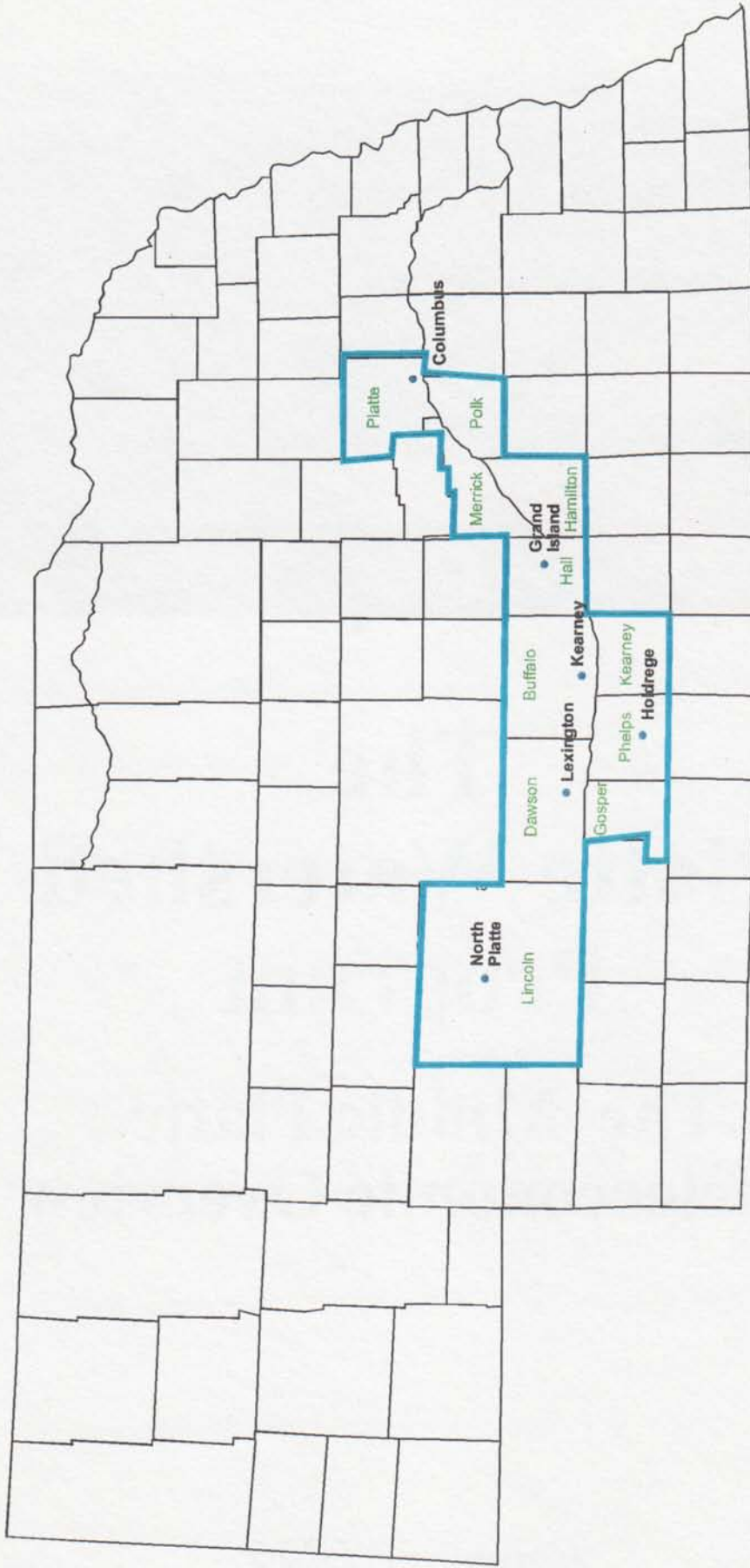




The Platte Watershed Program

The Middle Platte Socioeconomic Overview

February 1999



Nebraska

The Platte Watershed Program The Middle Platte Socioeconomic Overview

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Table of Contents

	Page
Introduction	2
The Platte River: Competing Demands For a Scarce Resource	7
Historical Overview of Economic Development	10
Agriculture	18
Groundwater Development	20
Water Quality	23
Nebraska Public Power District	25
Central Public Power and Irrigation District	26
Platte-related Tourism	28
Hunting and Fishing Impacts	37
Nebraska County Lodging Tax	45
Regional Sectoral Model	50
Public Attitudes and Awareness	58
Legal Issues/Public Policies that Impact the Middle Platte Region	67
Conclusions	75
References	76
Useful Internet Sites	78

Introduction

The Platte River, like other rivers in the Western United States, faces increasing demands on its limited water. But the Platte is not like other rivers. Occupying a niche matched only by the Colorado River, the Platte River is simultaneously the provider of the water critical for local economic viability and the provider of flows that are the absolute foundation for a unique environmental zone. While all rivers are important in the dry West, only the Platte River flows through the great crossroads of the North American continent. In south central Nebraska, on a stretch of river known as the Middle Platte, the east-west human transportation corridor intersects the narrow waist of the North American Central Flyway.

Crossroads often turn out to be battlegrounds. Given the Platte River's unique circumstances, it is not surprising that there are a variety of stakeholders with conflicting views concerning management of the river. Agricultural producers want to maintain, and expand if possible, irrigation opportunities. Municipalities want to maintain, and expand if possible, water allocations for domestic and industrial use. The electric utilities want to manage reservoir levels and river flows to meet the needs of their hydroelectric plants. Local, national and international environmental groups want to manage in-stream flows in ways that protect and expand habitat. Multiple layers of government are involved in Platte River issues. The Federal government, Wyoming, Colorado, and Nebraska State governments, and hundreds of cities, towns, natural resource districts, irrigation districts, and other governmental entities have a direct interest in the Platte. Because the Middle Platte River is identified as critical habitat for the endangered whooping crane, the threatened piping plover, and the endangered interior least tern, water use in the Platte Watershed is subject to the provisions of the Endangered Species Act.

Meeting the requirements of the Endangered Species Act is a catalyst for much of the debate now occurring over the Platte River. In the near future, a variety of management strategies for the river will be identified and evaluated. To make informed decisions and to participate in a meaningful way, all stakeholders must have access to adequate information. Informed debate requires knowledge of many issues. Speculation, conjecture, and hyperbole are not conducive to productive discourse. To actively participate in the ongoing discussion, one must know something about the economic impact of any proposed change in the amount of irrigation water, about public attitudes toward the Platte River, about the link between the river and the settlement pattern of the region, and about the economic opportunities of nature-based tourism. The following material is designed to provide sufficient background information to assist all participants in the dialogue now underway. The report was written as part of the Platte Watershed Program, which is described in the following section.

Recognizing that readers of this report will have different levels of prior knowledge concerning the Platte River, the author has attempted to create a document suitable for a range of audiences. Using data from a variety of

sources, this report is designed to facilitate discussion and provide a common body of knowledge to all groups now engaged in decisions regarding the Platte River. Researchers selected 1993 as the base year for the overall report because that was the latest year covered by the broadest range of pertinent data resources at the time the Platte Watershed Baseline Report was completed in 1996.

Major data sources include the 1990 U.S. Census, the 1992 U.S. Agricultural Census, the Regional Economic Information System, the Nebraska Department of Economic Development, Nebraska Public Power District, Central Nebraska Public Power and Irrigation District, U.S. Fish and Wildlife Service, and the Nebraska State Comprehensive Outdoor Recreation Plan. With the emergence of internet-based information services, the reader of this report is encouraged to visit the web-sites of the agencies listed above. While printed material is soon dated, the internet material is continually revised and updated. In addition to these major data sources, the report also relies upon the primary data collected in previous Platte Watershed Program studies. This primary data is particularly relevant in the sections dealing with public attitudes toward the Platte River and crane-based ecotourism activity.

The section of the river flowing from North Platte past Kearney to Columbus is called the Big Bend of the Platte, the Central Platte, or the Middle Platte. This report generally uses the term Middle Platte, but occasionally will use one of the others. Whichever term is used, this is the stretch of the river that is designated as critical habitat for a number of endangered species. Thus, all proposed water-using projects in the watershed must include an evaluation of their potential impact on the habitat of the Middle Platte. For purposes of this report, the Middle Platte region is considered to include the eleven counties bordering the Platte from the confluence of the North Platte and the South Platte to the entry of the Loup River. From west to east, this includes the counties of Lincoln, Dawson, Gosper, Phelps, Kearney, Buffalo, Hall, Hamilton, Polk, Merrick, and Platte. The Platte Watershed Program region does not exactly match the nine counties identified in the Three State Cooperative Agreement signed in 1997, which includes Adams County, but omits Lincoln, Platte, and Polk counties.

