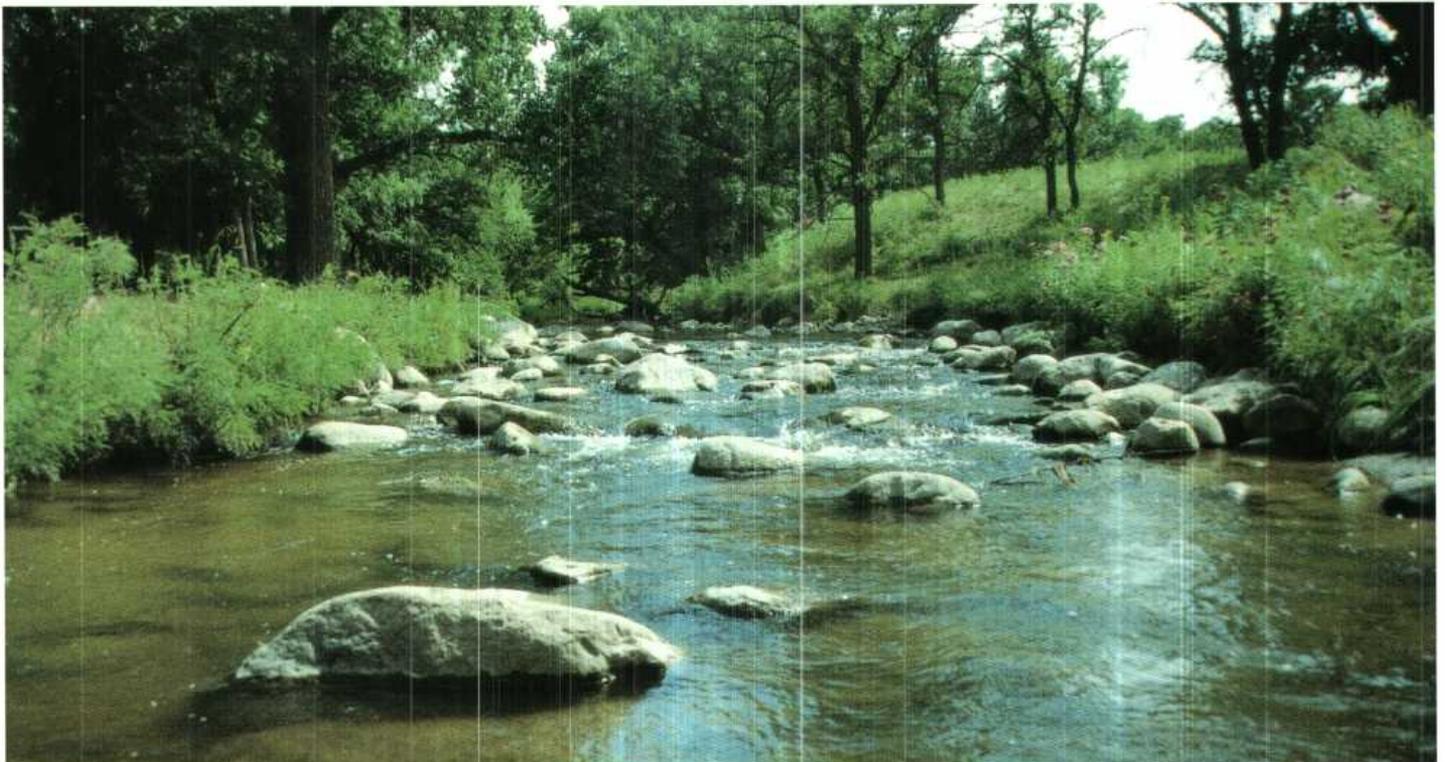
Rivers cover about 69,300 acres of eastern South Dakota. The major rivers in eastern South Dakota are the Big Sioux, Vermillion, James, and Missouri. Creation of the Missouri River reservoirs destroyed much of the riverine habitat in eastern South Dakota by changing those river reaches to impoundments. Some free flowing

reaches still exist, bordering Charles Mix, Bon Homme, Yankton, Clay, and Union counties, but even in these areas the natural hydrology has been greatly altered because dams control the flow of water.

