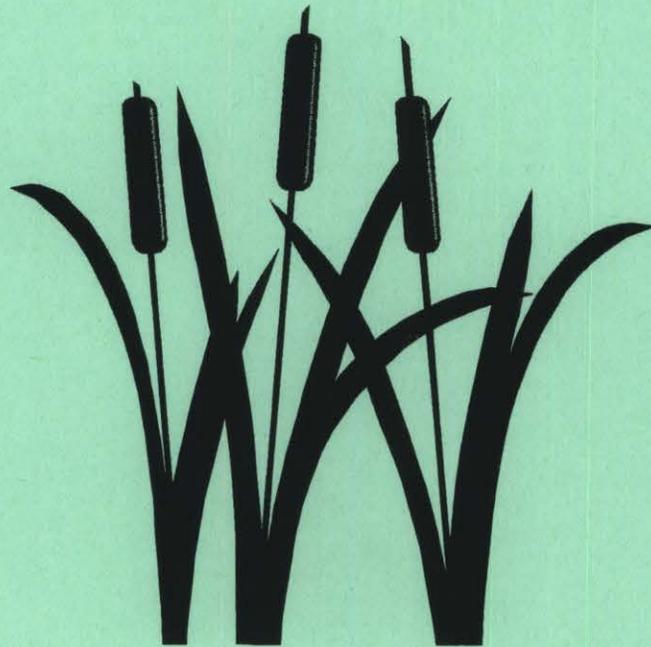


# **NEBRASKA WETLAND RESOURCES**

A Summary of the Issues Involving  
Conservation of Nebraska's Wetlands



prepared by

Nebraska Department of Environmental Quality

Nebraska Game and Parks Commission

Nebraska Natural Resources Commission

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Members of the Management Team were:

Steve Walker (Chairman)	NDEQ
John Bender	NDEQ
Terry Hickman	NDEQ
Elbert Traylor	NDEQ
Bill Baxter	NGPC
Ted LaGrange	NGPC
Randy Stutheit	NGPC
Terry Kubicek	NNRC
Steve Gaul	NNRC

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## INTRODUCTION

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Nebraska contains more than half of the total wetland acres found in the U.S. EPA Region VII (Dahl, 1990). Nebraska's wetland resources are characterized by a wide diversity of different wetland types, functions, and values. These wetlands are found among an array of natural palustrine, riverine and lacustrine habitats. The water holding capabilities of Nebraska wetlands range from permanent to temporary in nature and are dependent upon soil types and whether the source of water is from ground water aquifers or solely from precipitation and runoff. Wetland chemical properties range from freshwater to hypersaline and from acidic to alkaline.

Nebraska possesses three major wetland complexes which are recognized as being of international importance to wildlife. The Rainwater Basin area in southcentral Nebraska provides critical spring staging and migration habitat for waterfowl, shorebirds, wading birds and endangered species. The Big Bend area of the Platte River in central Nebraska provides critical migration habitat for the endangered whooping crane, spring staging habitat for nearly all of the world's sandhill crane population, breeding habitat for the threatened piping plover and endangered interior least tern, migratory habitat for waterbirds, and migration and wintering habitat for water fowl. The Sandhills area in northcentral Nebraska provides valuable breeding habitat for waterfowl, shorebirds and wading birds. Examples of other wetland complexes in Nebraska include saline wetlands and Missouri River wetlands in eastern Nebraska, high plains playas in southwest Nebraska, North Platte River valley wetlands in western Nebraska, and Niobrara River wetlands in northern Nebraska. All of these complexes provide recognized benefits for both resident and migratory wildlife.

The importance of Nebraska wetlands extends beyond their value for wildlife. Other recognized wetland functions include flood control; improved water quality through sediment and nutrient retention; and recreational activities such as swimming, boating, canoeing, hunting, fishing, trapping, picnicking, camping, bird watching,

photography, and nature studies. Unfortunately many of these functions have only recently been recognized. Extensive filling and draining of Nebraska wetlands has occurred since the early 1900's primarily as a result of agricultural and urban development. It has been estimated that only about 65 percent of the original Rainwater Basin wetland acres remain (Raines et al., 1990). Wet meadows in the Big Bend area of the Platte River have declined up to 45 percent since 1938 (Sidle et al., 1989). The U.S. Fish and Wildlife Service (1986) has estimated that as of 1972, only 64 percent of the original Sandhills wetlands remained. Similar losses have occurred in the other wetland complexes of the State (Gersib, 1991).

The Nebraska Wetlands Resources document represents the first coordinated statewide effort in Nebraska to obtain input from Nebraska's citizens about wetlands conservation. This document will hopefully provide Nebraskans with a better understanding of the importance of wetlands and increase their awareness of the roles and responsibilities of Nebraska agencies and organizations in protecting, restoring, enhancing, and creating wetlands.

This document has been organized into specific sections to provide information about Nebraska's wetland resources. The section titled "Wetland Resources in Nebraska" discusses the characteristics of wetlands, their functions and values, wetland dynamics and classifications, and the various wetland complexes found in Nebraska. The "Agency/Organization Roles and Responsibilities" section discusses the various agencies or organizations involved in wetland programs and the activities involved with wetland issues and management. The section titled "Wetland Ideas and Options" identifies wetland issues and problems and provides ideas for dealing with them. A "Wetlands Bibliography" lists wetland related material for further reference.

The Wetlands Ideas and Options section should provide a wealth of ideas and possible solutions for many of the existing wetland

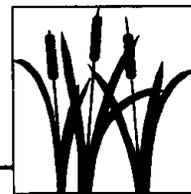
conservation problems and opportunities in Nebraska. It will be incumbent upon individual agencies and organizations to examine these ideas and options carefully and determine if their programs and wetland conservation efforts throughout the state could benefit from some of these suggestions. Nebraska's citizens can also play an important role by contacting appropriate agencies and organizations and expressing their support for some of these ideas and options.

We encourage you to be proactive and help us protect our remaining wetland resources in Nebraska.

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## WETLAND RESOURCES IN NEBRASKA



Nebraska's wetland resources are as diverse and dynamic as those of any state in the nation. They include marshes, lakes, river and stream backwaters, oxbows, wet meadows, fens, forested swamps, and seep areas. These wetlands vary greatly in nature and appearance due to physical features such as geographic location, water source and permanence, and chemical properties. Some wetlands pond water or are saturated for only a few weeks or less during the spring while others never go completely dry. Many wetlands receive their water from ground water aquifers while others are totally dependent on precipitation and runoff. And finally, the water chemistry of wetlands ranges from freshwater to saline and from acidic to basic. These descriptions identify the extremes of wetland characteristics. Nebraska's wetland resources possess these extremes and virtually every combination in between.

### WHAT IS A WETLAND?

There has been a tremendous amount of controversy about how to define wetlands. Much of this controversy is related to the fact that wetlands are regulated by several laws, and to apply these laws, the wetland boundary needs to be determined (a process termed wetland delineation). Delineation of wetlands is difficult because they occupy a transitional zone between deepwater and uplands on the landscape. Wetlands frequently go dry.

The State of Nebraska has adopted the federal definition that wetlands are "Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas." (USACE, 1987).

Wetland delineation in Nebraska and throughout the Nation is currently based on the 1987 Corps of Engineers Wetlands Delineation Manual (USACE, 1987). This manual requires three

diagnostic environmental characteristics to delineate wetlands. The three characteristics are

- 1) **vegetation** — defined by a prevalence of hydrophytic (water loving) plants adapted to growing in inundated or saturated conditions
- 2) **hydric soils** — the presence of soils that developed under inundated or saturated conditions that limit oxygen (anaerobic conditions)
- 3) **hydrology** — defined by inundation or saturation by water at some time during the growing season (the time when plants are actively growing).

The National Academy of Science, at the request of Congress, released a report on wetland definitions titled "Wetlands: Characteristics and Boundaries" (National Research Council, 1995). The report states that the current regulatory practice for characterizing wetlands is fundamentally sound. The report provides a wetland definition that states: "A wetland is an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical and biological features reflective of recurrent sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic or anthropogenic factors have removed them or prevented their development." Three factors were found to characterize a wetland:

- 1) **water** — saturated for a minimum of 14 days during the growing season in most years;
- 2) **substrate** — hydric soils and some wet areas that are not classified as soils, such as course-textured floodplain substrates that are seasonally flooded; and

- 3) **biota** — hydric vegetation was found to be mostly reliable. However, the use of some algae and animals as wetland indicators might be justifiable.

## **FUNCTIONS AND VALUES: WHY ARE WETLANDS IMPORTANT?**

Why should we care that Nebraska has lost some of its wetland resources? And why are some agencies now trying to protect wetlands when not long ago they were paying to drain them? Two main factors have contributed to this change in approach and attitude. The first is that our knowledge of how wetlands function has increased dramatically in the past few decades. Wetlands are now known to serve numerous functions, many of which have value to society as a whole. Secondly, as wetland losses have increased, the system that was dependent on these functions began to break down. Put another way, the loss of a small percentage of a region's wetlands probably had little effect, but as losses increased, a threshold was crossed and negative impacts began to occur. Examples include declining wildlife diversity and abundance such as have occurred in waterfowl numbers, increased flooding that has occurred in some watersheds, and deteriorating water quality that has become a problem in many regions. These negative impacts have created a recognized need for wetlands conservation in Nebraska.

There is a great deal of confusion generated by the terms, functions and values. Functions are defined as the things that a wetland does and value is the worth of that function to either an individual or society. Based on these definitions, functions are something that can be measured and documented, while values may vary from person to person. For example, we can measure the water holding and flood reduction functions of a wetland. This may have no value to a person living outside of the watershed, but a great deal of value to a downstream landowner or to society as a whole which pays indirectly for the costs of flooding. Ascribing and quantifying values is extremely complex and is beyond the scope of this document.

It is important to note that not all wetlands serve all the functions listed below. Nor will a given wetland necessarily serve these functions equally within a year or over a series of years. Some of the recognized functions of wetlands include:

**Improving Water Quality** — When most people consider wetlands, the last thing they think about is clean water. Wetlands can produce foul smelling gas (rotten egg odor) and contain numerous floating plants, algae, bacteria, bugs, and other animals that hardly make you want to appreciate their finer points. However, due to these plants and animals, and the chemical processes that produce the smelly gas, wetlands are a great natural cleanser of many common water pollutants. Wetlands act as a filter, slowing water and allowing sediment and many pollutants to settle out. As water slowly moves through a wetland, a series of chemical transformations take place that tie-up or alter a variety of pollutants. Generally, the net result is that the water leaving a wetland is of higher quality than the water entering the wetland. Studies have shown that up to 80 percent of the nitrate pollution entering wetlands is converted to harmless nitrogen gas by the time the water exits the wetland. Wetlands are increasingly being used for water pollution control and waste water treatment due to their water cleansing functions.

**Providing Habitat for Wildlife, Fish, and Unusual Plants** — Wetlands are one of the most productive biological systems on earth. They produce more plant and animal life per acre than cropland, prairies, or forests. This high level of productivity makes wetlands important habitat for an abundance of different kinds of wildlife and fish. Wetlands provide migration, breeding, nesting, and feeding habitat for millions of waterfowl, shorebirds, songbirds, and other wildlife. Wetlands are home to thousands of different plant and animal species including many that are threatened or endangered. Nine of Nebraska's 11 federal endangered and threatened species use wetland areas. Wetlands also provide important winter cover for pheasants, deer and other resident wildlife.

Nebraska is unique in that it possesses three major wetland complexes that are of international importance to wildlife. The Rainwater Basin area in south-central Nebraska provides critical spring staging and migration habitat for waterfowl, shorebirds, and wading birds as well as habitat for other wildlife including endangered species. Immediately north of this area is the Central Platte River wetland complex which provides critical migration habitat for the endangered whooping crane, spring staging habitat for 80 percent of all

North American Sandhill cranes, breeding habitat for threatened and endangered species, and migration habitat for waterfowl and other waterbirds. Finally, the Sandhills wetland complex in north-central Nebraska is recognized as providing important breeding and migration habitat for waterfowl, shorebirds, and endangered species.

**Reducing Flooding and Soil Erosion** — Many wetlands act as a sponge by storing water temporarily, and allowing it to percolate into the ground, evaporate, or be slowly released into a stream or river. This temporary storage capability reduces flooding after a storm. Wetlands also slow the overland flow of water which reduces downstream soil erosion.

**Producing Food and Fiber** — Some of our most productive cropland is located on completely drained wetland soils. Many of the same factors that make drained wetlands productive for agriculture can be tapped to make existing wetland areas productive for food and fiber. These functions are already recognized by many in agriculture who take advantage of the ability of existing wetlands to produce hay and forage for livestock. Less conventional uses are also possible such as raising fish, crayfish and frogs or growing alternative crops like wild rice, new strains of crops adapted to wetlands, and wetland plants used for biomass or ethanol production (USEPA, 1991).

**Supplying Water** — Wetlands store rainwater and runoff. Many wetlands slowly release water into the ground which helps recharge ground water. Some wetlands also slowly release water to streams and rivers, helping to maintain stream-flows. These water supply functions can benefit municipal and agricultural water users, and provide water for livestock.

**Providing Recreation and Education** — Wetlands provide numerous recreation opportunities including hunting, trapping, wildlife watching, photography, and enjoyment of the serenity that a wetland can offer. Anglers also benefit from wetlands because many species of fish use these areas for spawning and hiding, or because the foods used by the fish are produced in the wetland. Wetlands provide an excellent setting for environmental education because of the many unusual life forms present and because they are unique features of the landscape. Undisturbed wetlands also serve a heritage function

because they represent a landscape as it once appeared in the past.

## WETLAND DYNAMICS

Wetlands are highly dynamic and productive systems. Wetlands produce more plant and animal life per area than woodlands, prairies, or cropland. Because wetlands occupy a continuum between wet and dry conditions, they undergo a variety of unique changes both seasonally and from year-to-year. Wetlands become dry and then flood, are burned by prairie fires, and are subjected to other disturbances such as grazing. These are natural processes that don't harm the wetland. In fact, it is the interaction of all of these dynamic processes that make wetlands so productive. If some of these processes are altered, for example, by maintaining a constant water-level, the wetland will actually begin to deteriorate. Other factors that can cause the wetland to deteriorate are human-induced factors such as permanent drainage, filling with soil, concrete, or trash, water diversion, and erosion.

## WETLAND CLASSIFICATION

Numerous classification systems have been developed for wetlands. The one most commonly used today is the Cowardin system (Cowardin et al., 1979). This is a hierarchical method that classifies wetlands according to system, plant community and substrate, water regime, water chemistry, and numerous special modifiers such as the presence of dikes, drainage, and excavations. In many cases portions of the same wetland can be classified differently.

**Systems** — The three wetland systems that occur in Nebraska are palustrine, lacustrine, and riverine. Palustrine systems usually are marshes and are dominated by vegetation. Lacustrine systems are lakes, usually deeper than 6.6 feet. Riverine systems are rivers and streams that flow in a defined channel.

**Water Regime** — Water regime describes the duration and timing of water inundation or saturation in a wetland. In Nebraska, most palustrine wetlands are of the temporarily, seasonally, or semipermanently flooded water regime. Temporarily-flooded wetlands are flooded

for only brief periods, often only a few weeks, during the growing season. Seasonally-flooded wetlands have water present for extended periods during the growing season, but they tend to go dry by the end of the season in most years. Semipermanently-flooded wetlands contain water in them in most years and only occasionally go dry.

## **WETLAND INVENTORIES AND MAPS**

Many different techniques have been used to inventory the past and current number and acreage of wetlands, and to track the conversion or loss of wetlands in Nebraska. Because of this, the numbers derived statewide or within a complex are not always in agreement, and care needs to be taken when interpreting these numbers. Nevertheless, these numbers are useful in examining the major, long-term trends in wetland numbers and acreage in Nebraska.

The most current and accurate wetland inventory for Nebraska was conducted by the National Wetlands Inventory (NWI) of the U.S. Fish and Wildlife Service. The inventory produced maps that depict wetlands using the Cowardin classification (Cowardin, et. al., 1979). The maps are an excellent tool for inventorying and locating wetlands but they are not delineation maps (i.e., they do not depict official wetland boundaries). NWI maps for Nebraska can be ordered by calling (402)472-7523. Digital maps are available for much of the state and can be accessed via the internet at <http://www.nwi.fws.gov/>.

## **STATEWIDE WETLAND RESOURCES**

At the time of statehood in 1867, Nebraska contained an estimated 2,910,000 acres of wetlands covering about 6 percent of the state (Dahl, 1990). Through much of the state's history wetlands were viewed as an impediment to transportation, agriculture, and development. The federal government actively encouraged the conversion of wetland areas to other uses through land give-aways, direct financial assistance, technical assistance, crop subsidies, and tax incentives. Wetlands were impacted directly by filling, ditching, tiling, digging concentration pits, channelization, and declining water tables, and indirectly by changes in the surrounding uplands that caused increased

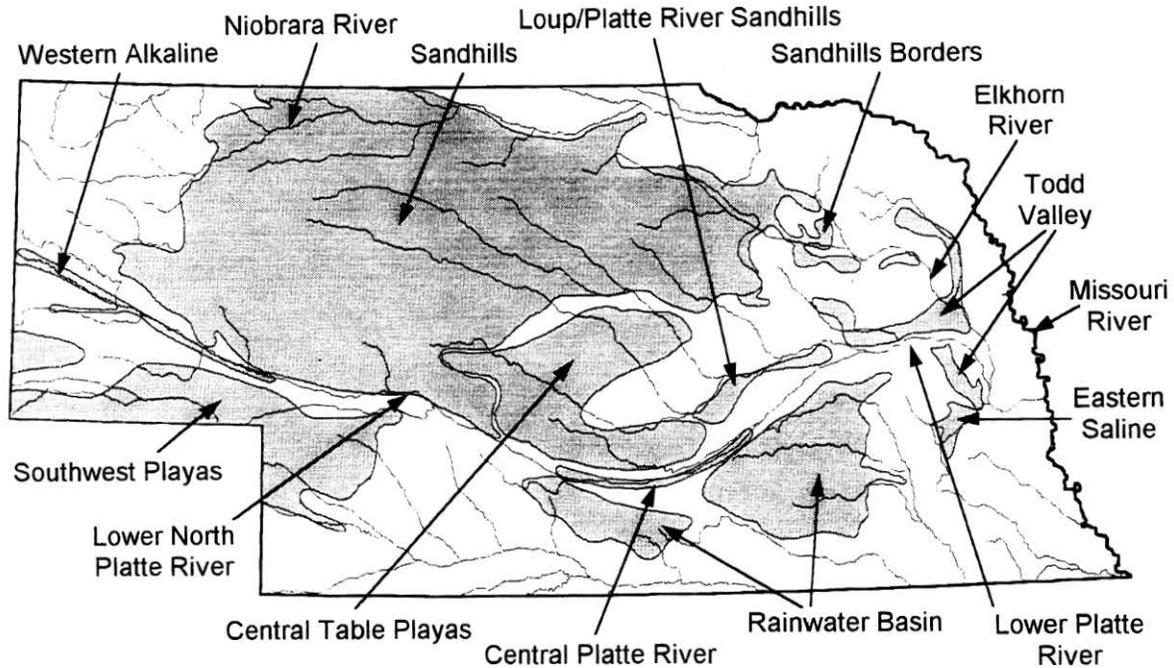
sedimentation or the diversion of surface runoff away from wetlands. Wetlands and water areas were also created in some regions due to the construction of farm and livestock ponds, and locally rising water tables due to irrigation canal and reservoir seepage. However, the net result of all of these activities statewide was a reduction in wetlands by an estimated 35 percent, to 1,905,000 acres covering only 3.9 percent of the state (Dahl, 1990). The destruction of wetlands was much higher in some regions of the state, but the statewide figure is buffered by the large wetland resource still remaining in the Sandhills. Temporarily-flooded and seasonally-flooded wetlands were lost at the highest rate throughout the state, and much of this acreage was not compensated for by the construction of lakes and ponds. Most states surrounding Nebraska have lost a greater percentage of their wetlands.