The Platte Watershed Program

The Platte Watershed Program is a partnership to protect and enhance the ecosystem of the Platte River and its alluvial aquifer in Nebraska. Originating in the mountains of Colorado and Wyoming, the watershed of the Platte River drains two-thirds of the State of Nebraska. The Platte River alluvial aquifer provides drinking water for seventy percent of Nebraska's citizens. The water resources of the Platte basin support multiple uses - irrigation, hydropower, recreation, aquatic life/wildlife, and tourism - and an economy based on agricultural production. The Platte River serves as a vital link in the Central Flyway, providing habitat for 300 species of migratory birds, including eighty percent of the continental population of Sandhill cranes. It is a distinct environmental transition zone with a rich diversity of plant and animal life.

The Platte Watershed Program was initiated by the Region VII Office of the Environmental Protection Agency and the Nebraska Department of Environmental Quality in 1991 following a regional comparative risk project which identified the most serious remaining threats to human health and the environment in the region. A comprehensive ecosystem approach to the Platte River Basin in Nebraska was undertaken to address areas of high risk for pesticides, nitrates, and toxic contamination and habitat destruction and alteration.

The goals of the program are to:

- 1) protect and enhance water quality, public health, and ecological integrity of the Platte River Basin and its alluvial aquifer through cooperative assessment and action;
- 2) 2) facilitate development and implementation of long-range management plans to reduce ecological and human health risks while maintaining economic and socio-cultural well being of communities in the Platte River Basin.

Major Objectives of the Platte Watershed Program:

Demonstrate application of watershed ecosystem place-based community- based management principles and ecological restoration techniques.

Support scientific assessments to inventory and prioritize threats to water quality, human health, and ecological integrity in the Platte River Basin.

Focus Federal, state, and local authorities and resources on identified threats to water quality, human health, and ecological integrity in the Basin.

Develop and implement outreach programs to form partnerships and involve stakeholders in Platte watershed protection/enhancement.

Provide resources and develop tools to enhance capacity for risk-based targeting and long-term ecological and economic sustainability in the Basin.

Community Based Environmental Protection

Community Based Environmental Protection (CBEP) represents a new approach by the Environmental Protection Agency. The traditional "Command and Control" approach to environmental protection focused on a particular medium or problem. While Command and Control programs have been very effective at reducing point source pollution and improving environmental quality over the past two and one-half decades, the approach is not as well suited to environmental problems like those on the Platte River. Issues like non-point source pollution, overall water quality issues, and endangered species habitat do not lend themselves to Command and Control solutions. Instead, this solution must seek to address the various causes of the problems and build an understanding of the interrelationships between human behavior, habitat change and pollution in the Middle Platte area. CBEP supplements and complements the traditional environmental protection approach by focusing on the health of an ecosystem and the behavior of humans that live in the ecosystem's boundaries, instead of concentrating on a medium or particular problem.

Using a CBEP approach, the number and diversity of stakeholders tends to increase. CBEP stakeholders in the Platte Watershed Program include:

State officials from Nebraska, Wyoming and Colorado;
City officials from municipalities that rely on Platte River water;
Federal officials from agencies dealing with natural resource issues;
County officials from the 11 county region;
Natural Resource District Commissioners;
Agricultural groups interested in irrigation issues;
Environmental groups interested in habitat preservation on the Platte;
Local economic development groups;
Tourists, especially Sandhill Crane watchers;
Academics at various universities;
Concerned citizens.

The CBEP approach broadens the issues dealt with by environmental protection programs. Often a particular environmental problem, such as non-point source pollution, is affected by and related to several other environmental and resource issues in a geographic area. In order to solve one environmental problem, the related and connected environmental concerns must also be addressed. Because humans are the main agents of change in most ecosystems today, the CBEP approach recognizes that the needs of humans must be developed in concert with environmental solutions to promote a sustainable future. A place-based focus allows stakeholders to identify the inter-related problems and forge a comprehensive, long-term plan that addresses the needs of the environment and its citizens.

Finally, the CBEP approach can improve environmental program management. A large, diverse group of stakeholders can provide a wide array of expertise and

knowledge when properly informed of an area's interrelated problems. This encourages the development of effective and appropriate problem-solving tools. For example, a tool that may improve water quality levels but exacerbate other ecosystem pollution problems would be avoided under a CBEP approach. Widespread stakeholder collaboration also improves environmental protection management by providing a means and forum for adaptive problem solving. If a problem-solving method is not working, the relationships established under collaborative work should facilitate discussion and implementation of alternative approaches. Therefore, the CBEP approach, by tapping into a high level of expertise and collaborative relationships, is an effective management tool.

The Platte Watershed Program follows the six key CBEP Principles:

<p>Focus on Geographic Area Work Collaboratively with Stakeholders Protect and Restore Quality of Air, Water, Land, and Living Resources in a Place as a Whole Integrate Environmental, Economic and Social Objectives Take Action Using Most Appropriate Tools Use Adaptive Management</p>

The Platte Watershed Program is a continuation of EPA's involvement in place-based, collaborative, and holistic environmental protection. Related programs include geographic programs such as the National Estuary Program, the Chesapeake Bay Program, and the Great Lakes Program. These programs and others have demonstrated the advantages of a CBEP approach.

Given the complexity of issues surrounding the Platte River, the initial task of the CBEP is to ensure that all stakeholders have access to adequate information to make informed decisions. The following material describes the current socio-economic circumstances of the Middle Platte Region. To understand the uniqueness of the Platte, the material begins with a brief description of the physical characteristics of the river.

The Platte River: Competing Demands for a Scarce Resource

The Platte River system carries water from the Rocky Mountains to the Missouri River, draining northeast Colorado, southeast Wyoming, and central Nebraska. The Platte River system runs for 1,352 miles through Colorado, Wyoming, and Nebraska. Like other rivers flowing through the Great Plains, the Platte River faces increasing demands on its limited water supply. From its headwaters in the Colorado Rockies, the Platte system carries approximately 1.16 million acre-feet of water each year through the Central Platte Valley to Grand Island. (An acre-foot is the water required to cover one acre with one foot of water, or, 325,851 gallons.) Since the 1880s, the Platte's flows have increasingly been diverted to meet municipal and irrigation needs. Prior to the construction of the five major reservoirs in Wyoming – Pathfinder (1909), Guernsey (1927), Alcova (1938), Seminoe (1939), and Glendo (1957) – and McConaughy (1941) in Nebraska, the Platte River would often flood in late spring, but go completely dry in late summer during drought years. The original river, described by early pioneers as a “mile wide and an inch deep” is now a series of braided channels separated by mature stands of riparian forest. The impact of these changes on endangered species and whether or not the Central Platte River ecosystem is continuing to change in ways harmful to listed species is the subject of an ongoing biological debate. For information on this debate, go to any of the following works, which are cited in the reference section at the end of this report. (Williams 1978; Johnson 1996; Johnson 1994; Currier 1996; Kwapnioski and Dekleva 1997).

The Platte River flows through territory identified by early American explorers as the Great American Desert. The twenty-two-inch yearly precipitation isoquant is one of nature's great boundaries, marking the beginning of a semi-arid region. (An isoquant is a line on a map linking areas with a common characteristic.) Successful high-value crop production with less than twenty-two inches of annual precipitation requires systematic irrigation. Over much of the Central Great Plains, this natural boundary roughly parallels the 100th Meridian. The twenty-two inch line crosses the Platte River in Dawson County in south central Nebraska. Because there is substantial variation in precipitation from year to year during the growing season, the actual irrigation zone pushes eastward from the twenty-two inch line to the eastern third of Nebraska. In the irrigation region, during normal-precipitation years irrigated acres will produce approximately one-third more corn than dryland acres. In very dry years, non-irrigated cornfields are completely devastated. For example, in 1997, corn yields in south central Nebraska averaged 160 bushels per acre on irrigated land and 53 bushels per acre on dry land.

Currently, there are 195 significant storage facilities on the Platte system, capable of holding up to 8,885,000 acre-feet of water. The South Platte River is a major municipal water source for the rapidly growing Front Range region of Colorado, including the Denver to Fort Collins development corridor, and

provides surface irrigation water for 983,000 acres in Colorado and Nebraska. The North Platte River provides surface irrigation for 721,000 acres and hydropower for southeastern Wyoming and western Nebraska. The Central Platte River, from the confluence of the two branches at the city of North Platte to Grand Island, provides surface irrigation for 225,000 acres in south central Nebraska. Hydroelectric power plants in Nebraska use Platte water to generate 120,000 kilowatts of low-cost electricity each year.