Rivers in the glaciated prairie pothole region tend to be narrow with weakly developed channels. Consequently they tend to be flood-prone when snow melts quickly or after heavy rains.

The Big Sioux River was once nick-named the “Silvery Sioux.” In 1838, Joseph Nicollet described the Big Sioux near Brookings as “a stream of clear, swift-running water” flowing over a “pebbly bottom.” Only rivers that flow mainly through pastureland—like the Yellowbank River in Grant County—still fit this description.

Healthy riverine habitats often have high biodiversity. Although flowing freshwater comprises only about 1/1 millionth of all the water on earth, 50% of all animal species inhabit creeks, streams, and rivers. In fact, one of the best ways to evaluate the health of a river is to sample its invertebrates.



The Yellowbank River in Grant County

Created wetlands

Created wetlands are usually constructed in one of two ways: by excavating a hole or channel or by blocking the natural flow of water with a dam, thereby creating an impoundment.

The only types of excavated wetland discussed in this report are **dugouts**—rectangular holes dug to intercept surface runoff or to expose the water table. Generally dugouts are constructed to provide water for livestock. A total of 56,827 dugouts are scattered across eastern South Dakota, of which 35,086 (62%) were excavated in 22,530 natural wetlands. The remaining 21,741 dugouts were constructed outside of natural wetlands or in stream channels.

Although dugouts may occasionally enhance natural wetlands by providing a deep-water refuge for duck broods or fish, their impact may be negative when spoil from the excavation is piled in the natural wetland.

Eastern South Dakota **impoundments** may be subdivided into two broad groups; (1) small impoundments, often called stock dams, and (2) large (more than 100 acres), permanent reservoirs. All impoundments are constructed by creating a dam in a channel. Consequently, most are found on or near the Missouri River, outside areas of recent glaciation.

Although the technology of damming up a ravine or intermittent stream to create a stock dam is superficially like that of creating a large reservoir on a mainstem river or major tributary, the results for landowners and wildlife are very different. Both types of constructed wetlands can effectively impound runoff; however, livestock and wildlife relate to the shoreline of an impoundment, making little or no use of the center of these bodies of open water. Stock dams typically have much greater shoreline length relative to their size than do large reservoirs. Therefore, small stock dams provide greater benefits to landowners and wildlife than does a single large reservoir of the same total area.

Some stock dams provide added benefits of recreational fishing. Stock dams also may enhance cattle performance by improving stock distribution and range and pasture utilization. Several federal agencies offer cost sharing and technical assistance for creating these kinds of wetlands.

In eastern South Dakota, most stock dams are a few acres in size and have a 200-600 acre watershed. Most contain between 12 and 20 acre-feet of water when full. A total of 11,836 stock dams have been constructed in eastern South Dakota covering 106,740 acres.

Large reservoirs are permanent impoundments constructed for flood control, hydroelectric power generation, domestic or agricultural water supplies, or for recreation. The 75 reservoirs in the region cover 256,826 acres, or about 12% of the total area of surface water in eastern South Dakota. This total acreage includes the area of Missouri River reservoirs within the counties on the east side of the river.

Approximately 95% of the reservoir area in eastern South Dakota is made up by lakes Lewis and Clark, Francis Case, Sharpe, and Oahe on the Missouri River.