Many organizations and agencies have put a great deal of effort into conserving and managing some outstanding examples of Nebraska's wetland resources. These entities have acquired or in other ways protected approximately 50,000 ac. of wetlands in Nebraska, however, this represents less than 3 percent of the remaining wetlands in the state. Examples of some public areas to visit are provided in the section on regional wetland complexes. A statewide list of public Wildlife Management Areas, many of which contain wetlands, is available from the Nebraska Game and Parks Commission.

## **NEBRASKA'S REGIONAL WETLAND COMPLEXES**

Wetlands occur throughout the state. But for many purposes it is useful to identify some of the larger wetland complexes in the state. A complex is considered a geographically definable concentration of wetlands that are similar in form and function. The basis for these identified complexes and much of the information about them was adapted from the Nebraska Game and Parks Commission's Nebraska Wetlands Priority Plan (Gersib, 1991).

The wetland complexes are grouped into four categories: playas, sandhills, saline/alkaline, and riverine. Six of the complexes were ranked by Gersib (1991) in the Nebraska Wetlands Priority Plan, and the assigned rankings were based on wetland functions, losses, and threats. The remaining eight complexes were not discussed or



Nebraska's Wetland Complexes and Rivers

ranked by Gersib (1991). Therefore, the information available for these complexes is considerably less.

It needs to be strongly emphasized that, even if a wetland is not located within one of the complexes, this does not mean it is unimportant or does not provide valuable functions. There are numerous wetlands, especially along Nebraska's many streams and rivers, that are important components of the ecosystem.

**PLAYA WETLANDS**

Playa wetlands are wind-formed, nearly circular depressions located in semi-arid areas of the country, including Nebraska. Playa wetlands are located throughout the northwest three quarters of the state, except in the Sandhills. The major playa complexes in Nebraska include the Rainwater Basin, Central Table Playas, Southwest Playas, and the Todd Valley.

**Rainwater Basin**

**Profile**

The Rainwater Basin region occupies a 4,200 sq. mi. area in 17 south-central Nebraska counties. It was named for the abundant natural marshes that formed where clay-bottomed depressions catch and hold rain and runoff water. The region is characterized by flat to gently rolling loess plains formed by deep deposits of silt-loam soil. These wetlands tend to have a northwest to southeast orientation, and there frequently is a hill located immediately south or southeast of the basin where the windblown loess was deposited. Surface water drainage in the region is poorly developed and results in numerous closed watersheds draining into these depressions. Most of the wetlands in this region do not receive ground water inflow. Wetlands range in size from less than one to over one thousand acres.

**Loss and Threats**

Original soil survey maps from the early 1900s indicate that approximately 4,000 major

wetlands totaling nearly 100,000 acres were present at the time of settlement. Schildman et al. (1984) estimated that less than 10 percent (374) of the original major wetlands and 22 percent (20,942) of the original wetland acres identified on early soil surveys remained in 1982. This trend study did not attempt to estimate the quantity and quality of smaller wetlands that were not identified on early soil surveys. However, it is likely that the proportion of loss documented by the Commission's major wetland trend analysis has occurred for all Rainwater Basin wetlands.

Using National Wetland Inventory (NWI) digital data and recent soil survey maps, a multi-agency wetland team in 1990 identified 34,103 acres of Rainwater Basin wetlands remaining (Raines et al. 1990), and of these only 28,260 acres were naturally occurring palustrine basins (Smith and Higgins, 1990). These studies indicated that palustrine (marsh-like) emergent wetlands were decreasing, and virtually all remaining wetlands have been degraded in some fashion. Rainwater Basin wetlands were identified by the US Fish and Wildlife Service as one of nine areas in the U.S. of critical concern for wetland losses (Tiner, 1984).

Rainwater Basin wetlands were given a priority 1 ranking in the Nebraska Wetlands Priority Plan due to extensive past losses (Gersib, 1991). The remaining wetland resources of the Rainwater Basin Complex continue to face numerous threats, mostly related to conversion to cropland. Rainwater Basin wetlands face the direct threat of elimination by drainage and/or filling. The construction of concentration pits (also called dugouts or reuse pits) was common in the past and caused the loss of wetland functions by converting the shallow, vegetated portion into deep and less productive water pits. Water pollution, especially sediment, can seriously reduce the functions of Rainwater Basin wetlands. Additionally, nearly all Rainwater Basin wetlands are threatened by changes to their watershed that divert water away from wetlands or concentrate upland runoff water into concentration pits. Of greatest concern is the cumulative impact of all of these threats that cause shallow wetlands to lose a few inches of water and become dry uplands.

The spread of purple loosestrife (*Lythrum salicaria*) throughout Rainwater Basin wetlands is an additional threat. Purple loosestrife is an introduced plant of little value to wildlife that out-competes desirable native plants. No information is

available on the extent of purple loosestrife abundance or distribution throughout the Rainwater Basin area; however, it has been observed near Exeter and along the Platte River.

### Functions and Values

Rainwater Basin wetlands are most noted for their importance to waterfowl, especially during the spring migration (Gersib et al., 1992; Gersib et al., 1990a; U.S. Fish and Wildlife Service and Canadian Wildlife Service, 1986). They host five to seven million spring-migrating ducks and geese annually, providing the nutrient reserves necessary for migration and reproduction further to the north. Approximately 90 percent of the mid-continent population of greater white-fronted geese, 50 percent of the mid-continent population of mallards and 30 percent of the continent population of northern pintails use the Basins during spring migration. Recent surveys have identified that a minimum of 200,000-300,000 shorebirds represented by over 30 different species migrate through the basins during the spring (Adrian Farmer, Pers. Comm). In some years the Basins also produce substantial numbers of ducks (Evans and Wolfe, 1967). Over 257 species of birds have been recorded in the Rainwater Basin. Rainwater Basin wetlands are regularly used by the federally endangered whooping crane, peregrine falcon, and the threatened bald eagle. Forty-two percent of confirmed whooping crane observations in Nebraska have been at Rainwater Basin wetlands. These wetlands have provided more whooping crane use-days during fall migration than any other known migration habitat in the United States' portion of the Central Flyway (C.A. Faanes, unpubl. data).

Rainwater Basin wetlands provide water quality functions in the form of flood storage, nutrient retention, sediment trapping and shoreline anchoring (Gersib et al., 1990b). Because of the impermeable clay pan characteristic of Rainwater Basins and water table elevations that lie more than 50 feet below the wetlands, ground water discharge does not normally occur. One exception occurs in Phelps County where Platte River irrigation water has resulted in ground water discharges into some basins (Gersib et al., 1990b). Ground water recharge is limited to periods of high precipitation when surface water in wetlands extends beyond the clay lens associated with wetland soils (Keech and Dreeszen, 1959).

Nearly all Rainwater Basin wetlands provide for recreation activities, particularly hunting and fur harvest. The public is showing increased interest in using Rainwater Basins for other recreation such as bird watching and nature photography.

### **Central Table Playas**

#### **Profile**

Central Table Playa wetlands are situated in central Nebraska on relatively flat, loess soil tablelands surrounded by a landscape that is highly dissected by natural drainages. The largest cluster is just west of Arnold, but similar wetlands are scattered in some of the surrounding counties. The complex possibly represents an extension of the Southwest Playas east toward the Rainwater Basin and Todd Valley complexes. The wetlands in this complex are possibly remnants of a larger complex of wetlands that was naturally eroded, breached and drained by streams. It's uncertain why this area has a more developed natural drainage pattern than the other complexes.

#### **Loss and Threats**

Losses and threats to the wetlands in this complex are less well known than for many other complexes in the state. Casual observation indicates that the amount of loss of these wetlands falls somewhere between that noted for the Southwest Playas and the Rainwater Basins. Some of the wetlands have been modified by concentration pits or drained by drainage ditches. In some locations, the hydrology of the watershed has been altered by the placement of terraces and diversions that reduce the amount of water entering the wetlands. Most of the Central Table Playas are farmed as conditions allow.

#### **Functions and Values**

Our understanding of the functions and values of the Central Table Playa wetlands is limited by the lack of information. The wetlands are often visited by endangered whooping cranes during migration, with 25 percent of total whooping crane use days in Nebraska occurring in this complex. These wetlands also provide habitat for migrating waterbirds, including waterfowl, shorebirds, and wading birds.

### **Southwest Playas**

#### **Profile**

The playa wetlands of southwest Nebraska occupy small clay-lined depressions on nearly flat tablelands of loess soil. These freshwater wetlands receive water from runoff and are small (mostly less than five acres.), temporarily and seasonally-flooded wetlands. Most have no natural outlet for water. In most years these wetlands dry early enough in the growing season to be farmed. Southwest Playa wetlands are similar to Rainwater Basin wetlands farther east, except that the Rainwater Basin region receives greater rainfall and the wetlands there tend to be larger.

#### **Loss and Threats**

Due to the small amount of rainfall received (16-18 in. per year) in the Southwest Playa region, there has been less need for drainage of these wetlands than has occurred in many other complexes. Some of the wetlands are drained into concentration pits or road ditches, but most simply go dry naturally and are farmed through. In some locations, the hydrology of the watershed has been altered by the placement of terraces that reduce the amount of water entering the wetlands. These terraces also reduce the amount of eroded soil entering the wetlands. Since eroded soil filling the wetlands is an added threat to the Playas, soil erosion treatments are needed in the watershed of these wetlands. However, care needs to be taken to ensure that the erosion treatments do not reduce the wetland's water source.

#### **Functions and Values**

Our understanding of the functions and values of the Southwest Playa wetlands is limited. Casual observations indicate that these wetlands provide important habitat for migrating waterfowl and shorebirds, and cover for pheasants. These water areas are especially important to wildlife in the dry High Plains region of the United States where wetlands are often scarce.

### **Todd Valley**

#### **Profile**

The complex is split into two regions. The region south of the Platte River is located in an

ancient valley of the Platte (termed the Todd Valley) that runs from NW to SE (Lueninghoener, 1947). The valley has partially filled with sand deposits and fine wind-blown loess soils after the river moved to its present location. The region north of the Platte River is located on an ancient floodplain terrace between the Platte River and Shell Creek and along Logan Creek. Todd Valley wetlands occupy small, clay-lined, closed depressions located in loess soils. They are mostly fresh-water, seasonally and temporarily-flooded wetlands that receive most of their water from runoff.

### **Loss and Threats**

Losses within this wetland complex have not been quantified. However, examination of soil maps and wetland maps, combined with limited site visits, suggests that many Todd Valley wetlands have been altered or eliminated. These losses have been caused by concentration pits, drainage and road ditches, tile lines, and in some areas by agricultural drainage wells that drain water into the underlying sand layers. The principal threat facing Todd Valley wetlands is continued conversion to agricultural production.

### **Functions and Values**

Todd Valley wetlands provide functions similar to those of Rainwater Basin wetlands. Since the individual wetlands tend to be smaller than Rainwater Basin wetlands, and the total complex is smaller in geographic extent, they don't attract concentrations of migratory waterbirds as large as the Rainwater Basin wetlands. Little is known about the hydrologic functions of the Todd Valley wetlands.

### **SANDHILL WETLANDS**

These wetlands are formed in depressions in sandhill areas where ground water intercepts the surface of the land. The most notable complex is the Sandhills, a 19,300 square mile area containing over one million wetland acres. The other complex is the Loup/Platte River Sandhills. Additionally, sandhill type wetlands are located in southwest Nebraska, in the Sandhills Borders area along the Elkhorn River, and in scattered pockets south of the Platte River.

## **Sandhills**

### **Profile**

The Sandhills region of north-central Nebraska comprises the largest contiguous tract of grassland remaining in the United States and the largest stabilized sand dune area in the Western Hemisphere. This region encompasses 19,300 square miles and overlies several extensive aquifers of the Ogallala Formation which contain a storage capacity of nearly one billion acre-feet of water. This vast water resource occurs both in the underground aquifer and above ground in the form of wetland areas. It's estimated that 177,000 acres of open water and marsh and 1,130,000 acres of wet meadows remain in the Sandhills. These are mostly freshwater wetlands and include saturated wet meadows, shallow marshes, and open-water lakes. The wetlands range in size from less than one acre to 2,300 acres with greater than 80 percent of all wetlands estimated to be 10 acres or less in size (Wolfe, 1984).

Several unique wetland types are located within the Sandhills. The Nebraska Natural Heritage Program has identified fens within the Sandhills (Steinauer, 1995), a rare wetland type both in the Sandhills and throughout the United States. Fens are characterized by slightly acidic water, and peat (undecomposed plant parts) soils that form in areas fed with a nearly constant supply of ground water. Fens harbor several rare plant species such as cotton grass (*Eriophorum polystachion*), buckbean (*Menyanthes trifoliata*), and marsh marigold (*Caltha palustris*). Now these plants are found mostly in colder regions north of Nebraska and are likely relics from a much cooler period in the Sandhills that have survived in these specialized habitats. In the western portion of the Sandhills region there are numerous highly alkaline wetlands (Steinauer, 1994) that harbor unusual plants and invertebrate life. These alkaline wetlands are very attractive to shorebirds because of the invertebrate life they produce.

### **Loss and Threats**

Wetland loss in the Sandhills has occurred primarily through draining by surface ditches, beginning as early as 1900 (McMurtrey et al., 1972; U.S. Fish and Wildlife Service, 1960). With the introduction of center pivot irrigation systems to the Sandhills in the early 1970s, land leveling/shaping and local water-table declines have resulted in

extensive wetland loss in some areas. Center-pivot irrigation increased 1,746 percent in the Sandhills between 1972 and 1986 (U.S. Fish and Wildlife Service, 1986). While quantifiable data are not available for the Sandhills, estimates of wetland acres drained range from 15 percent (McMurtrey et al., 1972) to 46 percent (U.S. Fish and Wildlife Service, 1986). Sandhills wetlands were given a priority 1 ranking in the Nebraska Wetlands Priority Plan due to past losses (Gersib, 1991).

Sandhills wetlands are most threatened by drainage in an attempt to increase hay acreage. This drainage directly impacts the lake or marsh where the project occurs and also can lead to cumulative wetland loss both downstream and upstream as the channel becomes entrenched, lowering the water table and causing lateral drainages to occur that impact adjacent wetlands. Many smaller wetlands are also threatened by conversion from ranching to irrigated farming. Concentrated, large-scale irrigation development can result in long-term effects on wetland communities by lowering the ground water table. Changing farm economics appeared to greatly slow center-pivot irrigation development in the Sandhills, and the Conservation Reserve Program (CRP) allowed many pivots to be planted back to grass cover. However, this situation could change as CRP expires or economics change.

Ground water pollution, largely from agricultural chemicals and concentrated livestock waste, is a threat to the historically excellent water quality in the Sandhills. Nitrate levels in ground water exceed safe limits (10 mg/l) in some locations due to fertilizer application (NRC, 1993; Engberg, 1984). Traces of atrazine in ground water have resulted in the inability of native vegetation to pioneer some abandoned center-pivot sites (BIO/West, 1986).

A potentially disastrous future threat is the sale and removal of ground water to areas away from the Sandhills. With its extensive ground water resources (Bleed and Flowerday, 1989), the Sandhills region is sometimes touted for major water sales. Such a loss of water would greatly impact the region's lakes, marshes, and meadows since they are connected to the ground water.

#### **Functions and Values**

Sandhills wetlands are extremely valuable to the region's ranchers and the ranching economy.

These wetlands, especially the wet meadows, provide abundant and nutritious forage that is used as winter cattle feed. Wetlands also offer grazing sites and a source of water to livestock.

Sandhills wetlands provide habitat for over 300 species of birds, including large numbers of waterfowl, as well as for numerous shorebirds, herons, egrets, and other waterbirds (U.S. Fish and Wildlife Service, 1981; 1986). The North American Waterfowl Management Plan lists the Sandhills as a habitat area of major concern in North America (U.S. Fish and Wildlife Service and Canadian Wildlife Service, 1986). The Sandhills are the most important waterfowl production area in Nebraska and are considered by Bellrose (1980) to be the best duck production area south of the Prairie Pothole Region. The Nebraska Game and Parks Commission counted an average of 108,860 ducks by aerial surveys in the Sandhills during the 1991-95 nesting seasons (Humpert, 1995). The most common species of nesting waterfowl include mallards, blue-winged teal, northern shovelers, northern pintails, gadwalls, redheads, and ruddy ducks. Production from the Sandhills Canada goose flock provides a fall flight that likely exceeds 10,000 birds (Gabig, pers. comm.). Trumpeter swans are expanding their nesting range throughout the Sandhills.