In addition to these important human uses, the Platte River provides the water for a critical ecological zone. Viewed from space, the North American Central Flyway has a vast hourglass shape, with the narrow waist lying along the eighty mile stretch of the Platte from Grand Island to Lexington, Nebraska. Millions of waterfowl, shorebirds, songbirds and other migratory species rely on this stretch of the river during their annual migration. Two species are particularly linked to the Platte. Each spring 400,000 to 500,000 Sandhill cranes use the river as a staging area. The cranes establish pair-bonds, feed in nearby cornfields and wet meadows, and roost in the middle of the shallow river as protection against predators. During their three-week stay on the Platte, the Sandhill cranes gain the strength and weight necessary for successful nesting in Canada, Alaska, and Siberia. The endangered whooping crane, with a wild population hovering around 150 birds, is also linked to the Platte. While whooping cranes do not stay on the river for extended periods, they use the Middle Platte as a stopover in their annual migration between nesting grounds in Canada's Wood Buffalo National Park and wintering grounds in Aransas National Wildlife Refuge on the Gulf Coast of Texas

The springtime staging of Sandhill cranes along the Platte River has drawn increasing national and international attention since the 1970s. The ecological value of the region began to attract both public and private habitat preservation and restoration efforts. The Nebraska Game and Parks Commission, Nebraska Public Power District, Central Nebraska Public Power and Irrigation District, and the Central Platte Natural Resource District have funded scientific studies and engaged in habitat improvement efforts. The National Audubon Society established the Lillian Annette Rowe Wildlife Sanctuary on the Platte River southwest of Grand Island in 1973. This was the first direct action taken by a private group to protect critical habitat in the Central Platte Valley.

The public debate generated by the proposed construction of the Midstate Irrigation Project in south central Nebraska increased awareness of the unique environmental qualities of the region. While the proposed development was defeated in 1975, it brought national attention to the cranes and focused attention on the diminishing stretches of the river available to migratory birds in the Central Flyway. The National Wildlife Federation and State of Nebraska filed suit to stop the construction of Grayrocks Dam on the Laramie River, a tributary of the North Platte. Both parties were concerned about the impact on downstream wildlife habitat, water supply and irrigation. Eventually, the Grayrocks Dam was built, but

only after provisions were made to mitigate its downstream impact. As part of the court-approved settlement, the Platte River Whooping Crane Habitat Maintenance Trust was created in 1978 through a 7.5 million dollar payment by the Missouri Basin Power Project. With proceeds from the settlement, the Crane Trust has purchased more than 8,000 acres of land and is actively involved in habitat restoration.

Platte River Development

The contemporary Platte River is markedly different than the river that existed before pioneer settlement of Colorado, Wyoming, and Nebraska. Given the scarcity of growing season precipitation, early farmers turned to the river as a source of reliable irrigation. By 1890 there were nearly two thousand small canals and diversion dams that removed water from the Platte system. The first major dam on the North Platte River, Pathfinder in central Wyoming, was completed in 1909. Guernsey (1927), Alcova (1938), Seminoe (1939), McConaughy (1941), and Glendo (1957) reservoirs soon followed. There are now fifteen major dams on the Platte River system creating a system of large reservoirs. For example, McConaughy is approximately twenty-two miles long and has a storage capacity of some two million acre-feet of water.

It is difficult to compare historic and contemporary flow rates since systematic measurements were not made in the Middle Platte region until 1915, six years after Pathfinder's construction. Most estimates place the current annual flow at approximately twenty percent of the historic flow. Because the snowpack in the Rocky Mountains is the source of much of the Platte's water, the historic flows involved considerable seasonal variation. In late winter and early spring, the "natural" Platte had low flows, and sometimes even went dry in places. As the snow pack began to melt, flows would increase in April and May, peak in June, then begin to decrease. The spring floods shaped the Middle Platte ecosystem by removing vegetation and creating a broad, flat valley. In dry years, by late summer flows would disappear completely.

Human intervention has changed the river in the last one hundred years. Elimination of spring floods allowed a substantial increase in stream-side vegetation and a concurrent decrease in the river's width. The human-regulated Platte is now a braided river of narrow channels which is only ten to twenty percent of its historic width. The Platte no longer goes completely dry as it did before the storage dams were built.

Altogether, the Platte system provides surface irrigation water for nearly 2 million acres of farmland west of Grand Island, Nebraska. Water from Platte system provides irrigation for 1,083,000 acres in Colorado, 608,000 acres in Nebraska (west of Grand Island), and 238,000 acres in Wyoming. Of these acres, 983,000 are irrigated with South Platte water, 721,000 from the North Platte, and 225,000 from the Middle Platte. Combining these numbers with the yield differential

between dryland and irrigated crop production, the Platte's direct economic impact in the agricultural sector is several hundred million dollars each year.

Given the importance of irrigation throughout this area, it is not surprising that there is a long history of considerable friction between Nebraska, Colorado, and Wyoming concerning the allocation of Platte flows. In 1934, during a period of severe drought, Nebraska initiated a suit (*Nebraska v Wyoming*) against Wyoming seeking a more equitable apportionment of the North Platte's water. The legal action was soon expanded to include Colorado and the South Platte as well. Nebraska held that the upstream states were diverting too much water into their irrigation projects. Because of the complexity of the issue, the U.S. Supreme Court did not hand down its decision until 1945. Although Nebraska essentially won the case, the decision did not resolve all Platte River issues and the states have continued to battle over water allocation.

Historical Overview of Economic Development

To understand the current attitudes about the Platte River, and to find sustainable solutions to the management issues now arising, one must know something about the central part the river played in the settlement of the region. Before white settlement, the Platte Valley was an important transportation route for Native Americans. South-central Nebraska was an important buffalo hunting area for Native Americans, but the climate limited permanent settlement. The Pawnee would travel along the river twice each year on buffalo hunting expeditions, traveling from their permanent villages just east of the Middle Platte region. There is no evidence that the Pawnee, Sioux, Cheyenne, or other tribes had any significant anthropogenic impact on the Platte.

The current socio-demographic circumstances of the Middle Platte region are shaped by a variety of geographic, demographic, political, and historical/cultural influences. Early settlement patterns were influenced by public policies like the Homestead Act, aggressive recruitment of settlers by the railroads, and the inherent differences in local agricultural productivity based upon differences in soil, rainfall, and climate. Growing grain, particularly corn, has traditionally provided the economic foundation for the region. While agricultural production is still an important component of the regional economy, there is an increasing amount of manufacturing and service activity. Technological change has dramatically increased output per farmer, which, in turn, means that fewer farmers are needed. Small towns that traditionally serviced the surrounding farm population now must diversify to survive.

After the Louisiana Purchase of 1803, the United States began sending scientific expeditions onto the Great Plains. Major Stephen Long's 1819-20 expedition was particularly influential in shaping the public perception of south central Nebraska. Major Long followed the Platte River to the confluence of the North

Platte and the South Platte, then traveled along the South Platte into the Rocky Mountains. Journal entries in present day Dawson County described the region as a place of "irreclaimable sterility." Dr. Edwin James, the expedition's geologist and botanist, wrote: "The traveler who shall at any time have traversed its desolate sands, will, we think, join us in the wish that this region may forever remain the unmolested haunt of the native hunter, the bison, and the jackall." The expedition map labeled western Nebraska, western Kansas, eastern Colorado and eastern Wyoming as the "Great American Desert."

Even though early explorers were generally critical of the region's development potential, the broad, gently-up-sloping Platte Valley was quickly identified as the best possible east-west overland passage. In 1830, the Sublette party proved that the route was suitable for wagon traffic, taking ten wagons along the Platte to the Rockies. Between 1841 and 1870, an estimated 360,000 settlers traveled the Great Platte River Road - the combination of the Oregon, Mormon, and California Trails. Because of its location on this major east-west transportation route, the Middle Platte region developed differently than other sections of the Great Plains. Even though hundreds of thousands of people passed through on their way West, the region itself remained sparsely populated. Nebraska was part of Indian Territory until 1854, which meant that Congress restricted permanent non-Native American settlement in the region between 1821 and 1854. Nebraska had only 2,372 settlers when it became a recognized territory in 1854.

Early regional economic activity was based upon the needs of travelers on the Oregon, California, and Mormon trails. Special services were provided by road ranches, trading stores, and blacksmiths. Road ranches raised horses, mules, and oxen for sale to pioneers, or would trade fresh livestock for animals exhausted by their journey from St. Joseph or other gateway cities. Trade stores stocked food, hardware, and other items specifically for the wagon trains. For a time, these market niches provided steady employment and income for local businesses. However, the era of wagon trains proved to be short-lived once the Union Pacific finished laying track in south central Nebraska in 1866.

Settlement of the region was shaped by government policy, the improvement of a steel plow capable of turning the tough prairie sod, access to the railroad, and, later, by the development of irrigation. The Homestead Act (1862) gave 160 acres of land to anyone who would live on a farming claim for five years. The lure of free land brought thousands of people to south central Nebraska. The free land policy was later altered by the Kinkaid Act (1904) which allowed settlers to take 640 acres in western Nebraska. This change reflected the realization that 160 acres were insufficient to maintain a family in the drier climate of western Nebraska. The problem of turning the virgin prairie sod was solved with the development of the "rod" or "grasshopper" plow, which had an upright cutter to slice through the sod.