Dugout in a natural wetland

Wetlands summary

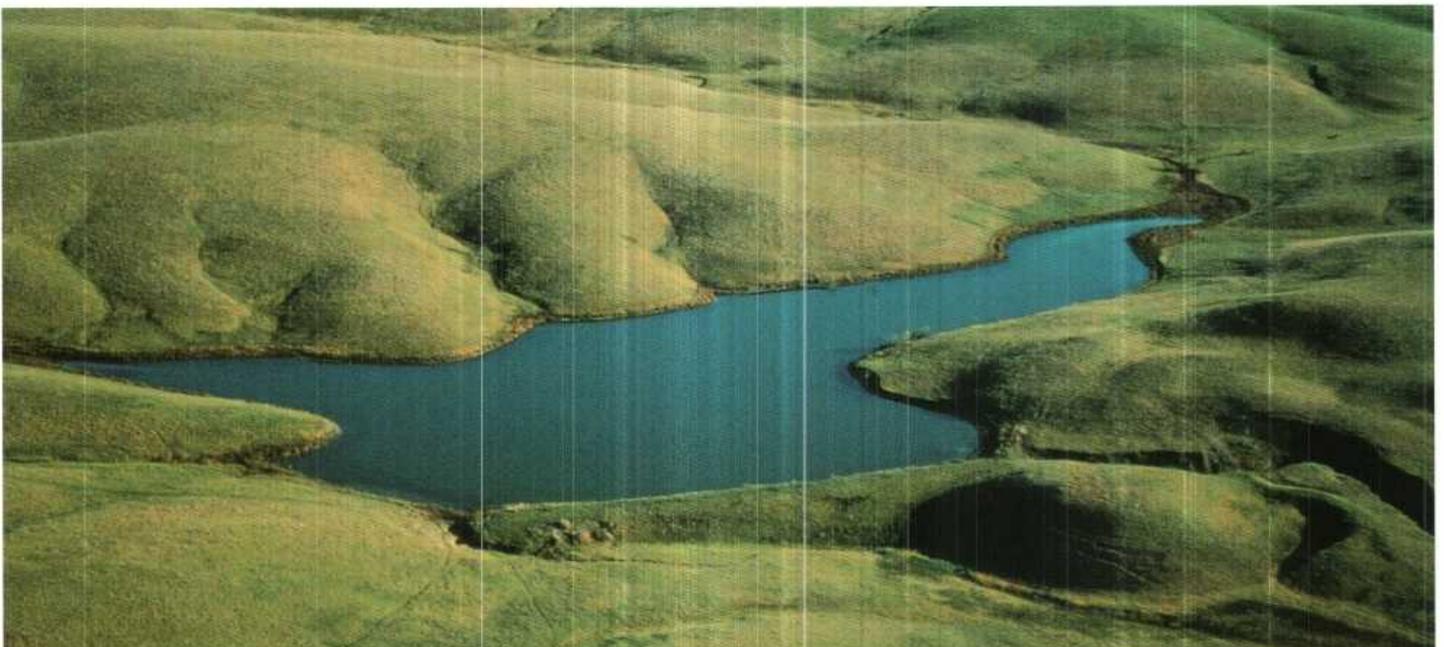
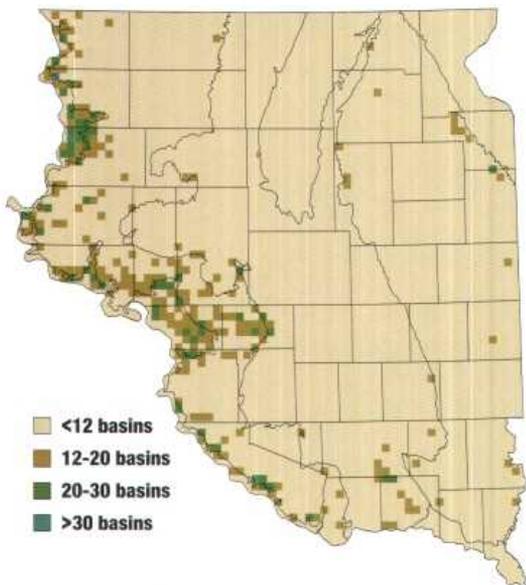
Nearly a million wetlands still exist in eastern South Dakota. These wetlands provide benefits that reach far beyond the borders of South Dakota to other states and Canadian provinces:

- Wetlands preserve biodiversity.
- Wetlands provide flood control.
- Wetlands recharge ground water.
- Wetlands stabilize stream flows.
- Wetlands improve water quality.
- Wetlands enhance quality of life.

Although eastern South Dakota still has a rich wetland resource, the future of that resource is not secure. Only about 25% of remaining wetlands are currently protected by easements or fee-title ownership by concerned agencies. Approximately 75% have no legal protection and are subject to various forms of alteration or destruction.

Recent wetland research by staff and graduate students of the Department of Wildlife and Fisheries Sciences at South Dakota State University in conjunction with the National Wetlands Inventory and recent technological advances such as geographic information systems have provided agricultural groups and natural resource managers with important new information about the distribution and characteristics of wetlands and their values to wildlife, livestock, and society as a whole. On-going and future research will continue to improve our understanding of the functions of wetlands and their value to humans. This understanding is crucial to making informed decisions about the role of wetlands in eastern South Dakota in the next century.