Several state and federally listed threatened and endangered species use the Sandhills and associated wetlands. The migration corridor of the endangered whooping crane and peregrine falcon encompasses most of the Sandhills. Threatened bald eagles move through the area during migration and also winter along Sandhills rivers. Wet meadows provide habitat for the western prairie fringed orchid, which is a threatened species.

Most of the lakes in the Sandhills are too shallow or alkaline to support game fish populations. However, some freshwater lakes, and their associated wetlands, have adequate water depth to over-winter fish and support an exceptional warm-water fishery. While over 75 fish species occur within the Sandhills, the most common sport fishing species are northern pike, yellow perch, largemouth bass, bluegill, and crappie. Sandhills streams and their associated wetlands also provide habitat for four state threatened fish species in Nebraska: the pearl dace, northern redbelly dace, finescale dace, and blacknose shiner.

Wetlands in the Sandhills function both as ground water discharge and recharge sites, though recharge usually occurs only during heavy precipitation events in the spring (Bleed and Flowerday, 1989). Although precipitation is low and evaporation rates are high, the large underground reservoir, known as the Ogallala Aquifer, provides a water table at or near the surface for discharge into a vast array of wetlands, even during drought. Agricultural, residential and municipal water supplies within the region, and a sizable portion of the rest of Nebraska, are dependent upon the Ogallala Aquifer as their sole source of water.

The Sandhills region in general represents one of Nebraska's most popular tourist areas. Visitation data from Valentine and Crescent Lake National Wildlife Refuges as well as the presence of many State Wildlife Management and Recreation Areas within the Sandhills reflects well on the recreational values these wetlands provide. Camping, canoeing, boating, fishing, hunting, trapping, birdwatching, and wildlife photography are common recreational activities within this area.

### **Loup/Platte River Sandhills**

#### **Profile**

The Loup/Platte River Sandhills wetland complex is in a narrow band of wind-deposited sand located from the confluence of the Platte and Loup Rivers at Columbus, west to near the town of Ravenna. Wetlands are most numerous in a 70 sq. mi area south of Genoa. This complex was called the Platte-Nance-Merrick county Sandhills complex by Gersib (1991). Within these sandhills are numerous freshwater wetlands. These wetlands are mostly small (<5 ac.) and range from temporarily to semipermanently flooded. Some information suggests that the ground water that recharges these wetlands is related to levels in the Platte and Loup Rivers, but little quantitative information is available.

#### **Loss and Threats**

Some drainage and cropping of these wetlands has occurred, however, losses within this complex appear to be less than in many other complexes in the state. Threats to these wetlands are primarily related to the potential of local ground water pumping drawing down water tables and causing the wetlands to lose their water source. This

complex may also be impacted by alterations of flows in the Platte and Loup Rivers, but this connection is currently not well understood. In the early 1970's there was a proposal to drain a large number of wetlands within this complex to facilitate conversion to agriculture (Farrar, 1974), and the potential for this threat remains.

#### **Functions and Values**

Unfortunately, little is known about how this wetland complex functions. The wetlands are known to provide good habitat for nesting waterfowl and likely provide habitat for other water birds. Locally, the area provides recreation for waterfowl hunters. These wetlands provide water and forage production for area livestock. The role that these wetlands play in the water quality and ground water dynamics of the region needs further investigation.

### **SALINE/ALKALINE WETLANDS**

These wetlands have saline or alkaline water. They receive their salts from either ground water or through concentration by evaporation. The complexes in Nebraska include the Eastern Saline and the Western Alkaline. There are also some highly alkaline wetlands in the western Sandhills that are covered in the Sandhills Complex section. Additionally, moderately saline/alkaline wetlands are found in scattered pockets along much of the Platte River.

#### **Eastern Saline**

##### **Profile**

Eastern Saline wetlands are of historical significance as their presence spawned a short-lived salt mining industry in the 1860's that led to the establishment of the city of Lincoln. Eastern Saline wetlands occur in swales and depressions within the floodplains of Salt Creek and its tributaries in Lancaster and southern Saunders counties. The wetlands receive their salinity from ground water inflow that passes through an underground rock formation containing salts deposited by an ancient sea that once covered Nebraska. Eastern Saline wetlands are characterized by saline soils and salt-tolerant vegetation. Many plants found in these salt marshes occur nowhere else in the state, although they are common along seashores and in alkaline areas farther west (Kaul, 1975). Soil salinity varies

greatly between, and even within, wetlands. Highly saline wetlands usually have a central area that is devoid of vegetation, and when dry, exhibit salt encrusted mudflats. Seablite and grasswort are curious succulent plants growing along the edge of the saltiest places where nothing else will grow. Spearscale and saltgrass form a ring farther back from the edge of these marshes (Kaul, 1975). Wetlands having lower soil salinities are fully vegetated with salt-tolerant plants.

### Loss and Threats

Eastern Saline wetlands are considered critically imperiled in Nebraska (Clausen et al., 1989) and the most limited and endangered vegetation community in the State (Kaul, 1975). Although historic wetland acreages have not been quantified, past losses are considered to be significant (R. Gersib, pers. comm.).

Inventory and assessment work by Gersib and Steinauer (1990) and Gilbert and Stutheit (1994) noted extensive wetland losses from expansion of the city of Lincoln and agricultural activities. They further noted that all extant saline wetlands identified in their inventory have experienced recognizable degradation through drainage, diking, filling, farming and overgrazing. Eastern Saline wetlands were given a priority 1 ranking in the Nebraska Wetlands Priority Plan due to extensive losses in the past (Gersib, 1991).

Because the entire Eastern Saline wetland complex is located in and near the city of Lincoln, past losses have been severe, and future threats from development activities are imminent. Saline wetland assessment work by Gersib and Steinauer (1990) indicated that 168 of 188 uncultivated wetland sites were considered to have a high or moderate vulnerability to future wetland degradation or loss.

Categories of threat to Eastern Saline wetlands include drainage or filling, streambed degradation, agricultural conversion or use, residential or commercial development, transportation, and water pollution. Of these, commercial or residential development and road construction are considered to be the greatest threats to Eastern Saline wetlands. Commercial and residential development usually result in total wetland destruction and the loss of all related functions. One of the most serious long-term threats is the degradation (deepening) of stream channels

that results in erosive lateral headcuts (gullies) that eventually drain wetlands, and would likely lead to lower area water tables.

### Functions and Values

Eastern Saline wetlands provide habitat for a variety of wildlife species and are particularly important as migrational habitat for shorebirds. The exposed saline mudflats provide abundant invertebrate foods. During the last century, more than 230 species of birds have been reported for the salt basins of Lancaster County (Farrar and Gersib, 1991). Ten of these species are on the National Audubon Society's Blue List, and 13 are listed as species of special concern. The federally endangered peregrine falcon frequents the Eastern Saline wetlands during migration and sightings of the endangered least tern and threatened piping plover have been reported.

The salt creek tiger beetle (*Cicindela nevadica* var. *lincolniana*), a very rare and geographically restricted subspecies, is found only on the open salt flat areas of Eastern Saline wetlands. The salt creek tiger beetle is a candidate for the endangered/threatened species list.

Eastern Saline wetlands are home to many saline plants that are found nowhere else in Nebraska. Three plant species found growing in Eastern Saline wetlands are considered rare in Nebraska (Clausen et al., 1989) including saltmarsh aster (*Aster subulatus* var. *ligulatus*), saltwort (*Salicornia rubra*), and Texas dropseed (*Sporobolus texanus*).

Silty clay soils reduce downward water movement resulting in low to moderate ground water recharge functions. The location of wetlands within the Salt and Rock Creek floodplains and their alluvial soils provide strong indications that flood control functions are being provided by these wetlands.

Because of their location in and around the city of Lincoln and their proximity to Omaha, Eastern Saline wetlands are ideally located to provide recreation opportunities. Bird watching, nature study, and waterfowl and pheasant hunting are the most common outdoor recreation activities. Few wetland areas in Nebraska provide the educational opportunities afforded by the close

proximity of these unique wetlands to so many students.

### Western Alkaline

#### Profile

Western Alkaline wetlands occur on the floodplain of the North Platte River upstream from Lewellen, and along the upper reaches of Pumpkin Creek. These wetlands receive their water from a combination of overland runoff, flood overflows, and springs. The hydrology of these wetlands is complex and influenced by local irrigation runoff. The alkalinity is principally caused by the salts of sodium carbonate and calcium carbonate becoming concentrated in the soils as a result of high rates of evaporation in this semi-arid region. These wetlands frequently go dry and a white crust of alkaline salts forms on the exposed soil surface.

#### Loss and Threats

Wetlands in this complex appear to have experienced fewer losses and to be less threatened than many of the other complexes in Nebraska. Much of this is due to the lack of development in the vicinity of these wetlands and because the soils are poorly suited to crop production. However, some wet meadows on less alkaline sites have been drained and converted to cropland or planted to non-native wheatgrasses. Irrigation projects have affected some sites. Long-term effect of reduced flows in the North Platte River may be a threat but is unknown.

#### Functions and Values

Western Alkaline wetlands provide nesting and migration habitat for a variety of waterfowl, shorebirds, and other waterbirds. This complex is especially attractive to nesting American avocets, Wilson's phalaropes, blue-winged teal, mallards, and Canada geese. Much of the shorebird habitat is provided by the open alkaline flats. These wetlands provide important waterfowl hunting and wildlife viewing opportunities in this region of the state. Several plants rare to Nebraska occur in the alkaline wetlands including the Nevada bulrush (*Scirpus nevadensis*), slender plantain (*Plantago elongata*), silverweed (*Potentilla anserina*), eastern cleomella (*Cleomella angustifolia*), thelypody (*Thelypodium integrifolium*), seaside heliotrope (*Heliotropum curassavicum*) and sea milkwort (*Glaux maritima*). Little is known of their other functions.

The location of these wetlands near springs and along the Oregon Trail lends to their historical significance.

### RIVERINE WETLANDS

Wetlands are closely associated with the riparian zone and floodplain of all of Nebraska's rivers and streams. These riparian areas are complex systems with numerous inter-related components (e.g., wetlands, organic matter, sandbars, tree falls, side channels, etc.). Wetlands are an important component of this system for producing invertebrates and other organic matter that provide energy and food to other parts of the streams and rivers. Additionally these wetlands provide spawning and nursery areas for many different types of fish, and homes for numerous wildlife species. Although wetlands occur along all of Nebraska's rivers, this discussion focuses on the wetlands associated with the Platte, Missouri, Niobrara, and Elkhorn Rivers. These complexes appear to contain the greatest river-associated wetland acreage remaining in the state. The Platte River system contains important wetlands throughout its reaches; however, in this guide, three reaches of the Platte are singled out for special consideration.

### Central Platte River

#### Profile

The Central Platte River (also called the Big Bend Reach) extends approximately 90 miles from Lexington to Chapman. Historically the Platte was a broad open prairie river with a braided channel and numerous saturated wet meadows adjacent to the river. However, the diversion of approximately 70 percent of the historic annual flows has changed the Central Platte into a narrower river with a dense band of mature deciduous woodland encroaching on the wet meadows. Numerous islands, which at one time were open sandbars, have since been overgrown with woody vegetation due to a reduction in high-water scouring flows.

#### Loss and Threats

The Platte River valley epitomizes the struggle between agricultural and development interests, and wildlife, fish, recreation, and other values associated with wetlands. American Rivers, a

river conservation organization. has listed the Platte River system as one of the most endangered waterways in the United States.

Diminished flows, increased sediment storage in upstream reservoirs, and agricultural conversion, have greatly altered the Platte River valley. Since 1860, the Central Platte River has lost up to 73 percent of active channel areas (Sidle et al., 1989). Upstream from the Central Platte, active channel losses on the river have reached 85 percent. In many areas, channel width has been reduced to between 10 and 20 percent of its historic size (U.S. Fish and Wildlife Service, 1981). From 1988 through 1994, open channel areas declined by 4 percent to 41 percent due to relatively low summer flows and reduced scouring flows, allowing the establishment of undesirable woody vegetation (Currier, 1995). Since settlement, wet meadow acreage in the Central Platte has declined 73 percent (Currier et al., 1985). Wet meadow acreage declined up to 45 percent between 1938-82 (Sidle et al., 1989). An increase of shrub and forested wetland types has occurred at the expense of riverine, emergent wetlands, and wet meadows as a response to decreased scouring flows. The increase in the shrub and forested wetlands has been detrimental to fish and wildlife resources that historically used the river valley (Currier et al., 1985; U.S. Fish and Wildlife Service, 1981). Wetlands along the Central Platte were given a priority 1 ranking in the Nebraska Wetlands Priority Plan due to extensive losses in the past (Gersib, 1991).

Agriculture (drainage and conversion to grain crops) and sand and gravel mining operations pose the biggest immediate threats to wet meadows adjacent to the Platte River. Loss of instream flows, ground water depletions, and degradation of the riverbed continue to pose a long-term threat to the source of water for the remaining wet meadows. As the water is depleted, the meadows become drier, allowing tree invasion or agricultural and residential development. Impoundment and diversion of river water and water-borne sediment are the main factors that have and continue to cause shifts from a wide, shallow, open channel to a narrow, deep channel surrounded by upland or wetland with woody vegetation. Failure to address these stream flow issues within the Platte River will continue to threaten the river and the fish, wildlife, and people that depend on it.

The spread of purple loosestrife is an additional threat. Purple loosestrife is an introduced plant of little value to wildlife that out-competes desirable native plants. Purple loosestrife was only reported west of Kearney in the late 1980's (Gersib, 1991) but has since become established throughout the Central Platte.

#### **Functions and Values**

The Central Platte provides habitat for several federally threatened and endangered species. The endangered whooping crane uses the river during spring and fall migration, and the portion of the Central Platte from Lexington to Shelton, has been designated as critical habitat necessary for the survival and recovery of this species. Up to 200 threatened bald eagles winter in the Central Platte area annually. The endangered interior least tern and threatened piping plover nest on the few remaining unvegetated sandbars in the river and at some sand and gravel pits adjacent to the river. Terns and plovers have been forced to nest on the sand and gravel pits because of the encroachment of woody vegetation on most river sandbars. Endangered peregrine falcons occasionally are seen along open stretches of the river channel or in adjacent wet meadows during migration (Currier et al., 1985). Wet meadows near the river provide habitat for at least one population of the western prairie fringed orchid, which is listed as a threatened species.

During the spring, nearly one-half million sandhill cranes, which comprise 80 percent of the North American population, converge on the river valley to rest and accumulate fat reserves for later migration and nesting (U.S. Fish and Wildlife Service, 1981). Five to seven million ducks and geese, including white-fronted geese, Canada geese, mallards, and northern pintails, stage along the Platte River and in nearby Rainwater Basin wetlands. Average midwinter waterfowl counts, 1992-96, were 5,000 mallards and 15,000 Canada geese in the stretch of river from Lexington to Central City (Nebraska Game and Parks Commission, unpubl. data). This reach also hosts large concentrations of migrant wading and shorebirds and several nesting colonies of great-blue herons. Over 300 bird species have been observed along the Platte River, including over 75 percent of the species on the 1986 Audubon Blue List (Tate, 1986; Safina et al., 1989); and 141 species have nested in the area. Over half of the 300 species are

neotropical migrants that winter largely south of the Tropic of Cancer but nest north of the tropics (Lingle, 1994). A report issued by the National Audubon Society focused on the importance of the Central Platte as wildlife habitat, especially for migratory birds, and the complexities of managing this severely threatened system (Safina et al., 1989).

During high flows, the Platte River recharges the underlying aquifer, which provides irrigation water for thousands of acres of cropland (Burns, 1981) and municipal water for 35 percent of the population of Nebraska. In stretches where the channels are not constricted by structures (e.g., bridges and bank protection) or encroached upon by vegetation, the Platte River has an enormous capacity to carry floodwaters within its own banks (Safina et al., 1989).

The Platte River provides a variety of recreation opportunities. From fall 1986 to fall 1987, Nebraskans spent an estimated \$51.3 million on nature-associated recreation in the Platte River Valley (Bureau of Sociological Research, 1988). Activities from highest to lowest participation rates include picnicking, nature hikes, observing wildlife, swimming, fishing, camping, boating, and hunting. A separate study indicated that up to 80,000 crane watchers flock to the Platte River each spring and benefit the local economy by more than \$40 million (Lingle, 1992).

### **Lower North Platte River**

#### **Profile**

The lower reach of the North Platte River extends approximately 20 river miles, from Sutherland to North Platte. This wetland complex consists of riverine and marsh-like wetlands lying within the historically active floodplain and channel of the Platte and North Platte rivers. Temporarily and seasonally flooded vegetated wetlands comprise an estimated 80 percent of all wetlands in the lower reach of the North Platte River.

#### **Loss and Threats**

Sidle et al. (1989) reported that the active river channel width between North Platte and Lake McConaughy has declined 85 percent since 1860. Since 1938, the active channel width between North Platte and Sutherland has declined by 65 percent (U.S. Fish and Wildlife Service, unpubl. data). Wet

meadow acreage losses along the North Platte River were estimated to be 23 to 33 percent since 1938, though much of the farmable meadows already were converted and under gravity irrigation prior to 1938 (Sidle et al., 1989). Additionally, an increase of scrub-shrub and forested wetland types has occurred at the expense of riverine and emergent wetlands as a response to decreased instream flows and increased sediment storage in upstream reservoirs. Lower North Platte River wetlands were given a priority 2 ranking in the Nebraska Wetlands Priority Plan due to extensive losses in the past (Gersib, 1991).

Agricultural conversion, ground water depletions, and sand and gravel mining operations pose the greatest short-term threats to wet meadows adjacent to the North Platte River. Residential and commercial developments commonly encroach on wet meadows after drainage, filling, or the mining of sand. Ground water depletions and degradation of the riverbed will continue to impact the remaining wet meadows in the long-term. Impoundments and the diversion of river water and sediment are the main factors that have caused and will continue to cause the shift from a wide, shallow, open channel to a narrow, deep channel bordered by uplands or scrub-shrub/forested wetlands.