The Union Pacific Railroad and the Burlington and Missouri River Railroad pushed across Nebraska in the 1860s and 1870s. By 1869 the first transcontinental railroad was completed. The railroad altered settlement patterns and presented new economic opportunities. Towns were sited to meet the fuel and water needs of the railroads. Small towns sprouted along railroad spurs, serving as the shipping points for cattle and agricultural products. Cattle were driven to these shipping points from the local area as well as from surrounding states. Some cattle were shipped to Eastern markets from Nebraska after being driven from Montana or Texas.

One indicator of the settlement pattern in the region is presented by the date when each county was formally organized. These dates reveal the general wave of settlement moving from east to west through the valley. Platte and Polk counties were organized in 1856, followed by Merrick and Hall in 1858, Kearney, Dawson, and Lincoln in 1860, Hamilton in 1867, and Phelps in 1873. Buffalo County had originally been organized jointly with Hall County, but received separate recognition in 1870. Gosper County was not organized until 1881.

While the area saw substantial growth beginning in the 1860s, there was still considerable concern about water. For many early travelers through the region, the treeless nature of the Plains indicated a shortage of water for agriculture. Farmers were hesitant to move into a region with insufficient water. Their worries were addressed through the cultivation of an idea that conversion of the prairie to cropland would increase yearly precipitation. Charles Dana Wilber, Superintendent of the Department of Geology and Mineralogy, Nebraska Academy of Sciences and Samuel Aughey, a professor of natural sciences at the University of Nebraska, popularized the notion that "rain follows the plow." Wilber and Aughey theorized that native prairie sod was so thick that it prevented rainfall from seeping into the ground. Rainfall immediately ran-off into the streams and rivers, and was carried out of the region. Once the sod was broken, the newly-exposed underlying soil would act like a giant sponge. The captured moisture would gradually return to the atmosphere promoting cloud formation and a new round of precipitation. Over time the plowed land would create its own micro hydrological cycle.

The years immediately following the Homestead Act were unusually wet, which seemed to vindicate Wilber and Aughey. Since, in the short-run, increasingly favorable climatic conditions seemed to support this theory, policy-makers encouraged settlement further west. Farmers poured into the state, increasing the population from 450,000 in 1880 to over one million by 1890. Reality returned when the wet cycle ended and severe droughts in 1874, 1880, and 1890-95 destroyed the theory and drove thousands of settlers from the region.

During this period of settlement, small towns formed to provide services and trade needed by the local farm population. Economic activity was primarily

focused on agriculture, agricultural services, and transportation services. There were a few early attempts at manufacturing as early entrepreneurs attempted to capitalize on regional access to transcontinental rail service and availability of Platte River water for power and processing.

In the 1890s, dry weather and a sharp national recession halted local growth. In areas where normal amounts of rainfall would not support corn production, population shrank as farmers left to try their luck elsewhere. General regional prosperity did not return until World War I greatly expanded the demand for U.S.-produced grains. Wartime demand, combined with government price guarantees and good weather, sent land values soaring. Many farmers borrowed heavily to finance expansion, with much of the expansion taking place on marginal land. After the war, as foreign demand for agricultural products declined and government ended its price supports, the agricultural boom soon became a depression. Farmers were already financially stressed when the droughts of 1934 and 1936 devastated agricultural production. In 1934, temperatures reached 117 degrees (F.) at Grand Island; fifty times during the summer the mercury hit one hundred degrees. Nineteen thirty-six was nearly as bad, with temperatures above one hundred for thirty days. Most farms in the region were not yet irrigated, so corn and wheat production fell to record low levels. Corn yields, which had averaged twenty-four bushels per acre during the preceding decade, averaged only two to three bushels an acre during the worst drought years. The economic hardships wrought by these temperature extremes are remembered by many current residents. These memories have influenced local attitudes toward irrigation, water rights, and the provision of in-stream flows to meet non-human habitat needs.

In the 1930s, the introduction of hybrid strains increased corn yields when there was sufficient water. By the 1940s and 1950s improvements in agricultural chemical inputs--fertilizers, herbicides, and insecticides--further increased yields. Across the entire state the use of nitrogen fertilizer increased by 700 percent between 1955 and 1974. The lessons of the drought years were well learned - irrigation expanded from the early canal system to include pump irrigation by the 1930s and center-pivots by the 1960s. The drought years of the mid-1930s sparked considerable interest in pump irrigation. From 1931 to 1935 only five irrigation wells were dug in the entire state. In 1935, drillers dug 1,195 new wells. By 1992, there were 74,714 registered wells. With increased irrigation, average corn yields pushed above one hundred bushels per acre by the 1970s and approached one hundred fifty bushels per acre by the 1990s.

Focusing on more recent events, the past two decades have witnessed large swings in the area's economy. The 1970s were generally expansionary with relatively strong and stable economic growth in the region. The 1980s began with a long and severe economic recession in the agriculture sector created when the inflation-fighting tight money policy initiated in November 1979 combined with an expansionary national fiscal policy to shoot short-term interest

rates beyond twenty percent. These high rates were disastrous for many of the region's agricultural producers and related agribusinesses. Agricultural exports and incomes, as well as land values declined. The local economy was rocked by numerous foreclosures, forced farm liquidations, and financial stress on rural agricultural banks.

Many of the region's ag-dependent communities have lost population in recent years as technological advancements in equipment, new hybrids and fertilizers, and new farming practices increased farm size and yields while requiring fewer laborers. As farm population declined, the need for local economic services also diminished. Thus began a long-run decline in both rural economic activity and rural population. There is no evidence at this time that these trends have run their course.

Cultural Influence

The Great Platte River Road, running east to west through the region, carried hundreds of thousands of settlers through Nebraska Territory beginning in the 1840s. However, Nebraska Territory was not open to white settlement until passage of the Kansas-Nebraska Act of 1854. Once the territory was opened, a wave of settlers was drawn by the economic opportunities presented by the newly opened lands. Along with the farmers came speculators who developed towns that each envisioned would someday be the "Gateway to the West." A second wave of migration in the 1890s gave central Nebraska its unique cultural heritage. A massive advertising campaign in Europe and the eastern United States, backed by government, the Union Pacific Railroad and the Burlington Northern railroad, enticed thousands of Europeans to migrate to the region. The campaign sought to change the public image of the Plains. Settlers came because advertisements promised cheap land, fertile soil, and ample water. Railroads determined the early development of towns, with the townsites often on land selected by the railroad and sold to settlers and speculators. The Union Pacific Railroad controlled development of towns in the Platte River Valley.

By 1895 the population of Nebraska was 452,402, with one quarter of the population immigrants from a foreign country. Germans, Irish, English, Czechs, and Swedes arrived in large numbers. The settlement pattern, largely determined by the railroads, encouraged ethnic groups to live in segregated communities. For example, Gothenburg, in Dawson County, was founded in 1882 by Olaf Bergstrom, a Union Pacific Railroad employee from Sweden. The story goes that Bergstrom enticed fellow Swedes to settle in Gothenburg with the promise that this new town was going to be totally Swedish, and the new residents would not need to learn to speak English.

Germans settled Columbus and Grand Island, Swedes founded Gothenburg and Stromsburg, and Danes established Dannebrog. There were large Czech populations in Omaha and Wilbur while Russians and Latvians settled in Lincoln. These ethnic settlements brought a variety of cultures to the state, which even

today offers an unexpected dash of Old World custom, cuisine, and festivals. But the immigrants also brought along old grudges and prejudices, so the resulting highly-segregated settlement pattern resulted in clannish behavior, considerable friction with neighboring communities, and a general dislike and distrust of government. Settling in large groups slowed the ethnic mixing process. With a primary allegiance to the local ethnic group, state government was viewed with considerable distrust. For many Nebraskans, government was the vehicle that their opponents (other ethnic groups) could use to gain abusive power.

The second major cultural influence on Nebraska is economic in nature. The dominance of agriculture in Nebraska's economic life has shaped the culture of the state. Historically, even the urban areas of Omaha and Lincoln were decidedly agriculturally-oriented in their perspective. Early urban industries, like meat-packing, were related to agriculture. As recently as 1982, a constitutional amendment was approved by voters to prevent non-family corporations from buying farmland. The political support for this legislation reflects the statewide reaffirmation of the value attached to the traditional family farming. The State's symbols are all agricultural. The statue on top of the capital building - The Sower - is a farmer planting grain by hand. The University of Nebraska - Lincoln's athletic teams are the "Cornhuskers."