Stocks dams and other impoundments/10mi².

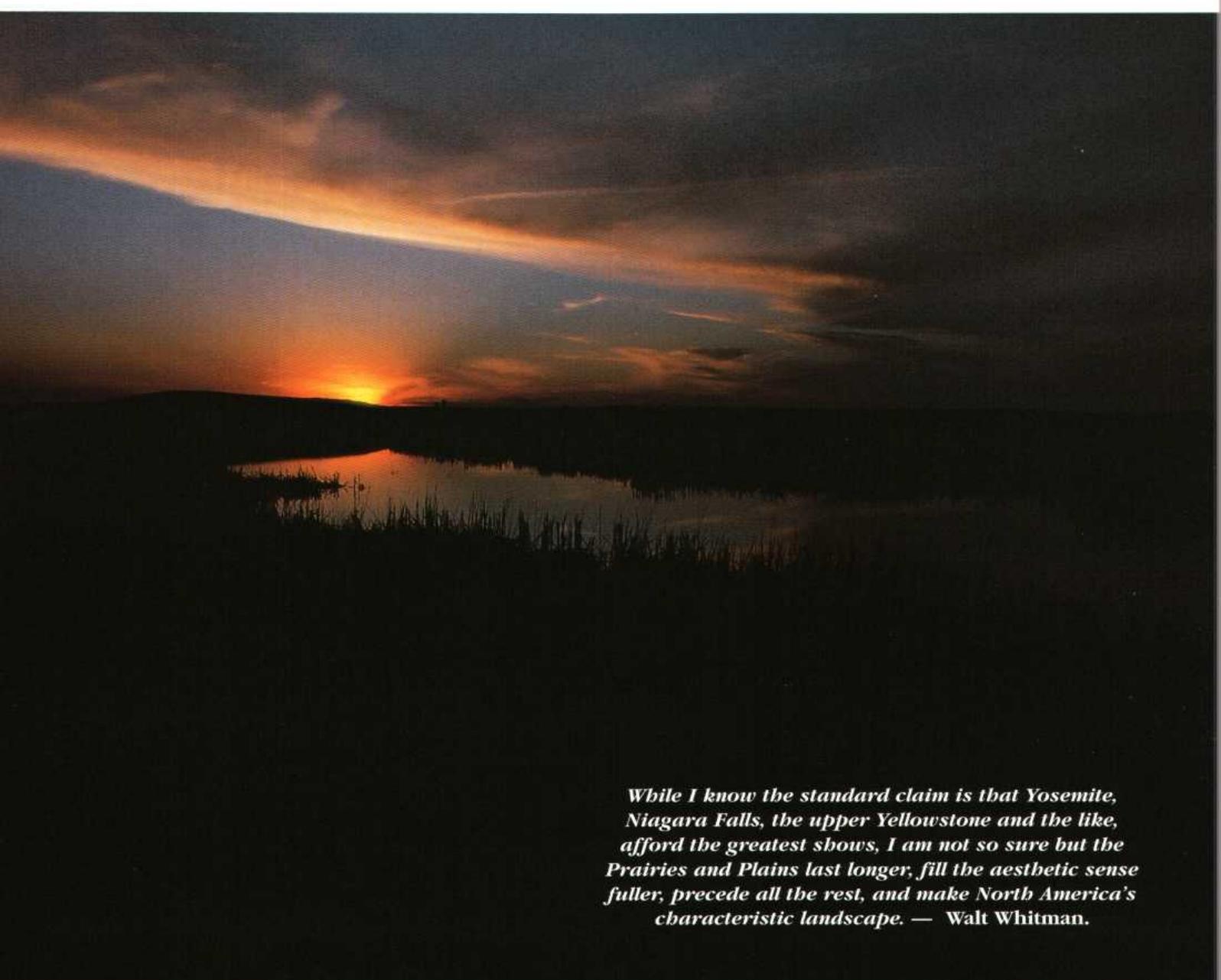


Creating wetlands in healthy rangeland, like this stock dam in Buffalo County, is often a boon to wildlife