#### **Functions and Values**

During the spring, about 100,000 migrating sandhill cranes spend up to six weeks feeding and resting on the Lower North Platte River and adjacent wet meadows. Sandhill cranes roost in the river and wet meadows at night and forage in wet meadows, grassland, and cropland during the day. Threatened bald eagles winter along the river and also use it during migration. Endangered whooping cranes occasionally use this stretch of river during both spring and fall migrations. Migrating and wintering waterfowl use the river and associated wet meadows. The North Platte River provides habitat for a variety of other migratory and resident wildlife species (U.S. Fish and Wildlife Service, 1981) including 77 percent of the bird species on the National Audubon Society's Blue List of which all but three nest in the area (Currier et al., 1985). Thirty-two species which occur along the Platte and North Platte Rivers have been listed as species of special concern.

The Lower North Platte River and its associated aquifer provide municipal and irrigation water supplies (Missouri River Basin Commission, 1976). During high-flow periods, the river recharges

the underlying aquifer. Because the Platte River system, including the Lower North Platte River, is highly regulated by a series of upstream reservoirs and canals, the ground water discharge and recharge functions of the river and associated wetlands have been significantly altered from natural conditions (Missouri River Basin Commission, 1976). Although upstream reservoirs on the North Platte River provide considerable flood protection, the continued loss of wetlands and channel capacity increases the future chance of flood damage.

Waterfowl hunting and fishing occur on the Lower North Platte River (Anderson et al., 1989). A recent survey by the University of Nebraska indicated that Nebraskans as a whole have a keen interest in a variety of recreation activities available on the Lower North Platte River and support further efforts to provide these recreation opportunities (Bureau of Sociological Research, 1988).

### **Lower Platte River**

#### **Profile**

The Lower Platte River extends approximately 100 miles from where the Loup River joins the Platte near Columbus to the Platte-Missouri River confluence south of Omaha. The river in this reach begins to flow in a more defined channel, but islands and sandbars are still numerous. The Lower Platte has fewer acres of wetlands and wet-meadows than the Central Platte. The wetlands along the Lower Platte are mostly fresh to slightly saline, saturated wet-meadows and seasonally and semipermanently flooded channel remnants and oxbows. These wetlands were likely more forested historically than wetlands further upstream.

#### **Loss and Threats**

The wetlands and channel habitat along the Lower Platte have suffered losses similar to those in the Central Platte. Diversion of stream-flows have probably had the greatest impact. Numerous wetlands have also been altered by drainage and conversion to cropland, sand and gravel mining, and housing developments. Additional diversion of water poses threats to the wetlands in the future. These wetlands will also face continued threats of urban expansion and associated disturbances, especially considering their proximity to Omaha, Fremont, and Columbus.

### **Functions and Values**

The wetlands and associated habitats along the Lower Platte River provide important migrational habitat for a variety of waterfowl and nesting habitat for wood ducks. An average of 46 threatened bald eagles have wintered along the Lower Platte in recent years, and several nests have been confirmed. Endangered peregrine falcons are attracted to the Lower Platte during migration because of the large amount of shorebird and waterfowl prey that use this area. The endangered least tern and threatened piping plover nest on sandbars and sand pits along the river, however, disturbance and altered habitat threaten these populations. Nearly 10 percent of the entire interior least tern breeding population nests along this portion of the river. The federally endangered pallid sturgeon and state-threatened lake sturgeon are also found near the mouth of the Platte.

Wetlands along the river help to attenuate flood flows and also filter the water, removing some pollutants. Additionally, numerous communities, including the cities of Omaha and Lincoln, pump municipal water from wells that receive recharge from this reach of the river.

The Lower Platte receives very intensive recreational use since it is within 50 miles of over 60 percent of the state's population. Waterfowl and deer hunting, fishing, and boating occur on this reach (Anderson et al., 1989). State parks and recreation areas along the Lower Platte receive a total of over four million visits annually.

### **Missouri River**

#### **Profile**

In Nebraska, the Missouri River floodplain harbors a collection of riverine and marsh-like wetlands that follow the state line from eastern Boyd County downstream to the southeastern corner of the state in Richardson County. Prior to the 1930s, the Missouri was a wild, natural river that supported a tremendous number and diversity of fish and wildlife. The river was described as occupying a sandy channel that flowed between easily erodible banks 1,500 feet to over one mile apart with braided, sinuous channels twisting among sheltered backwaters, sloughs, chutes, oxbows, gravel bars, sandbars, mudflats, snags, alluvial islands, deep pools, marshland, and shallow water areas (U.S. Fish

and Wildlife Service, 1980). The character of the Missouri was drastically altered between 1930 and 1970 as channelization and mainstem dams caused the river channel to narrow and deepen and associated floodplain wetlands to wither and disappear. Upstream from Ponca the river has remained mostly unchannelized and numerous islands and wetlands remain. Within the downstream channelized reach, the riverbed is degrading from near Sioux City to where the Platte joins the Missouri near the town of Plattsmouth. The bed is stable or aggrading downstream from Plattsmouth.

### Loss and Threats

About 100,300 acres of aquatic habitats and 65,300 acres of islands and sandbars have been converted to dry land or navigation channel between Sioux City, Iowa, and the river's confluence with the Mississippi River (U.S. Fish and Wildlife Service, 1980). Channelization, along with the flood protection provided by mainstem and tributary reservoirs, has fostered agricultural, urban, and industrial encroachment on 95 percent of the floodplain (Hesse et al., 1989). The six large mainstem dams in the Dakotas and Montana have had measurable influences on water quality, quantity, and flood control along the Missouri River. The release of relatively silt-free waters from Gavins Point, the lowermost dam in the system, is causing riverbed degradation from below the dam to about Plattsmouth (U.S. Fish and Wildlife Service, 1980). Riverbed degradation causes adjacent wetlands to go dry and isolates backwater areas from the main channel. Missouri River wetlands were given a priority 1 ranking in the Nebraska Wetlands Priority Plan due to extensive losses in the past (Gersib, 1991).

The Missouri River is a wetland complex where most of the destruction and degradation has already occurred. Categories of the greatest threats along the Missouri River appear to be riverbed degradation, residential and commercial development, transportation, navigation projects, water pollution, water development projects, agricultural conversion, and drainage and filling.

Purple loosestrife has become well established in the upper reaches of the Missouri River near Niobrara, Nebraska. Purple loosestrife's rapid expansion into the backwater areas of Lewis

and Clark Lake is a threat to native plants all along the River.

### Functions and Values

The Missouri River, like many natural systems, is a whole that is greater than the sum of its parts. The interactions between the different parts (e.g., wetlands, organic matter, sandbars, tree falls, side channels, etc.) form a complex interrelated system. Wetlands are an important component of this system by producing invertebrates and other organic matter that provide energy and food to other parts of the river. Additionally these wetlands provide spawning and nursery areas for many different types of fish, and a home for numerous wildlife species.

Several state and federally listed threatened and endangered species regularly use the Missouri River in Nebraska. The threatened bald eagle uses the river as migrational and wintering habitat, with wintering populations averaging 220 since 1987. Additionally, several bald eagle nests have been discovered in recent years along the Missouri. The endangered peregrine falcon uses the Missouri River as a feeding area during migration. Peregrine falcons have recently nested in Omaha and rely on the Missouri River corridor for food. The endangered interior least tern and threatened piping plover nest on unvegetated sandbars in the unchannelized reach of the river, a habitat type which has been eliminated downstream from Sioux City. The recovery plans for both the piping plover (U.S. Fish and Wildlife Service, 1988) and the interior least tern (U.S. Fish and Wildlife Service, 1990) include Missouri River nesting habitat as being essential to the recovery of these species. The federally endangered pallid sturgeon and state threatened lake sturgeon inhabit the Missouri River. Several other fish species in the river are in severe decline, including the sicklefin chub and sturgeon chub which are both federal candidate endangered/threatened species.

Before channelization changed the character of the Missouri River, the area was very important migration habitat for ducks, geese, swans, pelicans, and shorebirds (U.S. Fish and Wildlife Service, 1980; U.S. Army Corps of Engineers, 1978). Large populations of wood ducks once nested in the river corridor along with smaller numbers of blue-winged teal, gadwalls, and mallards. Although of diminished quality, the Missouri River still

provides migration habitat for waterfowl and shorebirds, especially in the unchannelized reach. DeSoto National Wildlife Refuge in Nebraska and Iowa focuses on providing migrational habitat for waterfowl and often holds a peak fall snow goose population of 500,000 birds. Over 250 species of birds and numerous mammals use the Missouri River and associated habitats. Loss of wetland habitats has caused population decreases of wetland mammals such as beaver, muskrat, and river otter.

A significant spawning area for walleye and sauger still exists in the Missouri River along the South Dakota-Nebraska state line. Backwaters along the Platte and Missouri rivers also provide important nursery areas for sport and forage fish; however, channelization of the Missouri River and the reduction of sandbars and slack-water habitats has adversely affected the fishery in Nebraska (Funk and Robinson, 1974; Schainost, 1976).

Channelization, loss of wetlands, and extensive development of the floodplain have reduced the natural flood-carrying capacity of the Missouri River system. As a result, flood stages in receiving waters (e.g., the Mississippi River) have increased as was evidenced by the severe 1993 floods (Galloway, 1994).

The Missouri River in Boyd and Knox counties has been included in the National Park Service's Nationwide Rivers Inventory, in part due to outstanding fish and wildlife values (National Park Service, 1982). The Missouri River from Gavins Point Dam (South Dakota) to Ponca State Park (Nebraska) is a National Recreational River. Commercial fishing currently exists on the Missouri River for rough fish (primarily carp and buffalo). Outdoor recreation from boating and fishing to camping and hunting is important along most of the Missouri River in Nebraska; however, recreational use likely is much lower than its potential due to the reduction in fish and wildlife habitats in the channelized reach (U.S. Fish and Wildlife Service, 1980). In spite of this, a 1992 survey by the Nebraska Game and Parks Commission indicated that the Missouri provided total annual public recreation use estimated to be 28,750,226 person-hours, and total annual private use was estimated to be 50,328,300 person-hours (Hesse et al., 1993). The total recreation related expenditure was estimated at \$364 million. Several state parks and recreation areas along the Missouri River, including Indian Cave State Park, Lewis and Clark State

Recreation Area, Ponca State Park, and Niobrara State Park, receive well over 100,000 visitors each year.

### **Elkhorn River**

#### **Profile**

The Elkhorn River arises out of the eastern Sandhills and joins with the Platte River just west of Omaha. The Elkhorn contains numerous sandbars and side channels, similar in some ways to the Platte River. Numerous wetlands are associated with the floodplain of the Elkhorn River. Most of these wetlands are oxbows, occurring in former channels of the river that were left isolated as the river changed its course. These wetlands range from permanent lakes to temporarily flooded meadow areas.

#### **Loss and Threats**

The wetlands along the Elkhorn River appear to have been less impacted by drainage and diversion than those along the Platte and many other Nebraska rivers. However, some drainage and filling have occurred, and the remaining wetlands are threatened by continued conversion, sand and gravel mining, potential diversions of river water, sedimentation from surrounding cropland, and channel straightening.

#### **Functions and Values**

The Elkhorn River and its associated wetlands provide important habitat for endangered least terns and threatened piping plovers, especially in the vicinity of sand pit sites that provide nesting areas. The threatened bald eagle uses the Elkhorn during migration, and in recent years, two nests have been located along the river. Numerous wading birds, shorebirds, and waterfowl, especially wood ducks also use the Elkhorn and its associated wetlands.

Being associated with the river's floodplain, the wetlands of this complex play a valuable role in maintaining the natural functions and dynamics of the river system. These functions include filtering the water, attenuating flood peaks, and providing water to the river during periods of low flows.

The Elkhorn River provides significant recreation because of its proximity to the towns of O'Neill, Norfolk, Fremont, and Omaha.

## Niobrara River

### Profile

The Niobrara River flows across northern Nebraska from Sioux to Knox County. A variety of floodplain wetlands are associated with the Niobrara River, and receive water from the river and the numerous springs located along the canyon walls of the river valley. The Niobrara River is a scenic treasure in the State of Nebraska and provides a unique mix of northern, western, and eastern plant communities. A portion of the river downstream from Valentine has been designated as a National Scenic River.

### Loss and Threats

The wetlands located along the Niobrara have not been greatly altered by human activities. Some small dams have been constructed, but most of the river flows naturally. The river was threatened by a large diversion dam being considered in the vicinity of the town of Norden. That particular project was dropped and future projects are precluded by National Scenic River designation. Purple loosestrife has spread along the Niobrara and constitutes a threat because it is of little value to wildlife and it out-competes desirable native wetland plants.

### Functions and Values

The Niobrara River and its associated wetlands provide important habitat for over 160 bird species. Threatened bald eagles and endangered peregrine falcons use the Niobrara during migration, and wintering concentrations of eagles have ranged from 35 to 150. Endangered whooping cranes at times stop along the Niobrara River during migration. Endangered least terns and threatened piping plovers nest on unvegetated sandbars on the Niobrara. The region also hosts concentrations of migrating and wintering waterfowl and nesting colonies of wading birds such as great blue herons and double-crested cormorants.

Being associated with the river's floodplain, the wetlands of this complex play a valuable role in maintaining the natural functions and dynamics of the river system. These functions include filtering the water, attenuating flood peaks, and supplying the river during periods of low flows.

In recent years, tourism related to the river has greatly increased. On the Ft. Niobrara National Wildlife Refuge alone, nearly 25,000 people/year launch canoes or inner-tubes to float the Niobrara.

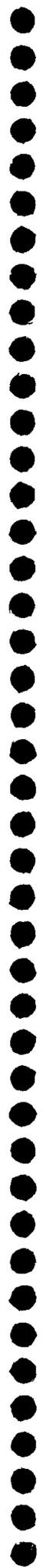
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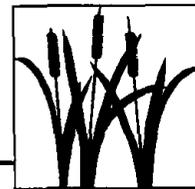
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## AGENCY/ORGANIZATION ROLES AND RESPONSIBILITIES



The following summaries describe the wetland conservation roles and responsibilities of agencies and organizations that responded to a request for information about their wetland-related programs and activities.

### FEDERAL AGENCIES

#### U.S. Army Corps of Engineers (USACE)

In 1972, Section 404 of the Clean Water Act was passed. It prohibits discharging dredged or fill material into U.S. waters without a permit from the USACE. Court rulings and litigation further defined "waters of the U.S." to include virtually all wetlands. Because the definition of "discharge of dredged material" was modified in August, 1993, activities that impact waters, including wetlands, will most likely require a USACE permit. To grant a permit, the USACE must weigh the need to protect aquatic resources against the benefits of the proposed development. USACE policy requires applicants to avoid impacts to wetlands and other U.S. waters to the extent practicable, then minimize the remaining impacts, and finally take measures to compensate for unavoidable impacts. On January 6, 1994, the four federal agencies which have primary responsibility for implementing federal programs relating to the nation's wetlands (USACE, EPA, the Natural Resources Conservation Service [NRCS], and the U.S. Fish & Wildlife Service [USFWS]) entered into a Memorandum of Agreement (MOA) whereby the NRCS was designated as the lead agency for making wetland delineations and certain other determinations of waters of the U.S. This agreement specified that wetland determinations made by NRCS under the authorities of the Food Security Act (FSA) will be relied upon for the purposes of Section 404 of the Clean Water Act.

#### U.S. Environmental Protection Agency (EPA)

The EPA's Wetlands Protection Program is involved with regulatory, financial assistance, technical assistance, inventory and monitoring, and information and education aspects of wetlands

issues. The EPA seeks to reduce the loss and degradation of water resources, including wetland and riparian areas, by implementing EPA authority under Section 404 of the Clean Water Act (CWA). These authorities include reviewing Section 404 permit public notices and enforcing the CWA. Water resources regulated under these authorities must meet the definition of "waters of the United States" which generally include waters recognized by the State of Nebraska. The EPA provides financial assistance to state, tribal, and local governments as well as nongovernmental entities for special studies, wetland inventory development, and other resource management tools. Special application procedures are dependent on the source of the financial assistance. Technical assistance is available to agencies and the public for wetland-delineation training, project consultation, and public education.

EPA's Clean Lakes Program is involved with financial assistance, technical assistance, inventory and monitoring, and information and education aspects of wetlands issues. The EPA is authorized to provide technical and financial assistance to states for protecting and restoring publicly-owned lakes that have public access and recreational use. This program offers financial assistance to states through four types of cooperative agreements: diagnostic feasibility study (30% non-federal cost-share), implementation (50% cost-share), post-implementation monitoring (30% cost-share), and statewide lake water quality assessment activities (50% cost-share). The restoration and maintenance of wetland and riparian areas are proven techniques for protecting water quality and other benefits provided by lakes.

The National Pollutant Discharge Elimination Systems (NPDES) and Pretreatment Programs are regulatory in nature. They regulate the discharge of pollutants from point sources to waters of the United States. The program is administered by the Nebraska Department of Environmental Quality (NDEQ). EPA has oversight and concurrent enforcement authority for the discharge of pollutants from industrial sources to municipal sanitary sewer

systems. Wetland or riparian areas may be designated as waters of the U.S., and may be protected from pollution discharges through the NPDES Program.

The Water Quality Standards Program is also regulatory. This program defines the uses to be made of the state's surface waters, the maximum allowable concentrations of specific pollutants, and the policies that protect human health and the environment. The program's specific responsibilities in Nebraska are providing oversight for state water quality standards and related policies established by the NDEQ. The EPA may promulgate standards if it finds that a state is not complying with the CWA or federal water quality standards regulations. Wetlands or riparian areas may be designated as state waters. Numeric or narrative criteria may be developed to ensure their protection.

The Wellhead Protection Program provides technical assistance, and information and education. Approximately 80 percent of Nebraskans depend solely upon ground water for their drinking water, and all Nebraskans use ground water for drinking water to some extent. The wellhead protection program is designed to assist communities in protecting water supplies. This program identifies areas around wells that should be managed to protect wells from activities that could contaminate ground water. Some wetlands and riparian areas recharge ground water and may be managed to prevent contamination of water supplies.