But the historic Nebraska agricultural experience was not genteel and nurturing, it was a screaming roller coaster of booms and busts; record high prices followed by prices that didn't even cover the cost of planting; plentiful rains one year and drought the next; expansion one season, farm foreclosure the next. As historian James Olson wrote in 1955:

Further conditioning life in Nebraska is the fact that the state's agriculture over the years has been subject to violent fluctuations, resulting from both man-made and natural causes, with the result that at no time, save for the past fifteen years, has the state's basic industry enjoyed uninterrupted prosperity for as much as a decade. This, of course, has had its effect upon the support Nebraskans could give schools, churches, and other cultural agencies, and upon the energy they could devote to pursuits not directly related to making a living.

James C. Olson,
History of Nebraska

Geographic Influences

A major geographic influence on local economic activity is the inherent fertility of prairie soil. While early European and American explorers who passed through the region thought the treeless plains were barren, the area is a highly productive agricultural region. Early attempts at farming in the eastern tallgrass prairie proved difficult until John Deere's steel plow began replacing cast-iron plows in

1837. By the 1860s, when large numbers of farmers migrated to south central Nebraska, the technology and knowledge to "bust the sod" was well established.

A second major geographic influence is the weather. With local weather patterns shaped by the continental influence, the area has hot summers, cold winters, and considerable variation in annual rainfall. Average growing seasons range from 160 days in the eastern part of the study area to 140 days in the west. In general, rainfall decreases as one moves west through the region. Merrick County, on the eastern edge of the study area, averages twenty-six inches of annual precipitation. Lincoln County, on the western edge, receives an average of nineteen inches of precipitation per year. Because there is considerable yearly variation, the transition zone of 18-22 inches of annual precipitation, which marks the boundary between subhumid and semiarid land, shifts across the region from year to year.

The third major geographic influence is the Great Plains environment itself. With fertile soils but marginal rainfall, farms had to be larger than those in the eastern Corn Belt. The average size of farms in Nebraska has increased significantly since the 1880s. The original 160 acre farms established by the Homestead Act were not sustainable. By 1900, the average Nebraska farm had increased to 246 acres, by 1935, 349 acres, and by 1993, to 846 acres. Larger farms mean lower population densities, more isolation, and more dependence upon the transportation network. With low population densities, the provision of services is expensive on a per capita basis. Life on the prairie, west of the 98th meridian, is different than life in the Eastern U. S. Historian Walter Prescott Webb described an "institutional fault" running along the 98th meridian. In the study area, this meridian runs through Merrick and Hamilton counties. According to Webb, successful settlement west of this line required a completely new set of institutional arrangements:

At this fault the ways of life and living changed. Practically every institution that was carried across it was either broken and remade or else greatly altered. . . . When people first crossed this line they did not immediately realize the imperceptible change that had taken place in their environment, nor, more is the tragedy, did they foresee the full consequences which that change was to bring in their own characters and in their modes of life.

Walter Prescott Webb,
The Great Plains

A fourth important geographical influence on local economic activity is that the region is a major east-west transportation route. Whether providing services to the thousands of pioneer migrants or the millions who travel Interstate 80 each year, the region's location creates opportunities not generally available to other parts of the Great Plains. Each year, nearly 5.5 million vehicles pass the

Kearney interchange on Interstate 80. Motels in Kearney rent 400,000 rooms each year.

The fifth geographical influence is that ecologically the Middle Platte Region is a transition zone. The upland tallgrass prairie of the eastern Great Plains historically covered the eastern counties of the Middle Platte Region. Lowland tallgrass prairie ran west through the Platte River valley all the way to Lincoln county. Mixed-grass prairie dominated the central part of the region, interspersed with pockets of sandhills prairie and sliced by a ribbon of riparian forest growing along the banks of the Platte. The southwestern corner of Lincoln county is covered by an uncommon sand sage prairie which has adapted to the semiarid conditions. As is typical of transition zones, there is tremendous ecological diversity in this region. Two researchers from the University of Nebraska - Kearney identified 367 plant species at two small sites near Grand Island. The local ecology is shaped by topography, weather, available water, and soil type. The Middle Platte region is a combination of cultivated land, range land, riparian forest, and wetlands. Scattered across Gosper, Phelps, and Kearney counties are a number of small surface depressions formed by dense, clay hardpan which hold water. These "Rainwater Basins" are an important migratory resource for the Central Flyway, for they provide feeding and resting opportunities for the millions of birds passing through the region twice each year.

Agriculture

Agriculture has traditionally provided the economic foundation for south central Nebraska. The region is blessed with fertile soils, a relatively long growing season, and a rolling topography suitable for cultivation. Rainfall diminishes as one moves east to west through the region, with irrigation required for successful crop production in the western two-thirds of the study area. Irrigation is provided by the surface waters of the Platte Rivers and by groundwater from the Ogallala Aquifer. The present agricultural production system now in place in south central Nebraska is one of the most productive in the world. While many crops are important, corn is dominant today just as was during the time of the Pawnee.

The First Farmers

As the Pawnee moved northward during their great expansion of the 13th and 14th centuries, they refined agricultural techniques, particularly relating to the growing of corn. By the time they settled just north of the Platte River along the Loup River, they grew ten varieties of corn, seven types of pumpkins and squashes, and eight kinds of beans. Women did most of the field work, tending plots from one half acre to one and a half acre. Farming was generally confined to the bottomland of creeks and rivers where the soil could be turned with a hoe made from the shoulderblade of a buffalo. The plots were planted in a patchwork manner, alternating pumpkins and squashes between the various corn and bean varieties to separate and preserve the individual breeds. The Pawnee had no plow capable of turning the thick prairie sod and did not use irrigation, so food plots were small and harvests were influenced by the amount of rainfall during the growing season. In addition to providing nourishment, corn was an important component of Pawnee religious ceremonies. The Lakota, Cheyenne, and other Native American tribes which used the western reaches of the study area did not practice horticulture. There were no permanent Native American settlements in the Middle Platte region, but the valley provided an important buffalo hunting area.

Settlement and Irrigation

After the Homestead Act of 1862, farmers poured into south central Nebraska. While railroad advertisements and community boosters had pronounced that there was sufficient rainfall for crops, the pragmatic farmers west of the 98th meridian quickly recognized the need for irrigation. According to recent research undertaken for Central Nebraska Public Power and Irrigation District, irrigation recommendations for growing corn in south central Nebraska are based upon the following facts:

- Total average annual water requirements -- 26 inches;
- Effective rainfall – 7 inches; (assumed to be approximately 70 percent of 10.6 inches, the average total rainfall from June through September)
- Water from soil moisture storage -- 4 inches

Net irrigation requirements for an average year -- 15 inches

Even though this shortfall of precipitation was quickly obvious, early proponents of irrigation had trouble convincing their neighbors to participate in projects. Irrigation was labor intensive and the available technology for transporting water was limited. The first irrigation projects used surface water, depending on gravity to move the water from one point to another in a field. Water diverted from streams and rivers flowed from diversion structures to canal systems to onfarm irrigation ditches. Irrigation was possible as long as the water could flow from the diversion structures of the canal and from the canal to the highest point in the field by gravity. To deliver the water from the high end of the field required releasing the water from the ditch by hand, cutting the irrigation ditch at regular intervals with a spade. Irrigation initiated during the 1870s with Platte River water included a project near North Platte, where a group of individuals used river water to irrigate cropland; near Fort Sidney, where diverted water was used to water gardens, trees, and lawns; and west of Fort Sidney, where hay meadows were irrigated.

Drought conditions caused heavy crop losses in 1890, 1893, and, 1894 driving home the point that irrigation was essential for successful agricultural development. Although the need for irrigation was recognized, financing the necessary canals presented a substantial obstacle. Interest in irrigation increased in dry years, but farmers had little or no extra money. In years of adequate precipitation, farmers viewed irrigation as something not needed. Thus, early irrigation projects went broke trying to show that irrigation was feasible. For example, the first irrigation project in Dawson County, initiated in 1890, failed. The project, funded by non-Nebraskans, met opposition and indifference by farmers, and, after a year, the financial backers pulled out.

Despite the recognized benefits of irrigation, acceptance was slow in coming for several reasons. Using gravity flow irrigation systems required long hours of backbreaking work. Water flow from ditch cut to ditch cut was highly variable, causing soil erosion problems. It is difficult to achieve uniform water distribution across the entire field. Achieving greater uniformity meant that the irrigator had to be present, both day and night. Many farmers, who had come from the eastern end of the corn belt, also lacked the experience and knowledge of how to farm with irrigation. Successful crop production depends not only on the timing of moisture but also the application level. Many farmers, lacking this knowledge and experience, could not see past the hard work associated with irrigation.

As farmers gained an understanding of the benefits of irrigation, they began to look to scientists, engineers, and water specialists for information about using and managing water. Irrigation studies had shown that surface water alone was insufficient to irrigate all the potential tillable lands in Nebraska. Beginning in the 1880s, careful study of Nebraska's geology brought new knowledge about the supply of water lying beneath the plains. In 1890 Congress appointed Richard J.