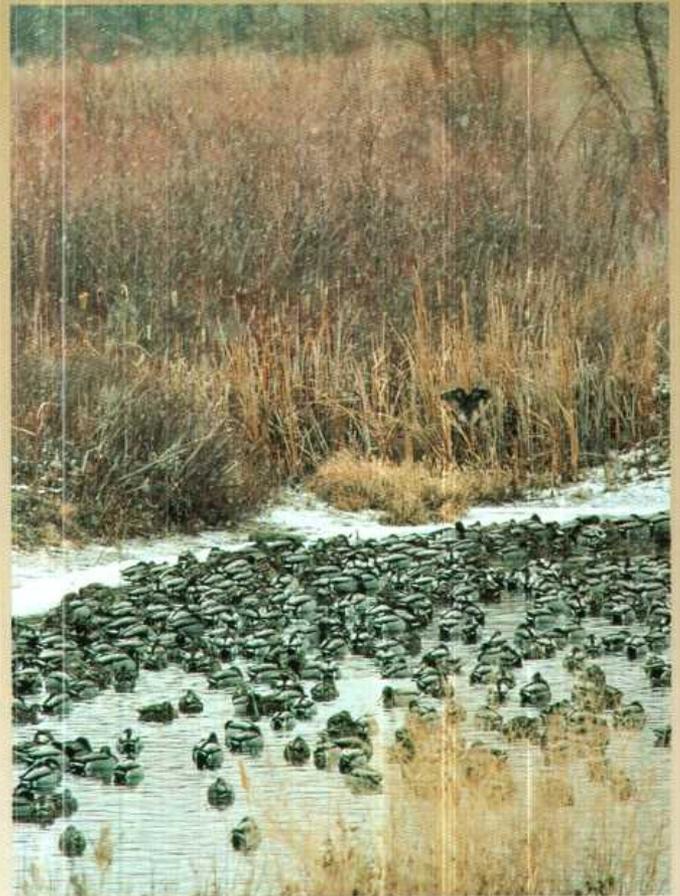
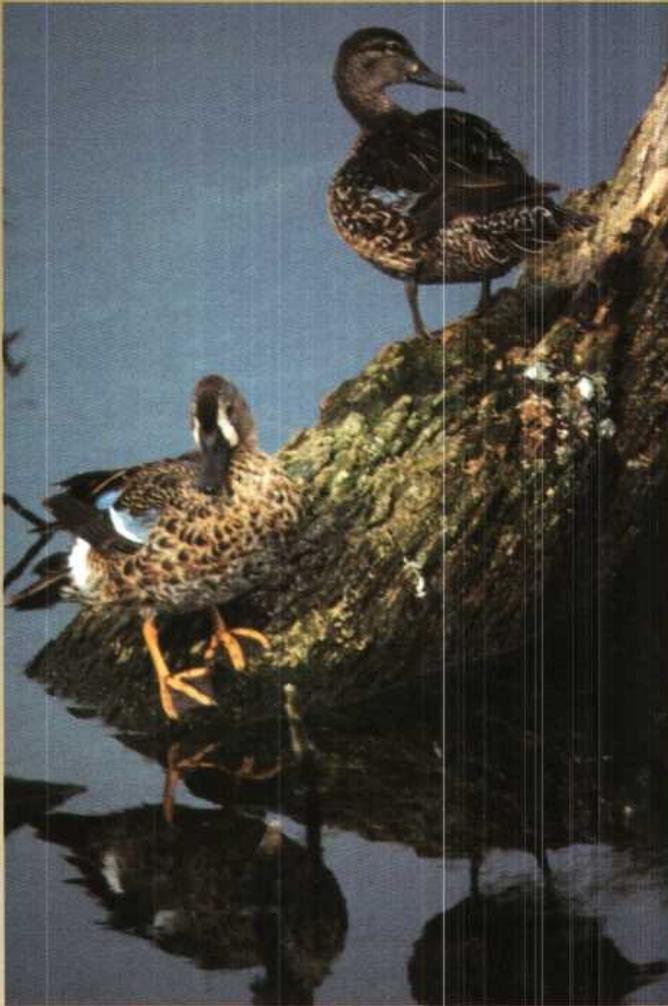
Literature cited