The Nonpoint Source Pollution Control Program offers financial and technical assistance and administers nonpoint source pollution control programs in EPA Region VII, which includes Nebraska. Working with the NDEQ, the program requires the development of a State Nonpoint Source Assessment Report, a State Nonpoint Source Management Plan, and provides grant funds to implement the Nebraska Nonpoint Source Management Plan. An annual report details the state's accomplishments toward the nonpoint source management plan. Restoring and maintaining wetland and riparian areas are proven techniques for reducing nonpoint source pollutants and may be part of a comprehensive nonpoint source management plan.

The State Revolving Fund Program provides loans and other forms of assistance for the construction of publicly owned wastewater treatment

facilities. These funds can also be used for implementation of nonpoint source management programs and projects developed under Section 319 of the CWA. These activities have potential for preventing or abating pollution of wetlands or riparian areas. Treatment facilities constructed under the program can include creation of constructed wetlands.

#### **USDA Natural Resources Conservation Service (NRCS)**

The Federal Agriculture Improvement and Reform Act of 1996 (1996 Farm Bill) reauthorized and amended a number of conservation programs from the 1985 and 1990 Farm Bills. The 1996 Farm Bill established a locally driven process for carrying out these programs through a partnership with NRCS, Farm Service Agency (FSA), and local agencies and organizations. The following programs conducted by NRCS involve wetlands: EQIP, CRP, WRP, WHIP, WFRP, and Swampbuster.

The 1996 Farm Bill established the Environmental Quality Incentives Program (EQIP) to combine the functions of the following USDA conservation cost-share programs: Agricultural Conservation Program (ACP), Great Plains Conservation Program (GPCP), Colorado River Basin Salinity Control Program (CRBSCP), and the water Quality Incentives Program (WQIP). EQIP provides technical and financial assistance to producers to implement conservation measures and plans with 50 percent of the funds targeted to livestock water quality practices. Wetland conservation practices are eligible under the EQIP program.

The Conservation Reserve Program (CRP) expanded its eligibility criteria under the 1996 Farm Bill to include water quality and wildlife benefits. These changes provided eligible landowners with more options for protecting wetlands and highly erodible lands. This program provides incentive payments to landowners for retiring highly erodible and environmentally sensitive land from agricultural production and protecting these areas with grass, trees, and other long-term cover.

The Wetland Reserve Program (WRP) is a voluntary program that provides owners of eligible land an opportunity to enter land into permanent easement and receive cost share assistance to restore and protect wetlands. In return for restoring the

wetlands and placing them into easements, landowners receive payments from USDA which may approach the value of the land. The benefits of this program include improving water quality, filtering sediment, habitat for wildlife, reducing flooding, recharging ground water supplies, and outdoor recreation and education. The WRP allows farmers to retire marginal cropland, while restoring and protecting wetlands. Noncropped wetlands that have been fully or partially drained are also eligible.

The Wildlife Habitat Incentive Program (WHIP) is a voluntary Program that offer eligible landowners the opportunity to develop habitat for upland wildlife, wetland wildlife, threatened and endangered species, fish, and other types of wildlife. The NRCS will assist participants in the development of a wildlife habitat development plan and provide cost-share payments for up to 75 percent of the costs.

The Whole Farm and Ranch Planning Program (WFRP) is an innovative approach which allows producers to integrate their agricultural production and natural resources requirements into a single plan. Plans are technically and scientifically sound and consistent with federal, state, and local requirements. Plans may focus on water quality/quantity management, erosion control, wetlands, nutrient/pesticide management, grazing, animal waste, and other issues. Nebraska is currently one of only six states with WFRP pilot projects.

The NRCS has responsibility for the Swampbuster provisions of the 1996 Farm Bill. These provisions discourage converting wetlands for agricultural purposes by withholding certain USDA benefits to landowners who accomplish conversions. The 1996 Farm Bill directed USDA to identify categorical minimal effect exemptions on a regional level that are exempt from Swampbuster. More flexibility was given to NRCS in allowing good faith exemptions for inadvertent Swampbuster violations. Additional changes included expanding areas where mitigation can be used and allowing mitigation by restoration, enhancement, or creation. The new act also allows USDA to establish a pilot program for wetlands mitigation banking.

Pursuant to the January 1994 Memorandum of Agreement between the USACE, EPA, USFWS, and NRCS, wetland delineations made by NRCS on agricultural lands, in consultation with FWS, will be

accepted by EPA and the USACE for the purpose of determining Section 404 wetland jurisdiction. In addition, the EPA and the USACE will accept NRCS wetland delineations on non-agricultural lands that are either narrow bands immediately adjacent to, or small pockets interspersed among, agricultural lands. NRCS is responsible for making wetland delineations for agricultural lands whether or not the person who own, manages, or operates the land is a participant in USDA programs.

In cooperation with the Kansas State University Agricultural Experiment Station, NRCS founded the Manhattan Plant Materials Center in 1935 to assemble, evaluate, and increase grasses, legumes, forbs, trees and shrubs. Plant materials for wetlands have become a major emphasis in recent years.

The Field Office Tech Guide (FOTG) is one of the most important tools used by NRCS field office staffs in carrying out the conservation programs of the agency. The FOTG is an integral part of conservation planning. It helps NRCS and land users identify resource problems, evaluate the effects of conservation treatments, compare alternatives, and select the best options to meet conservation needs and objectives. NRCS relies heavily on input from universities and experiment stations, NRCS plant materials centers, the USDA Agricultural Research Service and Extension Service, the EPA, and other Federal and State agencies to incorporate the latest conservation treatment technology into the FOTG.

#### **U.S. Fish and Wildlife Service (USFWS)**

The U.S. Fish and Wildlife Service conducts several programs and activities which involve wetlands. USFWS manages thousands of acres of wetlands located in the Rainwater Basin Management District (Waterfowl Production Areas) and the five National Wildlife Refuges located in Nebraska (North Platte, Crescent Lake, Valentine, Ft. Niobrara, and DeSoto). The Service also conducts its Private Lands Program which assists willing landowners with the technical aspects of restoring and managing privately owned wetlands.

The development of the Sandhills Management Plan was facilitated by USFWS and its implementation is ongoing. It was developed by a task force of ranchers and agencies to build a partnership which combined the interests and

concerns of all members to implement management strategies for wetlands in the Sandhills.

USFWS is also responsible for implementing provisions of the Endangered Species Act which protects listed threatened and endangered species. A large percentage of listed species in Nebraska rely on wetlands for habitat. Provisions of the Migratory Bird Treaty Act and the North American Waterfowl Management Plan are also implemented by USFWS. Wetlands provide necessary habitat for avian species which are affected by this Act and Plan.

### **U.S. Geological Survey (USGS)**

The USGS published "The National Water Summary 1992-93--Hydrologic Events and Wetland Resources" is the eighth in a series of reports that describe the condition and characteristics of the Nation's water resources. The 1992-93 Nebraska summary presents a concise overview of the types, distribution, hydrologic setting, and management aspects of wetlands in the State.

The National Water-Quality Assessment (NAWQA) Program is a long-term program of the USGS designed to describe the status of and trends in the Nation's water quality, and to identify, describe and explain, to the extent possible, factors that affect the observed water-quality conditions and trends. This is accomplished by collecting biological, physical and chemical data at sites that represent major natural and anthropogenic factors thought to control water quality in the river basins. The Central Nebraska Basins study unit consists of the area drained by the Platte River between the confluence of the North Platte and South Platte Rivers near North Platte downstream to its confluence with the Missouri River south of Omaha. A study within the Central Basins NAWQA study area was conducted to determine the physical, chemical, and biological characteristics of 31 wetlands.

### **National Park Service**

The National Park Service places a high priority on wetland protection and interpretation to the public, but the agency has no unique policy requirements specific to wetlands and is not charged with regulatory activities. The Clean Water Act, and Executive Order 11990, "Protection of Wetlands" are the main legal requirements affecting federal

facility development on lands managed by the National Park Service. The importance of protecting headwaters and wetlands is recognized in park planning and management.

In Nebraska, the National Park Service is conducting planning to comply with the Niobrara Scenic River east of Valentine, 39 miles of the Missouri River from Fort Randall Dam to the head of Lewis and Clark Reservoir near Niobrara, 20 miles of the lower River, and eight miles of Verdigre Creek from the town of Verdigre to the Niobrara River. Management plans with protection strategies and boundaries affecting adjacent land and wetlands are being developed. The 59 mile segment of the Missouri River from Gavins Point Dam to Ponca State Park was also designated in 1978 as part of the National Wild and Scenic River System, and its management plan is being revised.

## **STATE AGENCIES**

### **Nebraska Department of Environmental Quality (NDEQ)**

The NDEQ develops water quality standards which designate the beneficial uses to be made of surface waters and specify the water quality criteria to protect the assigned uses. The Environmental Quality Council promulgates these standards as rules and regulations of the State. Title 117 - Nebraska Surface Water Quality Standards form the basis of water quality protection for all surface water quality programs conducted by the Department. In 1993, wetland water quality standards were promulgated in Title 117. In addition to developing the Standards, the NDEQ develops and implements procedures to apply the Standards to the other surface water quality programs. These procedures include the Antidegradation Implementation Procedures.

The NDEQ administers the Water Quality Certification Program as set forth in §401 of the Clean Water Act. This program determines whether the State's Water Quality Standards will be violated by an activity involving a discharge to waters of the State (which include wetlands) that is regulated by a Federal permit or license. If the activity complies with Water Quality Standards, Water Quality Certification is granted for the activity. If the activity would violate Water Quality Standards, conditions for compliance are issued with the

Certification, or the Certification is denied. U.S. Army Corps of Engineers § 404 Permits (dredge and fill permits) and FERC licenses are examples of Federal regulatory authorities which require the issuance of Water Quality Certification in order to obtain the permit or license.

The NDEQ is involved in several wetland protection activities which are integrated with other programs such as the Surface Water Quality Standards and § 401 Water Quality Certification. The NDEQ was the lead agency in the preparation of this Nebraska Wetland Resources document which was developed in cooperation with the Nebraska Game and Parks Commission (NGPC) and the Nebraska Natural Resources Commission (NNRC). Fourteen public workshops were held to obtain input for the document's wetland conservation ideas and options. A wetlands water quality monitoring program collects seasonal water quality data from ten or more wetlands in two to three different river basins each year. This program provides background water quality information on the various wetland complexes found in Nebraska. The NDEQ also participates on several interagency teams involving wetlands-related issues. The focus of these teams is protection of Eastern Saline wetlands in Lancaster and Saunders counties, mitigation banking, sand and gravel mining, channelization, irrigation reuse systems, restructuring of general nationwide § 404 permits to fit Nebraska's resources and concerns, and development of regional general § 404 permits to expedite permit processing.

#### **Nebraska Game and Parks Commission (NGPC)**

The Nebraska Game and Parks Commission is interested in wetlands conservation because of the many fish, wildlife, and recreation benefits that wetlands provide. The Commission has a variety of wetland related programs and responsibilities.

Private Lands: There are several programs available to help private landowners to restore, enhance or manage their wetland areas. These programs are designed to be very flexible to meet both the needs of the landowner and wetland wildlife.

Wetlands Initiative Program (WIP) - This program will pay for the landowner's actual cost for restoring, enhancing, or creating shallow water wetlands and adjacent uplands for the benefit of waterfowl and other wetland wildlife. Participation is strictly voluntary and the landowner controls all

access and retains tax, weed control and other responsibilities. Agreements extend for at least 10 years. WIP will also provide landowners a one-time lump sum incentive payment for enrolling in the USDA's Water Bank Program.

Wildlife Habitat Improvement Program (WHIP) - This is a cooperative program between the Commission and many of the Natural Resource Districts to provide for creation and enhancement of habitat on private lands. Most practices include an annual payment for enrolled lands. This program does not pay for wetland restoration activities but can be beneficial by enhancing adjacent uplands.

Technical management advice - Commission staff will help interested landowners find out how to manage their wetland areas and ways that their agricultural practices can be compatible with wetland wildlife. Additionally, NGPC closely with many other private and government organizations in designing and implementing their wetland programs.

Public Lands: The Commission has a program for acquiring wildlife habitat, and wetland areas are a top priority. All acquisitions are from willing sellers and the NGPC makes a property tax payment on wildlife lands it acquires. Nearly all of the dollars used for the acquisition program are generated by the sale of hunting, fishing, and fur harvest licenses, and habitat and state waterfowl stamps. Commission staff manage these areas to maximize wildlife and public hunting and recreation benefits. Additionally the NGPC works with other agencies to help cooperatively manage their lands.

Information and Education: The NGPC has a wide variety of public information and education offerings on wetlands. Magazine articles, brochures, posters, displays, slide shows, and videos have been developed about Nebraska's varied wetlands. Project Wild offers teachers information about wetlands and wildlife. Staff members are available to answer questions and present programs about wetlands.

Advocacy: The NGPC plays an important role in working with other agencies and organizations on wetlands issues. Some examples include commenting on 404 permits and regulations and USDA wetlands rules, project consultation and impact analysis, wetlands program review, and providing wetlands related training.

Inventory and Research: There are a number of inventory and research projects that the NGPC has been involved in. Many of these have been cooperative efforts with other agencies and organizations. Some examples include: Rainwater Basin wetland and waterbird surveys, Sandhills stream survey, Sandhills fen survey, use of the Wetland Evaluation Technique on several Nebraska wetland complexes, Eastern Saline wetland inventory, plant and hydrology studies in the Eastern Saline wetlands, Western Alkaline wetlands, and the Rainwater Basin. Commission staff will continue to help initiate, conduct, or coordinate wetlands related inventory and research projects.

Special Initiatives: Many special initiatives are underway that the NGPC is involved in. Most of these initiatives are cooperative and regionalized, and incorporate many of the components listed above. The initiatives currently underway include: The Rainwater Basin Joint Venture, Sandhills Task Force, Eastern Saline Wetland Assessment, Rock Creek Cooperative River Basin Study, and Missouri River Mitigation.

#### **Nebraska Natural Resources Commission (NNRC)**

The Nebraska Natural Resources Commission's authority and interest in wetlands is based in its enabling legislation, (Neb. Rev Stat. 46-1501 et. seq.). The statutes establish the Commission as "the official agency of the state in connection with water resources development, soil and water conservation, flood prevention, watershed protection, and flood control" among other assigned duties.

Official duties the statutes assign to the NNRC include the following programs: 1) The Nebraska Soil and Water Conservation Fund, 2) The Nebraska Resources Development Fund, 3) Soil Survey Fund and a Small Watersheds Flood Control Fund, 4) Natural Resources Data Bank, 5) Nebraska State Water Planning and Review Process, and 6) Floodplain Management.

While many of the NNRC's programs can have a significant effect on wetlands, none are designed primarily for wetlands. The potential relationship of each program to wetlands follows.

Soil and Water Conservation Fund. The Nebraska Soil and Water Conservation Fund

provides state financial assistance to Nebraska Landowners for the installation of approved soil and water conservation measures that improve water quality, conserve water, and help control erosion and sedimentation.

Resources Development Fund. The Nebraska Resources Development Fund provides financial assistance to political subdivisions for projects providing a variety of benefits, including: flood control, recreation, sediment and erosion control, ground water recharge, water management, and wildlife enhancement. Although projects under this fund have not been wetland oriented, the eligible purposes do not rule out a wetland oriented project, especially if it is only one component of a larger project.

Soil Survey Fund and Small Watershed Flood Control Fund. While these funds have relatively minimal relation to wetlands, soil surveys are important in wetlands delineation.

Natural Resources Data Bank. The NNRC develops and maintains a computer based Data Bank with different types of natural resources information. Examples of information stored in the Data Bank include: soil survey data, census data, climatic information, ground water levels, water quality data and crop production statistics. National Wetland Inventory maps can be accessed through the Data Bank. In connection with the Data Bank and planning activities the NNRC conducts extensive geographic information system and computer access activities.

State Water Planning and Review Process. The Nebraska State Water Planning and Review Process provides technical and policy information to help Nebraskans make better soil and water resource management decisions. The process includes a variety of activities, a number of which have wetland implications. The Nebraska Soil and Water Conservation Strategy includes a wetlands related recommendation as does the Commission's 1982 Policy Issue Study on Selected Water Rights Issues Report #2: Drainage of Diffused Surface Water. NNRC participation in the Nebraska Wetlands Conservation Plan is conducted as a part of its state water planning efforts.

Floodplain Management. The NNRC is responsible for a non-structural program of floodplain management including delineation of

floodways and technical assistance on floodplain management programs. These programs are not formally tied to wetland responsibilities.

### **Nebraska Department of Roads (NDOR)**

NDOR wetland-related activities are project-specific. Each NDOR project which may impact wetlands is submitted to the USACE for the 404 permitting process. NDOR makes every attempt at "in-kind" replacement as required by federal regulations.

On January 21, 1997, NDOR entered into a Memorandum of Agreement with the Nebraska Department of Environmental Quality (NDEQ) concerning mitigation for impacted wetlands. The agreement states the policy and procedures to be used in the determination of the type and level of mitigation necessary to demonstrate compliance with Surface Water Quality Standards required to gain authorization from the U.S. Army Corps of Engineers in the form of a Section 404 permit for NDOR projects.

On June 23, 1993 the USACE approved NDOR's "Local Procedures for Wetland Mitigation Banking". NDOR and USACE agreed to follow these local procedures in the implementation of wetland mitigation banks to offset impacts to wetlands by NDOR projects. NDOR's Prospectus for Wetland Mitigation Banking was finalized in April, 1997 and NDOR's Wetland Mitigation Banking Instrument was subsequently approved on July 25, 1997.

### **NATURAL RESOURCES DISTRICTS (NRD's)**

#### **Upper Loup NRD**

The Upper Loup NRD contains wetlands which are influenced by ground water and therefore any related regulations or policies administered through the NRD are a part of their Ground water Management Plan. The Plan stresses education and a continuation and expansion of data collection programs to detect trends of water supply depletion and/or ground water contamination. The commitment statement concerning the ground water reservoir and related resources is as follows: "The ground water reservoir life goal for the ULNRD is to maintain, in perpetuity, ground water of a quality to meet standards appropriate to its use, in an adequate

supply for domestic, livestock, public, irrigation, agriculture, wildlife and industrial uses. The goal includes minimizing, as much as possible, the adverse impact of these uses on the quantity and quality of ground water that supports lakes, subirrigated lands, and streams."

Other wetland programs with which the NRD is involved are "The Sandhill Management Plan" and their Wildlife Habitat Program (WHIP). The latter program includes a Permanent Wetland Enhancement component.