Hinton to conduct an investigation on the feasibility of using artesian wells for irrigation. This study is one of the first systematic investigations of the nature and extent of groundwater in Nebraska. In the study's conclusions, Hinton indicated that although a considerable supply of water existed underground, the technology did not yet exist that could effectively raise the water to the crops.

Windmills represented a early effort to tap into groundwater supplies. In 1897 Erwin Hinckley Barbour, a University of Nebraska professor, conducted a field investigation of windmill usage in the Platte Valley. Barbour had high hopes for windmills but he was also realistic and cautioned farmers that windmills in use then had technical limits and were inefficient at pumping water from depths greater than 75 feet. Barbour also recognized the importance of groundwater to the future of irrigation in Nebraska and encouraged further studies that would improve windmills and pumps.

Groundwater Development

Although most of the interest in the Middle Platte is now focused on surface water, groundwater trends are also important. There is a connection between surface flows and groundwater, however this connection was only recognized legally by Nebraska in 1996. In April 1996, Nebraska enacted a new "conjunctive use" law, which recognizes that underground water and the flows in nearby rivers are intrinsically connected. Thus, for the first time in state law, the potential impact of groundwater irrigation on river flows is considered. While early studies had shown tremendous groundwater reserves beneath south central Nebraska, development of groundwater as a source of irrigation did not really expand until the appropriate technology became available. This process began in the early 1900s as the internal combustion engine revolutionized machinery. Early engines were only suitable for shallow lifts of groundwater, but by the 1930s deeper wells and heavier lifts were made possible through the use of turbine engines for irrigation pumps.

Technological developments from 1930 to 1950 brought irrigation potential to millions of acres. However, the adoption of this technology was gradual, as groundwater pumping was viewed with varying degrees of skepticism by farmers and their bankers. Drought conditions in the 1950s prompted many to overcome their reluctance and brought rapid development. Prior to 1950, the average number of new wells installed annually statewide was less than 500. The adoption of new well drilling techniques, innovations in pump technology, and drought conditions during 1953-57 encouraged rapid expansion, with the number of new wells increasing from less than 1,000 in 1953 to over 4,500 in 1956. New well drilling between 1957 and 1964 declined and remained fairly low, with around 500 new wells being drilled each year. However, groundwater development increased from 1964 to the early 1980s with rapid expansion during the years 1972-77. New well drilling reached a peak in 1976, with over 5,500 wells installed in Nebraska. In the 1980s, during the agricultural recession,

groundwater development slowed dramatically from 2,200 new wells annually in 1982 to 700 in 1983, reaching a 50-year low of about 200 in 1987. Since 1990 new well installations averaged 500 per year, bringing the total of wells in the state to 78,373 in 1997. The abundance of groundwater in Nebraska was an important factor in making the state a leading agricultural producer. In 1960 Nebraska had 2 million irrigated acres; by 1982 that had grown to 6 million acres, and by 1997 there were 6.9 million irrigated acres.

Groundwater irrigation had several advantages over surface water irrigation. Groundwater was available on demand, whereas surface water relied on water being in the stream or river at the right time and all season-long, whether it was needed or not. Pump irrigation was more efficient than surface water irrigation because there was less evaporation and seepage, allowing for the conservation of water. Irrigation was still very labor intensive, which limited the number of irrigated acres a single farmer could manage, and the need to use gravity to move water limited the acreage irrigated. The next major improvement in irrigation technology, the center pivot, overcame these constraints.

Center Pivot Irrigation Systems

In 1953 Frank Zybach of Colorado joined with A.E. Trowbridge of Columbus, Nebraska and began producing center pivot irrigation systems (automated self propelled sprinkler systems). In 1954, Zybach and Trowbridge sold the manufacturing and sales rights to Valmont Industries, now the oldest and largest producer of center pivot irrigation systems. Of the seven United States firms making and selling center pivots, five are in Nebraska. These five companies provide the majority of the systems and support services in both the United States and abroad.

Center pivot irrigation systems brought irrigation potential to millions of acres unsuited to gravity flow. Adoption of center pivots were enhanced by economic forces and geographic reality. High grain prices in the early 1970s due to Soviet Union purchases of U.S. grains encouraged increased crop production. High grain prices provided both the incentive and the financial means to adopt the new center pivot technology. Center pivot systems are less labor intensive, allowing a single operator to oversee more acres. Center pivot technology offers another advantage in that it is more sparing in the use of water and provides a way to apply chemicals through the sprinkler nozzles themselves.

Monoculture Agriculture

Farmers use irrigation because it pays. Irrigation increases the productive capability of cropland with yields on irrigated land far surpassing dryland yields, even in years of normal precipitation. Irrigation also allows for more reliable production, enabling farmers to switch to higher valued crops, namely corn and soybeans. Although Nebraska farm land is fertile and capable of producing a variety of crops, such as sugar beets, dry edible beans, sorghum, wheat, and alfalfa, irrigation has turned Nebraska farmers into corn growers. Of the principal

field crops, corn is the most responsive to well-timed applications of water and fertilizer. Thus, as the number of irrigated acres in Nebraska increase, so does the number of acres planted to corn. Nebraska now ranks third in the nation for corn production, behind Iowa and Illinois. However, this corn production has come at the exclusion of producing other crops, resulting in a trend towards a monoculture agriculture

Producing a single crop makes Platte Valley farmers vulnerable to price shocks. Total farm income is significantly impacted by the price of one commodity, thus exposing farmers to greater income risk. For example, when the price of corn declines dramatically, as it did in the summer of 1998 (less than \$2.00 per bushel), the resultant decline in farm income often brings up the question of whether individual producers can survive. The trend towards monoculturism has also resulted in increased pest problems. Growing the same crop year after year encourages large populations of corn rootworms, corn borers, red spider mites, and other crop pests. Continued widespread use of single-spectrum insecticides has resulted in insect populations that are increasingly resistant to the chemicals. Although irrigation increases yield potential, to obtain and maintain these higher yields requires larger application levels of agricultural chemicals. As more and more acres are planted to corn year after year, this increased use of chemicals and fertilizers to maintain productivity and alleviate pest damage means more agricultural runoff and nonpoint pollution.

Groundwater Levels

The extensive supplies of groundwater under Nebraska, estimated at 1.87 billion acre-feet, have enabled the state to become an agricultural powerhouse. Over time, groundwater levels change as a result of the imbalance between discharge and recharge. Discharge from the aquifer occurs naturally, through the natural processes of evapotranspiration or seepage, and by human activities, such as pumping for irrigation. Recharge occurs primarily through precipitation, although other sources include seepage from streams, canals, and reservoirs, as well as return flows from irrigation. Both precipitation amounts and irrigation development have impacted groundwater levels. In years of below normal precipitation or when drought conditions exist, the need for supplemental moisture increases. Under these conditions, groundwater levels decline as the rate of discharge exceeds recharge. On the other hand, during years with normal or above normal precipitation, water levels are expected to rise as the rate of recharge (precipitation) exceeds discharge (decreased pumping).

As pump irrigation expands, people are increasingly concerned about the overall supply and condition of Nebraska's groundwater resources. Portions of the high plains, particularly the Texas panhandle and southwestern Kansas, face growing concerns over rapidly declining groundwater levels. Prior to 1980, declines of more than 100 feet were observed, and more recently (1980-1995), declines of more than 40 feet have been observed in Texas and Kansas.

Fortunately, water levels under Nebraska have remained fairly stable during this period, with the exception of the extreme southwestern corner of the state, where levels have declined by 20 feet or less. In some areas of Nebraska, especially just south of the Platte River from Gosper County to the east, groundwater levels are rising. Recharge from Central Public Power's canal system helps maintain ground water levels. In the design of Central's canal improvements, certain reaches of canals are purposely left unlined to provide for ground water recharge. Despite the rapid increase in the number of wells between 1940 and 1992, the water table in Central's water service area has actually risen from 10 feet to more than 50 feet, forming a giant mound of groundwater beneath Phelps, Gosper, and Kearney counties.

While one might conclude that rising water levels are desirable, this is not necessarily the case. Rising water tables can change the productivity of land, turning tillable acreage into marshy areas.

Platte Valley irrigators are interested in increasing the efficiency of their operations. A survey conducted by Central Public Power indicated that approximately 70 percent of the more than 2,000 delivery points in its Irrigation Division have gated pipe surface systems. As of 1996, 2.5 percent of the delivery points have center pivot systems, with more being installed each year (more than 50 pivots were operating off of the system in 1997). Most of the remaining delivery points use furrow irrigation systems with siphon tubes. The average irrigation efficiency of all of the systems in use in Central's territory is estimated to range from 62 to 70 percent. Irrigation efficiency is defined as the ratio of delivered water available for crop growth to the total water delivered to the farm.