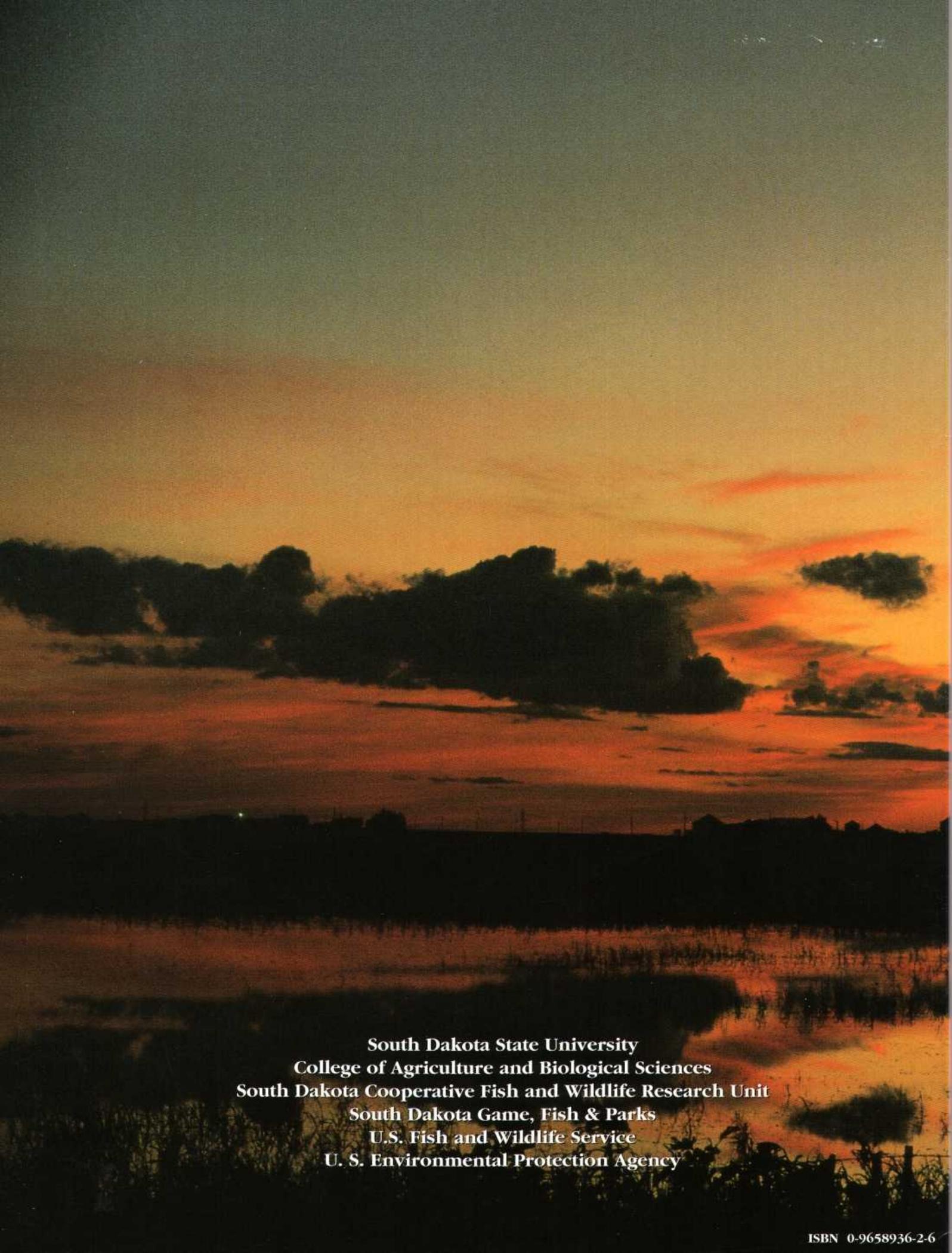
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While I know the standard claim is that Yosemite, Niagara Falls, the upper Yellowstone and the like, afford the greatest shows, I am not so sure but the Prairies and Plains last longer, fill the aesthetic sense fuller, precede all the rest, and make North America's characteristic landscape. — Walt Whitman.





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College of Agriculture and Biological Sciences
South Dakota Cooperative Fish and Wildlife Research Unit
South Dakota Game, Fish & Parks
U.S. Fish and Wildlife Service
U. S. Environmental Protection Agency**