#### **Upper Big Blue NRD**

The Upper Big Blue NRD encourages wetland enhancement through the Wildlife Habitat Improvement Program in cooperation with the Nebraska Game and Parks Commission.

The NRD is also a member of the Rainwater Basin Joint Venture (RBJV) group with the following agencies and organizations:

- Pheasants Forever
- Nebraska Game and Parks Commission
- Nebraska Farm Bureau Federation
- Natural Resources Conservation Service
- Farm Service Agency
- The Nature Conservancy
- U.S. Fish & Wildlife Service
- Ducks Unlimited

The Upper Big Blue NRD has representatives on three of the RBJV committees: 1) Public Lands, 2) Private Lands and 3) Communications.

#### **Lower Platte South NRD**

The Lower Platte South NRD is involved in the following programs and projects concerning wetlands:

**Wildlife Habitat Improvement Program.** This is a cooperative program with the Nebraska Game and Parks Commission to sign up private lands under 10 year contracts. This program is applicable to wetlands and is administered by the NRDs. Funding is 75 percent NGPC and 25 percent NRD. Annual payments are made of \$15 - \$30 per acre per year.

**Conservation Easements.** Since 1986 the NRD has pursued the purchase of conservation easements over saline wetlands on private land. To date, three easements have been purchased on 146 acres and the NRD is in negotiation on another 261 acres. These saline wetlands are located primarily along Lower Salt Creek, Rock Creek, and Little Salt Creek.

**The Nature Conservancy.** A saline wetland tract located along Little Salt Creek the NRD had been negotiating an easement on was purchased in 1994 by The Nature Conservancy (TNC). The NRD is working with TNC on the restoration and enhancement of this 58 acre site. The NRD and TNC cosponsored an Environmental Trust application to remove the tile drainage system, and install grade stabilization structures within Little Salt Creek.

**Whitehead Oil Company.** The District entered into an agreement with Whitehead Oil Company to study the hydrology, wetland flora and fauna, and the enhancement of a 120 acre site located on North 27th Street south of Interstate 80. Whitehead Oil Company is interested in commercial development along North 27th Street but is also interested in preservation, enhancement and management of the saline wetlands. The NRD made application to the Environmental Trust for implementation of the site restoration.

**Lincoln Saline Wetland Nature Center.** The NRD holds title to approximately 100 acres of saline wetlands located east of Capitol Beach in Lincoln, Nebraska which will be developed into the Lincoln Saline Wetlands Nature Center. The property was purchased and donated as part of a cooperative effort by the Capitol Beach Neighborhood Association, private developers, the NRD, private contributions and the U.S. Fish and Wildlife Foundation.

**Wetland Flora Inventories.** The NRD has completed flora inventories of three saline wetlands (conservation easements).

**Water Quality and Invertebrate Study.** The NRD entered into a cooperative agreement with U.S. Geological Survey to take water quality samples and samples of invertebrate fauna in three saline wetlands (TNC - Little Salt Creek and two conservation easement locations in the Rock Creek watershed).

**Rock Creek Saline Wetland Cooperative River Basin Study.** In cooperation with National Resources Conservation Service, NDEQ, NRC, NGPC, and the NRD the study's objective is provide a plan for the protection and restoration of the saline wetland environment by examining structural and non-structural measures and management practices.

The District made a recommendation to the Lincoln/Lancaster County Planning Commission to include the Resource Categorization of Nebraska's Eastern Saline Wetlands as part of the Lincoln/Lancaster County Comprehensive Plan.

### **Papio-Missouri River NRD**

The PMR NRD is involved in numerous wetland projects within the District. The Missouri River Corridor Project deals specifically with the restoration of the Missouri River as a system, including many riverine wetlands within its boundaries. The NRD's projects extend along the entire 137 mile stretch of channelized Missouri River within the District's boundaries. They include the Boyer Chute (National Wildlife Refuge) in Washington County (chute restoration completed in 1993); the Hidden Lake/Great Marsh project within Fontenelle Forest in Sarpy County (restoration contract to be issued in 1995); California Bend and Lower Decatur Bend restoration (in the Feasibility stage); Nathan's Lake (funded for restoration plans); Glover's Point and Hole-In-The-Rock sites in Thurston County (concept plans with preliminary designs complete). The NRD has established priorities for these and other sites within the Missouri River Corridor.

The PMR NRD has also assisted in the acquisition and development of Heron Haven Wetland with the Audubon Society of Omaha in Douglas County. It has also recently acquired the land where the springs originate that supply water to the Rumsey Station Wetland in Sarpy County. Both Heron Haven and Rumsey station will provide for environmental education opportunities to their surrounding areas, as well as providing the functions and values inherent in their locations in their watersheds.

### **Middle Niobrara NRD**

The Middle Niobrara NRD is offering a cost share program to landowners in the District. The

wetlands, riparian, and critical grassland habitat enhancement program will provide assistance to enhance or protect those habitats in the NRD. Funding for the program is provided through a \$15,000 grant from the U.S. Fish and Wildlife Service. Eligible practices will include: Grade stabilization structures, fencing riparian areas, streambank stabilization, revetments, water control structures, and planned grazing systems impacting wetlands and riparian areas. Proposed projects must provide protection or enhance critical wildlife habitats such as wetlands and riparian areas to qualify for assistance. The cost share level is 65 percent. There is no limit on the total amount of cost share that can be received and arrangements can be made to complete the practice over a two or three year period. A ten year maintenance agreement will be required on all practices.

## **NON-GOVERNMENTAL ORGANIZATIONS**

### **Rainwater Basin Joint Venture**

The Rainwater Basin Joint Venture is a partnership of state, federal and local agencies as well as private non-profit groups and landowners. The goals of the group include restoring, enhancing and protecting wetlands used by waterfowl during migration. The Joint Venture is accomplishing its objectives through acquisition and through developing programs targeted to assist landowners with wetland management.

### **The Nature Conservancy**

The Nebraska Chapter of the Nature Conservancy, through its Chapter Board of Trustees and the Nebraska Field Office proposes to undertake a protection initiative, in cooperation with federal, state, and local agencies as well as other interested

groups to preserve and restore the state's critical wetland/ upland systems. They have developed a Concept Plan for The Great Plains Flyway Initiative, the major objective of which is to preserve, protect and enhance the values of the diverse wetland systems located in the project area. Three strategies constitute the foundation for the ecosystem protection in the Great Plains: 1) Maintenance of the linkage between the upland and the wetlands; this linkage is water. 2) Maintenance of a diverse and dispersed group of critical wetland habitats as insurance against short-term or local catastrophes. 3) Maintenance of a linked wetland/upland system, which focuses upon keystone species of migratory waterbirds, at the same time providing an array of habitat opportunities required by less mobile species including resident flora and fauna.

### **Platte River Whooping Crane Maintenance Trust, Inc.**

The Platte River Whooping Crane Maintenance Trust, Inc., is a non-profit organization dedicated to conservation of migratory bird habitat along Nebraska's Platte River. The Trust's mission is to protect and maintain the physical, hydrological, and biological integrity of the Big Bend area of the river so that it continues to function as a life support system for the whooping crane and other migratory species which utilize it.

The Trust acquires land and water rights, manages and protects habitat, and conducts research related to migratory birds and their habitat needs. The Trust also participates in administrative and legal proceedings to ensure long term protection of resources. The Trust's lands are used for recreation and agricultural production whenever these activities are compatible with its primary goals.



## WETLANDS IDEAS, AND OPTIONS

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During late 1993 and early 1994, fourteen public workshops were held across the state to obtain public input on wetland conservation issues. These workshops were held in Lincoln, Omaha, South Sioux City, North Platte, Imperial, Alliance, Sidney, York, Columbus, O'Neill, Valentine, Grand Island, Holdrege, and Hyannis. An interagency team involving representatives from the Nebraska Department of Environmental Quality, Nebraska Game and Parks Commission, and Nebraska Natural Resources Commission developed additional ideas and options for wetland conservation during 1994 and 1995. The input from these wetlands discussions and the public workshops was compiled into the following 13 categories:

1. Information/Education
2. Planning Participation and Implementation
3. Data Collection/Inventory /Research
4. Current Programs/Coordination/  
Regulation
5. Physical Problems/Drainage
6. Wetlands Values and Uses
7. Property Rights
9. Taxation
10. Mitigation
11. Preservation/Enhancement/  
Restoration/Acquisition
12. Prioritization
13. Other

Each category includes a list of problems/opportunities and ideas/options for addressing each problem/opportunity. It should be noted that input from the public workshops was recorded and not judged.

Similar ideas and options were consolidated and a standard format was applied to each statement so that each idea or option began with a verb. Care must be taken in evaluating these comments as there may or may not have been a factual basis for some statements. Also, some ideas and options may not be feasible due to economic or statutory reasons, and several ideas and options may be contradictory. Some ideas and options may have been implemented since this input was recorded.

It is hoped that these ideas and options will provide the basis for further discussions and coordination among agencies and organizations regarding wetlands conservation in Nebraska. It will be incumbent upon individual entities to identify and take action on those ideas and options that have the most merit.

## 1. INFORMATION/EDUCATION

### Problem/Opportunity 1a

A need for more and better distributed information and education on wetlands was identified. The following topics were identified as important:

- a) Wetland definitions.
- b) Wetland values.
- c) Wetland issues.
- d) Clarification of programs and regulations.
- e) Wetland management.
- f) Improvement of hunter/fisher relations with landowners.
- g) Information to tax assessors.
- h) Providing landowner knowledge to government officials.
- i) Better publicizing private lands opportunities.
- j) Opportunities for funding local initiatives.
- k) Conduct attitude surveys if wetland landowners over time.
- l) Differences of urban/rural citizens on wetland issues.

### Options

- 1) Address wetland information/education needs by any of the following techniques as considered appropriate to the specific topic.
  - a) Brochures/booklets
  - b) Newsletters
  - c) Annual reports
  - d) Radio/television/video
  - e) News releases
  - f) Magazine articles
  - g) Attending and speaking at meetings
  - h) Holding meetings
  - i) A telephone hotline
  - j) Formation of a council with public representation
  - k) Attitude surveys
  - l) Urban/rural exchanges
  - m) Computer bulletin boards
  - n) Displays
  - o) Educational material for classroom use
- 2) Have speakers at annual meeting of tax assessors highlight landowners concerns on assessment of wetlands. (Responds to topic "g")

- 3) Ask the Cattleman's Association or other landowner organizations to organize and conduct tours/workshops that highlight landowner concerns to government organizations. (Responds to topic "h")
- 4) Put more personnel in the field for "one on one" service and education to landowners.
- 5) Allow the Game and Parks Commission to use funds raised from hunters for wetlands projects in urban areas provided the funds are used for wetlands education purposes.
- 6) Provide technology transfer, education and advice through advisory agencies - not agencies with regulatory or enforcement authorities.
- 7) Develop a catalog and a shortened summary of wetlands related agencies and programs.

### Problem/Opportunity 1b

A need for recognition of landowners and success stories was identified.

### Options

- 1) Develop a state level recognition program for wetland landowners who develop, enhance, restore or manage wetlands in an exemplary manner. Consider using regional wetlands committees to make nominations. Consider having the Governor sign certificates of recognition.
- 2) Publicize success stories, both public and private, through press releases, NRD newsletters, Nebraskaland magazine and other media.
- 3) Consider using an annual poster or calendar to publicize wetland success stories and recognize wetland landowners who develop, enhance, or restore wetlands in an exemplary manner.

**Problem/Opportunity 1c**

A need for technical assistance on wetland maintenance and development was identified.

**Options**

- 1) Provide a statewide toll-free number for landowners to call for assistance in wetland maintenance, enhancement, restoration, and development.
- 2) Provide a list of contractors who do wetlands work for the Natural Resources Conservation Service and the U.S. Army Corps of Engineers.
- 3) Provide Training for local Natural Resources Conservation Service Personnel on wetlands development, enhancement, restoration and maintenance techniques.

- 5) Develop a "showcase" wetland for each of Nebraska's major wetland complexes. Provide public access, an information kiosk and public information material specific to the site.

**Problem/Opportunity 1d**

A need for maintenance of wetlands for educational purposes was identified.

**Options**

- 1) Develop a program to acquire educational access to wetlands. Identify tour guides or others who can provide an appropriate educational program on each wetland. Make teachers and other educators aware of the availability of the individual wetlands and tour guides.
- 2) Develop a list of wetlands which allow access for educational purposes. Include private wetlands as appropriate. Publish and distribute the list.
- 3) Develop, publish and distribute a list of entities or persons prepared to give wetland tours.
- 4) Develop an Adopt a Wetland Program.

## 2. PLANNING PARTICIPATION AND IMPLEMENTATION

### Problem/Opportunity 2a

A need to make the plan responsive to local and regional concerns of citizens was identified.

#### Options

- 1) Develop region-specific management plans involving local landowners and appropriate agencies. This would involve support for existing regional initiatives and development of initiatives for some regions not addressed.
- 2) Assemble and Fund regional wetlands committees where they don't already exist. Regional representation on a state committee is a related option. Use existing organizations, i.e. joint venture etc. Make sure all interests are represented on committees, especially private wetland owners. Consider continuing committees after regional plans are completed.
- 3) Provide local control of regulations
- 4) Provide for local exceptions to wetland requirements.
- 5) Create a position to take the draft plan to places where landowners gather and both explain the plan and gather landowner ideas and comments.
- 6) Have the State of Nebraska assume control of the 404 process.

### Problem/Opportunity 2b

A need to encourage wetlands planning participation among all interests and especially private wetland owners was identified.

#### Options

- 1) Identify people who would be opposed to a wetland plan and work with them.

- 2) Develop a plan to help people who don't own wetlands participate in wetland conservation.
- 3) Make sure all wetlands interests are represented in compiling any local plans.
- 4) Encourage more participation by private wetland owners
- 5) Change laws and regulations to allow for limited food and beverage service at public meetings at public expense.

### Problem/Opportunity 2c

Some citizens expressed concern that the NWCP would increase personnel and tax burdens.

#### Options

- 1) Carefully estimate any costs of any NWCP recommendations and make them a prominent part of recommendation to encourage public debate.
- 2) Cap state and local wetland program expenditures at current levels.
- 3) Encourage a cap on federal wetland related expenditures.

### Problem/Opportunity 2d

Identify opportunities for funding local initiatives.

#### Options

- 1) Compile a catalog of programs providing funding and technical assistance on wetlands and distribute to appropriate local organizations.

### 3. DATA COLLECTION/INVENTORY/ RESEARCH

#### Problem/Opportunity 3a

A need for baseline information for planning was identified.

#### Options

- 1) Coordinate the definition of wetlands among agencies.
- 2) Inventory and classify wetlands comprehensively.
- 3) Gather baseline information on a targeted basis.

#### Problem/Opportunity 3b

A need for assessment of wetland quality for both acquisition and planning purposes was identified.

#### Options

- 1) Devise a quantification system for wetland values and functions.
- 2) Prioritize and define wetlands by value and function.
- 3) Target assessment of wetlands functions and values to specific areas.

#### Problem/Opportunity 3c

A need for periodic reinventory and reassessment of wetland areas to detect changes was identified.

#### Options

- 1) Identify and reclassify wetlands periodically - Inventory gains and losses of functions.
- 2) Track success of NWCP through use of NWI periodic updates.

- 3) Track changes in the number of joint projects sponsored by different agencies and organizations from year to year.
- 4) Monitor a fixed site to detect year to year fluctuations and the dynamic nature of wetlands - use in information and education.
- 5) Track changes by 404 permit mitigation.
- 6) Track number of acquisitions, restorations, and enhancements through the U.S. Fish and Wildlife Service, the Nebraska Game and Parks Commission and others.
- 7) Subsample complexes for changes in functions and values.
- 8) Target priority complexes for continuous monitoring - possibly overflights.

#### Problem/Opportunity 3d

A need for a comprehensive delineation of wetlands, valid for regulatory purposes, on all private property was identified. This would help landowners identify their land use options.

#### Options

- 1) Conduct a comprehensive delineation, valid for regulatory purposes, of all private wetlands in Nebraska.
- 2) Conduct a comprehensive wetland inventory, valid for regulatory purposes, in certain high value areas of the state that are especially subject to land use change such as urban areas.
- 3) Continue to delineate wetlands on private property only on a request basis.

**Problem/Opportunity 3e**

A need to more widely disseminate existing wetland inventories and data and make them more accessible was identified.

**Options**

- 1) Encourage federal and state government to integrate all Nebraska wetland information and mapping into a single system.
- 2) Digitize program databases and compile into a Geographic Information System.
- 3) Distribute information on how to access statewide and local wetlands maps and delineations.
- 4) Make statewide and local wetlands maps and delineations more widely available
- 5) Allow the general public to access the wetlands database by electronic means

**Problem/Opportunity 3f**

A need to prioritize and target research funding was identified. Potential parameters include complex, biology, hydrology, soils, values, chemical characteristics, physical characteristics and water quality.

**Options**

- 1) Prioritize research needs.
- 2) Provide funding for research.

#### 4. CURRENT PROGRAMS/COORDINATION/ REGULATION

##### Problem/Opportunity 4a

Some individuals felt that agencies don't act quickly enough, especially on 404 determinations, that too many agencies are involved in the process and that the federal appeals process is unresponsive.

##### Options

- 1) Speed up the processing of minimal effect agreements.
- 2) Set drop dead rates or maximum time frames for completing government agency work.
- 3) Have the State of Nebraska assume the 404 process.
- 4) Have the State of Nebraska assume the 404 process provided adequate federal funds are made available.
- 5) Reduce the number of agencies involved in 404 reviews and shorten the timeframe for reviews and appeals.
- 6) Reduce the timeframe for Swampbuster determinations.
- 7) Add additional staff to speed reviews.
- 8) Develop more general permits for specific types of wetland activities.

##### Problem/Opportunity 4b

Some individuals believe that existing federal wetland programs don't fit Nebraska well and that flexible, regionally sensitive and Nebraska specific programs are needed.

##### Options

- 1) Develop and implement different management options for different categories of wetlands.