Regulating Water Quality

In general, the major water issue in the Middle Platte is the quantity available for alternative uses. However, there are also water quality concerns, chiefly related to the impact of agricultural chemicals. Regulation of ag chemical application to cropland in Nebraska is the responsibility of Natural Resource Districts (NRDs), established by the Legislature in 1972. The state is divided into twenty-three Natural Resource Districts. The northern part of the Middle Platte basin is located within the Central Platte NRD while the southern part is split between Tri-Basin, Little Blue, and Upper Big Blue NRDs.

In 1984 the Legislature required that all NRDs create groundwater management plans, with the first of these plans initiated by Central Platte NRD in 1988. The NRD is divided into zones based upon the existing level of nitrogen in the groundwater. Phase III zones are those which have the highest levels of nitrates in the groundwater. In these areas, Central Platte NRD maintains stringent controls on the application of fertilizer. For example, farmers in Phase III areas cannot apply nitrogen in the fall regardless of soil type, irrigators are required to keep track of water pumped, and farmers must determine the nitrogen in both

their irrigation water and soil. At the end of each crop year, farmers submit an annual report to the NRD including soil and water sample results, crop yields, and nitrogen application information.

Regarding the Platte River's water quality, the Tri-Basin NRD master plan (1989) reported:

With the exception of total dissolved solids (TDS), which determine water salinity, Platte River water is good quality irrigation water. The water does, however, have TDS concentrations ranging from 370 to 940 parts per million (ppm). Based on the U.S. Salinity Laboratory scheme for classifying irrigation waters, these waters are in the medium- to high-salinity hazard range. This classification indicates that such irrigation should be used only on soils of moderate to good permeability and plants with moderate to good salt tolerance should be grown. Regular leaching is necessary to prevent serious salt buildups in the soil. (p. 12)

A second area of concern for ground water quality is that of chemigation (the practice of applying chemicals to crops via irrigation water). The Nebraska Legislature passed a law, which became effective in 1987, that controls the practice of chemigation. This law requires that applicators be trained and certified in the use of chemicals.

Special safeguards are required on irrigation equipment to prevent contamination of surface water or ground water supplies from chemical-laden water. The equipment must be inspected before a chemigation permit is issued. The NRD is responsible for the inspection and permitting requirements. The Irrigation Division has been active in educating its water users about the requirements and enforcement of the legislation through articles in its newsletter and cooperation with the Tri-Basin NRD.

Nebraska Public Power District

The following information comes from various company documents and the NPPD website at <http://www.nppd.com/>. Nebraska Public Power District (NPPD) is Nebraska's largest electric utility, with a chartered territory including all or parts of 91 of Nebraska's 93 counties. It was formed on January 1, 1970, by the merger of three utilities--Consumers Public Power District, the Platte Valley Public Power and Irrigation District and the Nebraska Public Power System. NPPD is a public corporation and political subdivision of the state of Nebraska. The utility is governed by an 11-member Board of Directors, who are popularly elected from NPPD's territory. NPPD's hydroelectric facilities on the Platte River are licensed by the Federal Energy Regulatory Commission

NPPD provides electricity to customers in more than 205 retail communities as well as 69 wholesale communities and 25 rural public power districts and rural cooperatives. The NPPD electrical grid system, which includes approximately 6,300 miles of transmission lines, delivers power to about one million Nebraskans. NPPD uses a mix of generating facilities, including a nuclear plant, two steam plants, nine hydroelectric facilities, nine diesel plants and three peaking units. NPPD also purchases electricity from the Western Area Power Administration, which is operated by the federal government. The average mix of fuel to supply NPPD's customers in a typical year is 60 percent from coal, 20 percent from nuclear, 20 percent from hydro and .1 percent from gas or oil. NPPD is a member of the Mid Continent Area Power Pool and the Western System Power Pool.

NPPD operates a network of irrigation canals, dams and reservoirs along a 150-mile stretch of the Platte River which help power its two hydro plants which use Platte water – the North Platte Hydro and the Kearney Hydro.

North Platte Hydro

The largest NPPD-owned hydro in terms of capacity, the North Platte hydro has been operating since 1937. The hydro has two General Electric generators and two Allis Chalmers turbines that can each produce 12,000 kilowatts, for a total output of 24,000 kilowatts. The water used at the hydro comes from the North and South Platte River(s). After flowing through the hydro, the water reenters the South Platte River. The hydro generated 175,604 MWh of electricity in 1997 surpassing the previous record, set in 1987, by 10,421 MWh.

Kearney Hydro

The Kearney Hydro was built in 1886 and has been an operational hydro since 1921, making it the oldest hydroelectric facility in the state. The hydro has one Westinghouse generator that can produce 1,490 kilowatts of electricity. In 1994, NPPD's Board of Directors decided to renovate the Kearney hydro and, following the complete rehabilitation of its generator, water turbine and control facility, the hydro generated 949 MWh of electricity in 1997 after going online midyear. With

these extensive renovations, the Kearney hydro is expected to be operational for at least the next 30 years.

Central Nebraska Public Power and Irrigation District

The following information comes from *A Journey Through the Central District* and other company documents. Central Nebraska Public Power and Irrigation District (Central) is a political subdivision of the State of Nebraska. It is governed by a 15-member board of directors elected from Gosper, Phelps, Kearney, Adams, Keith, Lincoln and Dawson counties, with directors elected to serve six-year terms. All qualified citizens in each county are eligible to vote for directors from their respective counties. Central's hydroelectric facilities are licensed by the Federal Energy Regulatory Commission.

Construction of Central's irrigation and power project began in 1936 with services beginning in 1941. The original project included Kingsley Dam, Lake McConaughy, North Platte Diversion Dam, the supply canal, three 18-megawatt hydroplants (Jeffrey, Johnson No. 1 and Johnson No. 2) and the irrigation distribution facilities. The 50-MW Kingsley Hydroplant was completed in 1984.

Central's Platte River facilities begin with its main storage reservoir, Lake McConaughy. Lake McConaughy is Nebraska's largest reservoir with a storage capacity of almost 2 million acre-feet. The lake is 22 miles long, more than three miles wide and covers 30,500 acres at maximum fill. Water released from Lake McConaughy flows through Lake Ogallala to the Nebraska Public Power District's (NPPD) Keystone Diversion Dam. At this point the water is diverted into NPPD's canal or is passed through the dam down the North Platte River. Water flowing through NPPD's system is returned to the South Platte River just above Central's Diversion Dam 50 miles east of Lake McConaughy.

Central's Diversion Dam, diverts water through the headgates of the Supply Canal, or can pass water down river. The 75-mile-long Supply Canal delivers water to Central's three main irrigation canals, E65, E67 and Phelps, which serve a total of more than 105,000 acres in Gosper, Phelps and Kearney counties, while another 7,500 acres in Lincoln and Dawson counties receive irrigation service directly from the Supply Canal.

Central's delivery system includes more than 500 miles of canals, laterals and pipelines. The E65 Canal starts just above the inlet to Johnson Lake and the E67 Canal branches off the Supply Canal just below the lake. The two canal systems serve about 48,000 acres in Gosper and western Phelps counties. Central's irrigation office in Bertrand is responsible for maintenance and irrigation service on the E65 and E67 systems.

Elwood Reservoir, which was added to the system in 1976, provides supplemental storage water to the E65 canal system. The reservoir, which is

filled prior to the irrigation season by pumping water from the river, has an operational capacity of 24,715 acre-feet and a total capacity of more than 40,000 acre-feet.

As water travels through the Supply Canal, it produces power at three remotely controlled hydroplants: Jeffrey, Johnson No. 1 and Johnson No. 2. Each of these hydroplants have an electrical generation capacity of 18,000 kilowatts. The three hydroplants are unmanned and remotely operated from the Gothenburg Control Center. With the addition of the 50,000-kilowatt Kingsley Hydro in 1984, also operated from Gothenburg, water flowing through Central's system can generate up to 104,000 kilowatts of electricity. All power generated at Central's hydro facilities is sold to NPPD for distribution to electrical customers.

Central's project also provides a wide variety of recreational opportunities and habitat for wildlife. The Nebraska Game and Parks Commission (NGPC) manages State Recreation Areas at the hydroplant lakes and the Clear Creek Wildlife Management Area at the west end of Lake McConaughy. Twenty-six lakes, ranging in size from less than one acre to more than 2,500 acres, are located along the Supply Canal, providing additional wildlife habitat.

Approximately 5,900 acres of land adjacent to Central's lakes are managed by the NGPC as State Recreation Areas and about 6,800 acres are designated as Wildlife Management Areas. Recreation areas managed by the NGPC are available to the public at Gallagher and Johnson lakes and wildlife management areas are located near Box Elder, Cottonwood, Midway and East Phillips lakes.