- 2) Make wetland preservation tradeoffs such as mitigation available to both developers in urban settings and agricultural interests that might otherwise have compliance problems with Swampbuster.
- 3) Develop and implement flexible water quality standards for constructed wetlands for wastewater treatment.
- 4) Allow more local level flexibility between landowners and agencies to find best options.
- 5) Develop a set of Nebraska-specific modifications to Federal regulations that can accomplish the same wetland goals.
- 6) Base regulations on the values and prioritization of individual wetlands.
- 7) Make regulations more flexible in regard to farm passageways across wetlands.
- 8) Make regulations more flexible in regard to pivot tracks.
- 9) Add mitigation flexibility in swampbuster for small "nuisance" wetlands.

##### Problem/Opportunity 4c

Some individuals suggested that better coordination is needed between agencies and a common definition of wetlands is needed.

- 1) Both the Corps of Engineers and Natural Resources Conservation Service permit forms and instructions related to wetlands should be readily available in all local offices of both agencies.
- 2) Every agency should play from the same (wetlands definition) handbook. It should be developed to be consistently interpreted, there should be continuity among agencies and it should be flexible.
- 3) A single agency should make decisions on wetlands permitting.

- 4) A common wetlands definition should be agreed upon.
- 5) Schedule regular meetings between government wetland related agencies and private wetland oriented agencies.
- 6) Form a wetlands council of interested wetlands organizations to meet regularly.
- 7) Schedule regular interagency meetings on specific wetlands topics.
- 8) Form an official interagency coordination group to address coordination issues.

**Problem/Opportunity 4d**

Some individuals noted that many people fear dealing with agencies or inviting them on their land.

**Options**

- 1) Separate educational and technical advice functions from enforcement functions so that asking for advice or a ruling doesn't result in enforcement.
- 2) Add local level agency staff.
- 3) Increase information-education efforts.
- 4) Increase flexibility of voluntary compliance options.
- 5) Make landowners aware of the availability of private non-regulatory environmental audits.

**Problem/Opportunity 4e**

Some individuals believe that enforcement of current federal programs is inadequate. They believe there are insufficient checks on compliance and violators are given too many opportunities to stop.

**Options**

- 1) Give violators fewer opportunities to stop illegal actions.
- 2) Provide more funds for federal enforcement.
- 3) Turn enforcement over to the Nebraska Department of Environmental Quality or Game and Parks Commission. designate a position at that agency and use more staff.
- 4) Hire additional enforcement staff to check more often whether illegal activities have stopped and detect new violations.
- 5) Increase fines for non-compliance after warnings.
- 6) Encourage the public to report violations.
- 7) Cross train regulatory inspection staff of various agencies and Conservation Officers of the Nebraska Game and Parks Commission in rules and regulations of other agencies. Provide a mechanism for them to contact other agencies with appropriate authorities.
- 8) Encourage the public to form volunteer wetland monitoring teams.

**Problem/Opportunity 4f**

Irrigation reuse pits are useful for proper conservation but conflict with some wetland regulations.

**Options**

- 1) Develop and promote new technology (quick recycle) for reuse pits.
- 2) Change regulations to allow reuse pits in wetland areas provided design minimizes effect on wetlands. Speed up the approval process for landowners that have pits with an acceptable design (i.e. a general permit for pits sized and built according to Natural Resources Conservation Service tech guides.

**Problem/Opportunity 4g**

Some individuals expressed concern that the Swampbuster program creates problems with farm operations because of small parcels of wetland in a holding where tractors get stuck.

**Options**

- 1) Make mitigation opportunities more easily available for very small wetlands that may interfere with an agricultural operation.
- 2) Speed up the application and exemption process for small wetlands in agricultural areas.

**Problem/Opportunity 4h**

Some individuals expressed concern that the Wetland Reserve Program has too long an easement, affects base acres, has property tax and income tax implications, and only applies to farmed areas.

**Options**

- 1) Change the length of easement provisions for the Wetland Reserve Program. Consider including the ability to negotiate contract length.
- 2) Change the manner in which wetland reserve easements affect farm program base acres.
- 3) Change the Wetland Reserve Program provisions to allow them to apply to non-farmed acres.
- 4) Supply information to county tax assessors to help in dealing with Wetland Reserve Program acres.
- 5) Develop a system to address local tax base inequities resulting from wetlands.
- 6) Develop a mechanism for developing state specific criteria for the Wetland Reserve Program and other federal programs.

- 7) Allow scaled payments for contracts allowing limited uses on wetlands.
- 8) Develop information and incentives to encourage proper management of Wetland Reserve Program land.
- 9) Target Wetland Reserve Program funding to the highest value wetlands.
- 10) Use state and local governments to implement the Wetland Reserve Program.

**Problem/Opportunity 4i**

Some individuals expressed a concern that the waterbank is not adequately maintaining existing wetland acres.

**Options**

- 1) Restructure the Waterbank program.
- 2) Eliminate the Waterbank program and encourage transfer of those funds into a more flexible wetland reserve.

**Problem/Opportunity 4j**

Some individuals suggested small private wetlands proposals are at a disadvantage when they compete for funding against larger government proposals.

**Options**

- 1) Encourage small private groups to work with agencies on proposals.
- 2) Publicize environmental justice grants and other grants available to small groups.
- 3) Provide set-aside of grant funds for small projects.

**Problem/Opportunity 4k**

It was suggested that provisions of the Environmental Trust could be changed to help wetlands projects.

**Options**

- 1) Make a large percentage of Environmental Trust funds available for innovative wetlands projects not fundable under current federal programs.
- 2) Give wetland programs a priority for Environmental Trust expenditures.

**Problem/Opportunity 4l**

Some individuals expressed concern that more money may go to salaries and travel expenses than wetland programs on the ground and that another layer of government and personnel isn't needed.

**Options**

- 1) Freeze hiring and spending levels on current state and federal wetlands programs.
- 2) Provide a Annual Nebraska Wetlands Report which includes state, federal and local wetlands expenditures.
- 3) Limit Nebraska Wetlands Conservation Plan administrative expenses.

**Problem/Opportunity 4m**

Some individuals suggested that current farm programs, by encouraging crop production, cause pressure to develop wetlands. Others suggested programs reward bad stewards who have already developed or degraded their wetlands while penalizing or prohibiting such actions by the good stewards who had taken care of their land.

**Options**

- 1) Encourage the federal government to decrease crop price supports.

**Problem/Opportunity 4n**

Some individuals suggested that keeping lands in wetland uses increases food prices and places priorities on animals instead of people.

**Options**

- 1) Discontinue wetland protection programs.

**Problem/Opportunity 4o**

It was suggested that the Nebraska Wetlands Conservation Plan should be under the Basin Management Approach umbrella.

- 1) Integrate the Nebraska Wetlands Conservation Plan with other watershed plans and projects.
- 2) Conduct wetlands research in conjunction with the Best Management Approach

## 5. PHYSICAL PROBLEMS/DRAINAGE

### Problem/Opportunity 5a

Human activities such as building of irrigation canals or upstream channel modification and drainage can cause wetlands to develop or enlarge on the property of third parties. In other cases a farmed wetland may no longer be capable of being farmed since it is wet more of the time due to human activity. Nonetheless drainage may not be allowed.

### Options

- 1) Require project sponsors to offer to buy affected land at inflation adjusted pre-project prices or pay difference in value.
- 2) Require project sponsors to consider offsite drainage problems and include in their cost-benefit ratios.
- 3) Require considerations of physical remedies for planned and existing projects.
- 4) Resolve artificial wetlands jurisdiction related issues.
- 5) Give higher acquisition priority to lands affected by third party projects.

### Problem/Opportunity 5b

Downcutting due to previous channelization or natural causes may drain or degrade existing wetlands.

### Options

- 1) Fill head cuts and put berms along streams that are downcutting.
- 2) Avoid a mechanism to help landowners restore previous stream length. Consider incentives, easements, streamlining of 404 process, etc.
- 3) Investigate mechanisms for sediment transport past streams.
- 4) Support check dams, grade stabilization structures, etc., to reduce downcutting.

- 5) Create a mechanism to reclassify a former wetland that has been filled or drained by natural processes. (Note: an appeals mechanism to accomplish this is already in place).
- 6) Clarify responsibilities when a wetland is degraded by third parties or natural causes.
- 7) Use a series of weirs to bring the streambed back to its original grade and cause water to spread out back close to its original location.
- 8) The following options were mentioned in public workshops. They were made specifically in relation to degradation and channelization of the Missouri River and related loss of wildlife and habitat. However, they can be selectively applied in other locations.
  - (a) Flush sediment from upstream reservoirs
  - (b) Stop river shipping/navigation
  - (c) Decrease flow velocities by opening chutes and removing wing dams and pilings
  - (d) Use condemnation if necessary to complete key projects
  - (e) Implement the 23 county degradation study
  - (f) Improve watershed management
  - (g) Place grade stabilization structures across the main channel
  - (h) Increase the number of ox-bows for recreation
  - (i) Selectively remove dikes and levees
  - (j) Build locks to slow degradation
  - (k) Settle the Iowa-Nebraska border dispute
  - (l) Use easements or 99 year leases to complete key projects

**Problem/Opportunity 5c**

Potential downcutting due to future channelization projects may drain or degrade existing wetlands.

**Options**

- 1) Adopt Natural Resources Conservation Service minimal effect criteria for channelization.
- 2) Prohibit all channelization unless necessary for the public health or welfare.
- 3) Allow channelization so long as mitigation is provided through restoring the channel length in a nearby location on the same stream or in the same basin as appropriate.
- 4) Require requests for stream channelization to go through a mitigation process.

**Problem/Opportunity 5d**

Groundwater pumping may lower water levels and degrade or drain wetlands.

- 1) Recognize conjunctive use of surface water and groundwater and make groundwater subject to an appropriative system.
- 2) Divert surface water to wetland areas being drained by groundwater pumping.
- 3) Allow limits to groundwater pumping in selected high value wetland areas.

**Problem/Opportunity 5e**

Incompatible land uses and erosion control practice or lack of those practices upstream can degrade a wetland.

**Options**

- 1) Include soil treatment around wetlands in a watershed approach.

- 2) Provide general permitting or exemptions to wetland requirements in those cases where a soil conservation practice can only feasibly be carried out by encroaching on a wetland.
- 3) Provide cost share for best management practices for land and livestock.
- 4) Consider land use regulations in areas above high value wetlands.
- 5) Manage urban development near wetland to reduce runoff of oil, salt, and other pollutants into wetlands in such areas as Lincoln's 27th Street.
- 6) Retain or create land retirement programs at the federal or state level such as CRP, waterbank, annual set-aside, and the Wildlife Habitat Improvement Program.

**Problem/Opportunity 5f**

Ranchers need flexibility in working with their water levels and ditches in order to "hay" their meadows.

**Options**

- 1) Solicit more ideas from landowners on needed practices and projects.
- 2) Provide financial assistance for small water impoundments that benefit both cattle and wildlife.
- 3) Provide general permitting exemptions to wetland regulations in cases associated with haying, where damage to wetland values would be minimal.
- 4) Research effect of manipulating water levels for haying or other purposes.

**Problem/Opportunity 5g**

Some individuals indicate concerns over the practicality of cleaning existing ditches given current rules.

- 1) Provide better public information on the existing regulations applicable to ditch cleaning.
- 2) Reexamine current general permitting authority regarding ditch cleaning and amend as appropriate.

**Problem/Opportunity 5h**

Some of the lakes and playas and other wetlands in the Upper Republican area seem to be drying up and the reason is unknown.

- 1) Provide funding for research on whether some of the lakes and playas and other wetlands in the Upper Republican area of southwest Nebraska are drying up and, if so, why.

## 6. WETLANDS VALUES AND USES

### *Problem/Opportunity 6a*

There is no definitive value system for wetlands.

#### Options

- 1) Develop and use a system for categorizing and ranking wetland values. The system should be employed on an as needed basis throughout the state.
  - 2) Develop a system for categorizing wetlands by function.
  - 3) Increase educational information on wetlands values and functions and carefully distinguish between values and functions.
- 2) Provide a subsidy to public entities using wetlands for selected alternative uses.
  - 3) Compensate the landowner to better manage for wildlife.
  - 4) Better publicize cost-share programs and other programs that compensate landowners.
  - 5) Develop new compensation programs for landowners.
  - 6) Provide flexibility in water quality standards waivers for wetlands constructed for wastewater treatment.
  - 7) Increase floodplain buffer along the Missouri River by purchase of easements and acquisition.

### *Problem/Opportunity 6b*

Liability costs to the landowner may prohibit some alternative wetland uses such as contract hunting and recreation.

#### Options

- 1) Subsidize landowners for liability coverage for alternative activities involving public access and use.
- 2) Set up leasing entities to publicize and facilitate hunter access to fee hunting on private wetlands.
- 3) Provide information on leases for hunting.

### *Problem/Opportunity 6c*

Alternative uses of wetlands are often available but not used or publicized by public entities or private individuals.

#### Options

- 1) Publicize alternative uses to governmental entities. Include uses such as wastewater treatment, stormwater retention and flood control.

## 7. PROPERTY RIGHTS

Some individuals indicated that since there is no compensation for requiring that land be left as a wetland, this is causing private burden for a public benefit and is unfair. Other individuals disagreed and indicated that changing a wetland use has off-site effects that negatively affect the public.

### Options

- 1) Compensate private landowners for requiring that their lands remain as wetlands.
- 2) Provide development credits. The credits could be traded so that significant areas could be protected while other areas with limited potential for restoration could be developed.
- 3) Purchase all needed wetlands from willing sellers. Pay taxes to the local government the same as other landowners.
- 4) Compensate private landowners damaged by upstream conversion of wetlands. For example damages could be from flooding, water quality problems or upstream conversion of wetlands.
- 5) Continue developing options to compensate landowners through fee title purchase, easements or set aside programs for preserving wetlands (see Issue 8. Incentives).

## 8. INCENTIVES

A number of individuals indicated that incentives were a viable option for conserving and enhancing wetlands. A wide variety of incentives were suggested.

### Options

- 1) Create a state Wetlands Reserve Program.
- 2) Encourage participation in the federal Wetlands Reserve Program.
- 3) Use wetland banking.
- 4) Create or continue incentive programs such as the Conservation Reserve Program.
- 5) Set wetland payments to landowners based on social values that the wetlands provide.
- 6) Provide incentives for management practices.
- 7) Provide incentives for riparian buffers.
- 8) Provide landowners with technical assistance on wetland management.
- 9) Provide physical management assistance on wetland management. (This could include contracting for tree removal, etc.)
- 10) Restructure farm programs so that they do not encourage crop production.
- 11) Provide incentives to make paid hunting more attractive.
- 12) Provide more private lands opportunities to landowners.
- 13) Encourage continuation of the Water Bank Program
- 14) Allow immediate capital gains loss due to classification of land as wetland. Ownership of land can be retained.

## 9. TAXATION

### Problem/Opportunity 9a

Some individuals suggested that a standard tax policy for wetlands needs to be applied uniformly across Nebraska. There were suggestions that this include prompt reassessment when land is reclassified and a low or zero percent tax rate be used since the land usually generates little income.

#### Options

- 1) Devise a system to automatically devalue land as soon as it is designated a wetland. The system should see that it is not the landowner's responsibility to notify the assessor. When a wetland easement goes into effect land should not be taxed at its maximum production value.
- 2) Adjust the state Land Valuation Manual so that wetlands are taxed at 0% or a very low rate.
- 3) Base property taxes on the land's production capability, not just soil types.
- 4) Implement a program like Iowa's "Slough Bill" that exempts wetlands from property taxes.
- 5) Reexamine the actions of county assessors on wetlands. Because of wide annual variations in whether an area is wet or produces hay, wet meadows may be assessed wrong.
- 6) Provide an intermediate tax category for farmed unmodified wetland.

### Problem/Opportunity 9b

Some individuals suggested that tax statements more clearly break out different valuations for different land classes so that the level of taxation on wetlands is more apparent.

#### Options

- 1) Change tax statements to make the level of taxation on wetlands more apparent.

### Problem/Opportunity 9c

Some individuals suggested that when private groups or individuals place land in a wetland use and receive lower tax rates it raises taxes for other landowners.

#### Options

- 1) Any government easements or payments to private groups or individuals for protecting or enhancing wetlands which result in the lowering of taxes on property could be accompanied by the allocation of additional government funds to supplement property tax payments on that land in the future.

### Problem/Opportunity 9d

Some individuals noted that the Game and Parks Commission in-lieu-of taxes are frozen at the year of purchase and that this may create problems for local governments. There were also concerns expressed about payment of taxes by the federal government and the Natural Resources Districts.

#### Options

- 1) Raise Game and Parks Commission in-lieu-of taxes to current year values as opposed to the year of purchase value.
- 2) Require state wetland property to pay in-lieu-of taxes based on current valuation and mill levy.
- 3) Tax federal lands on the same basis as neighboring lands rather than in-lieu-of rates.
- 4) Make in-lieu-of tax payments on areas natural resources districts acquire. (Note: Although NRDs are a local unit of government they do cut across the boundaries of other units of local government. An in-lieu of tax rate might also make the true cost of the NRD acquisition more apparent.)

**Problem/Opportunity 9e**

The tax system could be used to provide incentives or funds for wetlands conservation.

**Options**

- 1) Place a "check-off" on the state income tax form for wetlands and streambank stabilization.
- 2) Place a mil levy in property taxes with the funds generated dedicated to protecting wetlands and funding county parks.
- 3) Use wetlands as an income tax write-off.
- 4) Allow donations to a wetlands fund as an income tax write-off or deduction.
- 5) Provide tax structure incentives for wetlands conservation.
- 6) Provide vanity license plates with the proceeds to go to wetlands conservation.

## 10. MITIGATION

### *Problem/Opportunity 10a*

There are questions about what constitutes an appropriate standard for mitigation.

#### Options

- 1) Reexamine whether 1 1/2 times the acreage should be the standard.
  - 2) Allow enhancement as mitigation.
  - 3) Examine mitigation based on equivalent value.
  - 4) Mitigation processes should account for time lag before mitigation provides full values.
  - 5) Alternatives should be sought where a wetland is impossible to replace - development restrictions may be necessary in some locales.
  - 6) Consider large area restorations. Sometimes small areas may not make sense. (See problem/opportunity 10b on mitigation banking).
  - 7) Allow artificial impoundments of 10 acres or less to be dredged with no mitigation requirement.
  - 8) Consider formulating a matrix to determine what type of mitigation is required for different types and sizes of wetlands.
  - 9) Determine success of existing mitigation.
- 2) Facilitate development of privately held mitigation banks.
  - 3) Develop area or watershed mitigation banks to increase landowner options.
  - 4) Develop Game and Parks Commission owned, leased and managed mitigation banks.
  - 5) Provide more flexibility in mitigation options for swampbuster and 404 permits. (See 10a).
  - 6) Create a process for the Nebraska Department of Roads to work with Sandhills landowners would like to have Department of Roads mitigation wetlands on their land. This may mean allowing the Department of Roads to mitigate on parcels of land non-adjacent to their road corridor.
  - 7) Make wetland preservation tradeoffs such as mitigation available to both developers in urban settings and agricultural interests that might otherwise have compliance problems with Swampbuster.
  - 8) Add mitigation flexibility in Swampbuster for small "nuisance" wetlands.

### *Problem/Opportunity 10b*

There are questions regarding how to make more mitigation options widely available to landowners.

#### Options

- 1) Develop statewide procedures for privately held mitigation banks to increase landowner options.

**11. PRESERVATION/ENHANCEMENT/  
RESTORATION/ACQUISITION**

A number of individuals indicated that preserving, enhancing, or restoring wetlands entails physical difficulties, that it is difficult to assign values to those activities, and that acquisition policies cause disagreement.

Options

- 1) Develop an evaluation technique for inventorying wetlands and assigning wetlands values to assist in preservation, enhancement, restoration and acquisition of wetlands.
- 2) Encourage seasonal flooding of drained wetlands. It also helps crops.
- 3) Encourage pumping of reuse pit water back onto cropland at the end of growing season.
- 4) Use the willing seller approach on wetland acquisition.
- 5) Stop leasing and easements. Instead buy wetlands and pay the taxes.
- 6) Develop a pilot program for the State to acquire small parcels of land.
- 7) Use a series of metal weirs to bring the streambed back to its original grade and cause water to spread out back close to its original location.
- 8) Construct demonstration projects (on the Missouri these could be used for educational purposes.
- 9) Use easement or acquisition to increase the buffer on the Missouri River and allow more room for floods.
- 10) Target restoration and preservation of oxbow wetland (especially on the Missouri River).
- 11) Consider selectively removing dikes and levees (on the Missouri River).
- 12) Some wetlands in the eastern Saline Complex have been so badly degraded that restoration may not be feasible. Therefore development may be acceptable.
- 13) The Rock Creek Bottoms area represents a good opportunity for restoration.
- 14) Glovers Point was mentioned as a good restoration candidate on tribal lands. More cooperation from the Corps may help.
- 15) Omadi Bend and Crystal Point are restoration candidates on the Missouri River.
- 16) Retain or create land retirement programs at both the federal and state level such as the Conservation Reserve Program, Waterbank, Annual Set-Aside and the Wildlife Habitat Improvement Program.
- 17) Support private volunteer wetland restoration efforts.
- 18) Better publicize and explain current acquisition/enhancement/restoration and preservation programs.
- 19) Expand current acquisition/enhancement/restoration and preservation programs.

## 12. PRIORITIZATION

A need to assign priorities to wetlands for preservation, enhancement, restoration or acquisition was identified.

### Options

- 1) Develop a priority system which protects the most valuable and limited wetlands. This system could allow low value - low priority wetlands to be developed and mitigated elsewhere. It could become an integral part of the mitigation and acquisition programs. It could also be used to target funding for preservation, enhancement and enhancement.
- 2) Utilize concepts developed for the Rainwater Basin and Eastern Saline Wetlands complexes. This could include presence of threatened and endangered species or sensitive species, restorability, historical factors - Indian artifacts, and functions and values. Classify into separate categories from high to low values and functions.
- 3) Prioritize wetlands by specific categories or interests such as research, acquisition/restoration, and flood retention.
- 4) Research priorities may include baseline information on Todd Valley Wetlands, riparian wetlands, data gaps for HGM and WET models, and wetlands identified in the State Comprehensive Outdoor recreation plan that may need more research (Figure 2, W - 29).
- 5) Use threatened wetlands, size, lack of baseline information, accessibility, restorability and willing seller as overriding factors for prioritizing.

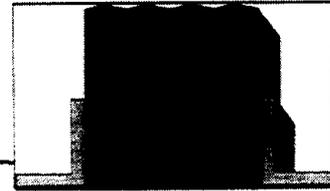
### 13. OTHER

The following ideas and options were not applicable to the problem/opportunity categories of the preceding sections.

- 1) Wetland enhancement won't be possible if there is water marketing
- 2) Who should be contacted before building a fish pond?
- 3) Urban residents are picking on rural residents to advance their own agenda.
- 4) Leave us alone (in the Sandhills).
- 5) Private outside interest groups that don't work in and with the Sandhills should not have a voice in determining the direction of Sandhills management.
- 6) Mitigation doesn't work for Saline Wetlands. They can't be destroyed or created in our lifetime.
- 7) We don't want government people entering private property without permission!
- 8) Prohibit redevelopment in floodplains and don't compensate landowners for floodplain losses.

## WETLAND BIBLIOGRAPHY

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The following is a bibliography of the more important works on wetlands which have been published in Nebraska and nationally. These wetlands references are organized as follows:

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## APPENDIX A: PUBLIC WORKSHOP ATTENDEES



### Public Workshop #1, Lincoln, Nebraska December 15, 1993

Jim Ashenbach	Pheasants Forever
Ronald Bauer	Citizen
Will Boyer	Upper Loup NRD
Mark Brohman	Nebr. Game and Parks Comm.
Keith Brown	Landowner
James Bruner	Nebr. Game and Parks Comm.
John Cambridge	Olsson Associates
Joe Daddario	Citizen
Craig Derickson	USDA Soil Conservation Service
Merlin Erickson	Citizen
Pat Foote	Nebr. Game and Parks Comm.
Joe Gabig	Nebr. Game and Parks Comm.
Roger Helgoth	Jacobson Helgoth. Inc.
Mark Hunzeker	Attorney
Julie Jorgensen	Citizen
Peter Katt	Attorney
Bruce Kevil	Nebraska State Homebuilders Assoc.
Sue Kuck	Citizen
Ron Kurtzer	Sierra Club
Bob Kuzelka	UN-L. Water Center
Clayton Lee	Citizen
Laura Lenzen	Nebr. Dept of Roads
Scott Leudtke	Nebr. Game and Parks Comm.
Mark Mainelli	Speece & Lewis Engineers
Patrick Molini	Citizen
Dennis Oelschleger	Landowner
Bob Rokeby	Citizen
Sam Sampson	Pheasants Forever
Dan Schulz	Lower Platte South NRD
Danny Seibold	Citizen
Jeff Shellpepper	Raymond School Teacher
Roxanne Smith	Lower Platte South NRD
Gerry Steinauer	Nebr. Game and Parks Comm.
Jerry Steinke	Central Nebr. Publ. Power & Irr. Dist.

Tom Taylor  
  
Chris Thody  
Tom Thomas  
Richard Wiese  
Carl Wolfe

U.S. Environmental  
Protection Agency  
Citizen  
Jacobson Helgoth. Inc.  
Citizen  
Lower Platte South NRD

### Public Workshop # 2, Omaha, Nebraska January 4, 1994

Jeff Doeschot	Citizen
Pat Dunn	Jacobson Helgoth. Inc.
Darrell Feit	Nebr. Game and Parks Comm.
Thomas Fowler	Citizen
Don Franklin	Citizen
Mike Gilbert	U.S. Army Corps of Engineers
Kristen Gottschack	Lower Platte North NRD
Ted Green	Citizen
Dave Hagengruber	Nebr. Game and Parks Comm.
John Hansen	Nebraska Farmers Union
DeLynn Hay	Nebraska Cooperative Extension Service
Lesley Helgoth	Citizen
Roger Helgoth	Jacobson Helgoth. Inc.
Lisa Jensen	Citizen
Don Keeton	Environmental Engineer
Bruce Kevil	Nebraska State Homebuilders Assoc.
Tony Korth	Citizen
Stephanie Krager	Citizen
Cate Kratville	Jacobson Helgoth. Inc.
Dan Ludwig	Lower Platte North NRD
Gene Mack	U.S. Fish and Wildlife Service
John Morton	HDR. Inc.
Clay Nielsen	Citizen
Dennis Oelschleger	Landowner
Marlin Petermann	Papio-Missouri River NRD
Bob Peterson	U.S. Dept. of Housing and Urban Development
Glen Pollack	Nebraska Audobon Society
Jim & Lisa Rush	Landowners

**Workshop # 2, Omaha, (continued)**

Mike & Linda Ryan	Citizens
Mark Schnabel	Nebraska State Homebuilders Assoc.
Donald & Katheryn Slaughter	Landowners
Suzanne Stirek	Citizen
Fred Thomas	Omaha World Herald
Tom Thomas	Jacobson Helgoth, Inc.
Don VanDriest	Citizen
Ione Worthman	Nebraska Audobon Society

**Public Workshop # 3, South Sioux City, Nebraska  
January 5, 1994**

Joe Ailken	Ducks Unlimited
Rock & Kris Albertson	Citizens
Lucille Big Fire	Winnebago Tribe
James Buttermore	Citizen
Terry Dolezal	Citizen
Brad Grier	Citizen
Warren Johnston	Citizen
John Huff	Biology Teacher
Bill Huser	Citizen
Paul Knudsen	Citizen
Vince Kramper	Nebr. Natural Resources Commissioner
Richard Leitschuck	USDA Soil Conservation Service
Pat Madsen	Citizen
Roger McGinnis	Citizen
Mark Merrick, Jr	Citizen
Jim Quinn	Pheasants Forever
Gordon Rave	Winnebago Tribe
Mike Raynor	Northeast Nebraska Sportman's Association
Ron Raynor	Citizen
Steve Shadle	Citizen
Curt St. Cyr	Winnebago Tribe
Clayton Stalling	Nebr. Game and Parks Comm.
Lyle Todd	Citizen
Bruce Trindle	Nebr. Game and Parks Comm.
Chris Voss	Chairman, Crystal Lake Project
Lisa Whitewing	Winnebago Tribe

**Public Workshop # 4, North Platte, Nebraska  
January 18, 1994**

Will Boyer	Upper Loup NRD
Tom Brown	Farmer
Bill Carhart	Twin Platte NRD
Mark Crist	North Platte Telegraph
Derek Dickinson	Citizen
Wayne Eatinger	Rancher, Upper Loup NRD Director
Dan Estermann	Rancher
Joe & Marlene Estermann	Ranchers
Rocky Hoffman	Nebr. Game and Parks Comm.
Bob Long	Citizen
Jacque Matthews	Rancher
Tom Morrison	Nebr. Game and Parks Comm.
George Nason	Nebr. Game and Parks Comm.
Dick Nelson	Nebr. Game and Parks Comm.
Rob Ravenscroft	Rancher
Dan Rochford	Nebr. Game and Parks Comm.
Lynn Stockall	Citizen
Rick Thompson	Landowner

**Public Workshop # 5, Imperial, Nebraska  
January 19, 1994**

Nadine Bishop	USDA Soil Conservation Service
Jerome Clemens	Landowner
Dirk Greene	Nebr. Game and Parks Comm.
Loral Johnson	Newspaperman
Jeff Leyland	Citizen
Ron Milner	Upper Republican NRD

**Public Workshop # 6, Alliance, Nebraska  
January 31, 1994**

Bob Craig	Nebr. Game and Parks Comm.
Jim Hollingsworth	Citizen
Gene Mack	U.S. Fish and Wildlife Service
Jim O'Rourke	Society for Range Management
Jack Peterson	Nebr. Game and Parks Comm.
Gary Schlichtemeier	Nebr. Game and Parks Comm.
Harvey Suetsugu	Nebr. Game and Parks Comm.

**Public Workshop # 7, Sidney, Nebraska  
February 1, 1994**

Vern Beyer	Cattlemen, Farm Bureau Member
Robert Franzen	Landowner
Rod Horn	South Platte NRD
Julie Lamphere	USDA Soil Conservation Service
Doyle Lund	Contractor
Kent Matsutani	USDA Soil Conservation Service
Keith Rexroth	South Platte NRD Director

**Public Workshop # 8, York, Nebraska  
February 15, 1994**

Jim Barr	Congressman Bereuter's Office
Vernon Pearson	Landowner, Fillmore Co. Supervisor
Wes Sheets	Nebr. Game and Parks Comm.
Bill Siefert	Landowner
John Sundberg	Landowner
Tim Teegerstrom	Landowner
Judy Watt	Women Involved in Farm Economics

**Public Workshop # 9, Columbus, Nebraska  
February 17, 1994**

Nathan Kreps	Columbus Telegram
Mark Czaplowski	Nebraska Public Power Dist.
Dennis Oelschleger	Landowner
Donna Fells	Citizen
John Fells	Citizen
Mike Gutzmer	Nebraska Public Power Dist.
Robert Mohler	Lower Loup NRD
Allison Preston	Citizen
Steven Preston	Citizen
Mary Schmid	Citizen
Wayne Schmid	Citizen
Lyman Wilkinson	Nebr. Game and Parks Comm.

**Public Workshop # 10, O'Neill, Nebraska  
February 28, 1994**

Diego Ayala	USDA Soil Conservation Service
Bill Conrod	National Park Service
Don Doty	USDA Soil Conservation Service
Garold Frickel	Landowner
Mike Gutzmer	Nebraska Public Power Dist.
Warren Hill	National Park Service
Gary Howe	National Park Service
Justin King	Nebraska Public Power Dist.
Leslie Krueger	U.S. Army Corps of Engineers
Terry Kubicek	Nebr. Natural Resources Commission
Gerald Mathis	Landowner
Bill Vodehnal	Nebr. Game and Parks Comm.

**Public Workshop #11, Valentine, Nebraska  
March 1, 1994**

Bob Bachelor	Landowner
Marianne Beel	Landowner
Orville Beyer	Landowner
Lyn DeNaeyer	Landowner
Bill DeNaeyer	Landowner
Leigh Fairhead	Landowner
Mark Feeney	Nebr. Game and Parks Comm.
J.B. & Pat Fischer	Landowners
Tom Higgins	Landowner
Betty & Les Kime	Landowners
Bill Krueger	Landowner
Jim Lee	Landowner
Gene Mack	U.S. Fish and Wildlife Service
Bruce Messersmith	Landowner
Hugh Potter	Landowner
Jack & Linda Ravenscroft	Landowners
Ila Reiser	Landowner
Todd & Kelly Rothleutner	Landowners
Ben Rutten	Landowner
Bob Stotter	Landowner
Jim VanWinkle	Landowner
Mae Ward	Landowner

**Public Workshop #12, Grand Island, Nebraska  
March 21, 1994**

Del Brown	Werner Construction Co.
James Bruner	Nebr. Game and Parks Comm.
Paul Currier	Platte River Trust
Tom Franti	UN-L, IANR
Jerry Jasmer	USDA Soil Conservation Service
George Leiser	Citizen
Dennis McCoig	Cedar Valley Reclamation Dist.
Paul Obermiller	Citizen
Kevin Orvis	Little Blue NRD
Richard Ray	Werner Construction Co.
Mike Shaughnessy	Natural Resources Commissioner
Lee Sonderup	Cedar Valley Reclamation Dist.
Rachel Swanson	Citizen
Jim Vanderloop	Cedar Valley Reclamation Dist.

**Public Workshop #13, Holdrege, Nebraska, March  
22, 1994**

Barb Friskopp	U.S. Army Corps of Engineers
Beth Hiatt	USDA Soil Conservation Service
Arthur Holsten	USDA Soil Conservation Service
Jay Maher	Central Nebr. Publ. Power & Irr. Dist.
Keith Ostermeier	Central Nebr. Publ. Power & Irr. Dist.
Don Schepler	Central Nebr. Publ. Power & Irr. Dist.
Jerry Steinke	Central Nebr. Publ. Power & Irr. Dist.
Bud Steinshouer	USDA Soil Conservation Service

**Public Workshop #14, Hyannis, Nebraska  
March 23, 1994**

Chris Abbott	Citizen
Tina Baker	Citizen
Pete Becker	Citizen
Will Boyer	Upper Loup NRD
Curt Brown	Citizen
Veldon Bullington	Citizen
Bernard Burgess	Citizen
Jack Connell	Citizen
Tim Cover	Citizen
D.A. Cox	Citizen
Bob Craig	Citizen
Al Davis	Citizen
Frances Davis	Citizen
Marian Downing	Citizen
Jim Ducey	Citizen
Arthur Duls	Citizen
Shannon Dyer	Citizen
Alma Edelman	Citizen
Bob Finegan	Citizen
Gary Goodrich	Citizen
Dean Haney	Citizen
Merla Hebbert	Citizen
Mickie Hebbert	Citizen
Carolynn Henderson	Citizen
Mike Henderson	Citizen
Warren Herman	Citizen
Jeff Jacobs	Citizen
Dean Jamison	Citizen

**Workshop #14, Hyannis, (continued)**

Erik Johnson	Citizen
Charles Jones	Citizen
Pat Keslar	Citizen
Sara Kettle	Citizen
David Kleensang	Citizen
Kevin Kostman	Citizen
Brad Kovarick	Citizen
Kenny Kramer	Citizen
Norman Kramer	Citizen
Robert Kramer	Citizen
O. Lynn Myers	Citizen
Dan Manning	Citizen
Jerry Merrihew	Citizen
LeeAnn Merrihew	Citizen
Fran Messersmith	Citizen
James Monahan	Citizen
Charlie Munn	Citizen
Gail Nason	Citizen
Trent Nelson	Citizen
Howard Parker	Citizen
Mark Phillips	Citizen
Lyle Phipps	Citizen
Cliff Quick	Citizen
Barb & Robert Rothwell	Citizens
Bill Rothwell	Citizen
Max Rothwell	Citizen
R.O. Rothwell	Citizen
John Sibbitt	Citizen
John H. Sibbitt	Citizen
Benjamin Simpson, Jr	Citizen
Paul Sweet	Citizen
Sid Sweet	Citizen
Burk Teichert	Citizen
Hop Vinton	Citizen
Tim Vinton	Citizen
Harry Younkin	Citizen