The Irrigation Division's three main canal systems distribute water to laterals and pipelines that deliver water to the irrigators' fields. The E65 canal begins just west of Johnson Lake and serves approximately 42,400 acres in the Loomis-Bertrand area. The E67 canal branches off the supply canal just east of Johnson Lake and provides water to approximately 5,700 acres northeast of Elwood. The Phelps canal begins at the end of the supply canal and serves approximately 57,000 acres from northwest of Holdrege to the Minden area. Laterals convey water from the main canals to the irrigators' fields. To conserve water, more than 65 percent of the approximately 475 miles of laterals are pipelines or lined canals (compacted earth, concrete or synthetic membrane). The Irrigation Division operates nine deep wells on the E65 system and three deep wells on the Phelps system. The E65 system wells enabled the use of smaller main canals. The wells provide irrigation water to the laterals on the lower end of the E65 system. The Phelps system's wells allowed some old, unlined laterals to be retired.

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Platte-related Tourism

In addition to providing irrigation water and hydroelectric power, the Platte River creates an unique ecosystem in south central Nebraska. Changing land use patterns and channelization of the Missouri River has increased the importance of the Central Flyway for migratory birds. Along the eighty-mile stretch of the Middle Platte, tourists come in the spring to view the Sandhill cranes and migratory waterfowl. In the fall, hunters come to the region for first rate waterfowl hunting. Over time, the economic impact of tourism is growing in the Middle Platte region.

Tourism Development

Tourism is often cited as Nebraska's third largest industry. In 1997, Nebraska travel and tourism expenditures were approximately \$2.4 billion according to the Nebraska Department of Economic Development (DED), up from \$1.739 billion in 1994. These expenditures represent spending by non-residents as well as residents that are at least 100 miles away from their home. Persons in these two categories combined were responsible for over 16.8 million trips in Nebraska in 1997. Employment in the travel and tourism industry is estimated at approximately 37,000 persons.

According to DED studies, the "average" nonresident traveling party visiting Nebraska by highway during the summer consists of 2.5 persons who stay 2.2

nights and spend \$171. Of those visiting the state, it is estimated that approximately 60% will stay at hotels and motels. Nebraska averaged almost a 60% occupancy rate on its 23,000 hotels, motels and bed & breakfast rooms in 1997. Five states contribute over 50% of the summer tourists to the state of Nebraska. The five states are: California, Iowa, Illinois, Minnesota and Colorado. Of the tourists or visitors to Nebraska during the summer months, it is estimated that over a third will visit some attraction or event.

Tourism promotion for the state of Nebraska has been the responsibility of DED since 1971. (Prior to 1971, the Game and Parks Commission occupied this role.) DED receives revenues from a 1% tax on lodgings. As of 1997, 51 of the 93 counties in Nebraska impose some type of lodging tax. Rates vary from a high of 4% to a low of 1%, however, the majority of counties (49) have adopted a 2% rate. According to DED, 98% of the revenues associated with commercial lodgings comes from these 51 counties. Of the 11 counties in the study area, 9 have imposed a lodging tax. Gosper and Polk counties do not have a lodging tax.

The Nebraska Game and Parks Commission maintains numerous State Recreation Areas along the Middle Platte. These are primarily day use, water-oriented facilities located on a natural lake, river, sand pit lake, or reservoir. Common activities at these sites include fishing, boating, and swimming. Some State Recreation Areas are located adjacent to the Platte, thus offering access points for canoe trips. Fort Kearny State Recreation Area, located about two miles northeast of the historical park, has a hike-bike trail to an old railroad bridge which crosses both channels of the Platte. An observation deck on the bridge provides a popular spot for crane watchers in early spring. The two most popular State Recreation Areas in the Middle Platte region are Johnson Lake, with more than three hundred thousand visitors per year, and Mormon Island, with approximately three hundred thousand visitors per year. Lake McConaughy, located just west of the study area near Ogallala, draws more than half a million visitors each year.

The Middle Platte region also contains a variety of State Wildlife Areas, including state wildlife refuges, habitat lands, and game management areas. The Sacramento-Wilcox Wildlife Management Area (2,313 acres) located in the southeastern corner of Phelps county provides an example of the variety one can find at a State Wildlife Area. Part of Sacramento is set aside as a waterfowl refuge, part is open to public hunting, and part is used as a breeding facility for Canada geese. Sacramento provides a variety of habitats. A network of dikes was built in the late 1950s to create wetlands for waterfowl. Several hundred acres are planted with strips of small grain crops to provide food for both game and non-game species of birds and animals. Extensive shelterbelts provide additional habitat for birds, reptiles, and mammals.

The Middle Platte area also contains a number of Federal Waterfowl Areas located in the counties south of the river. These tracts provide public access to some of the remaining wetlands of the Rainwater Basin. Year-to-year variation in precipitation affects the amount of water available to the migrating waterfowl. Because most of the natural wetlands in south central Nebraska have been drained, any basin with water will typically attract large numbers of birds during the spring migration. In the fall, these areas open to public hunting. The number of waterfowl and other migratory birds using the basins varies with water conditions and weather.

Crane- Based Tourism

The following information is condensed from the Platte River Nature Recreation Study prepared by Ted Eubanks, Robert Ditton, and John Stoll. Mr. Eubanks is the president of Fermata, Inc., a consulting firm which specializes in recreation studies. Dr. Ditton is a Professor of Human Dimensions of Natural Resources at Texas A & M University. Dr. Stoll is a Professor of Public and Environmental Affairs at the University of Wisconsin – Green Bay.

The study was undertaken in 1996 as part of a U. S. Environmental Protection Agency risk assessment of the Platte River in Nebraska. Wildlife watchers along the Middle Platte River (between the communities of North Platte and Columbus) were surveyed in an effort to better understand their viewing behaviors and expenditures. Wildlife watching along the Platte River is generally limited to bird watching, and survey efforts were concentrated on this specific recreation. The Platte River offers an exceptional opportunity to study bird watchers. The Sandhill Crane migration, lasting only two and a half months each spring, brings thousands of birders to a limited number of public access sites.

Measuring and valuing the monetary worth of natural resources is not easy. Methods for valuing resources may be categorized as market, hedonic (inferential) or contingent (hypothetical) valuations. Market valuation uses existing market prices as a measure of the value of a good. Hedonic valuation uses the unique attributes of a good as a measure of the value of that attribute. For example, if two houses were identical in every way except one was located on a beautiful lake and the other was five miles from the lake, the difference in selling price of the houses would reflect the value of "a view of the lake." Contingent valuation uses the presentation of a hypothetical situation followed by a set of questions to ascertain the respondents willingness to pay for a particular amenity. For example, people could be asked how much they would be willing to pay to see an endangered Whooping Crane.

Surveys were mailed to 1,963 birdwatchers randomly selected from seven different mailing lists gathered from Nebraska organizations, sites, and events. Sample populations included: crane watchers at Fort Kearny State Historical Park and Recreation Area, recreationists reserving blinds at Rowe Sanctuary, Nebraska members of the National Audubon Society, those reserving blinds at

Crane Meadows Sanctuary, members of the Nebraska Ornithologists' Union, registrants from the Spring River Conference in Kearney, and registrants at the Wings Over the Platte Festival in Grand Island. Of the surveys, 1,259 were returned in a usable form for a 64.42% raw response rate. Non-respondents were contacted by telephone, and asked a limited number of questions from the survey. The results of those interviews indicated no significant differences between their responses and those of respondents on the questions asked. This random telephone check revealed no response bias.

The survey solicited information about the demographics, expenditures, motivations, and satisfaction rates of birders who visited the Middle Platte region. The ten-page, self-administered questionnaire used a series of questions that have been used by researchers studying outdoor recreation behavior. In addition, the study probed the level of commitment for conserving wildlife habitat along the Platte, and evaluated the effectiveness of wildlife management regimes as they related to non-consumptive nature recreation. Finally, the survey attempted to determine the value birders placed on the Platte River and its wildlife resources.

The survey revealed that a travel party of birders visiting the Platte during crane season consisted of 5.19 persons. These visitors stayed in the region for 2.99 days, and spent an average of \$285 per person in Nebraska. Birders interviewed were attracted to the Platte throughout the year, not just during crane migration. They averaged 3.5 trips and spend a total of \$790.17 on their annual travels within the Middle Platte region.

Respondents had been birding for an average of 17.54 years, and had taken 7.34 birding trips for 30.91 days during the previous year. Nebraska birders traveled frequently and widely within their own state, but many birders who lived outside Nebraska visited only during crane migration. Platte River wildlife watchers resembled similar recreationists studied in other parts of the country regarding age (53), gender (balanced), income (over \$50,000) and years of formal education (over 16 years). Platte River visitors appeared to be more general nature enthusiasts than specialized birders. Only 10.7% considered themselves to be "committed." However, the respondents invested significantly in birding equipment, averaging \$1,505 as measured by replacement cost.

To estimate the Total Gross Economic Output of these expenditures, two separate multipliers (estimating induced and indirect impacts) were utilized. The Nebraska Department of Economic Development uses a multiplier of 2.7 to estimate the effects of tourism expenditures throughout the state. The more localized input/output model discussed later in this report predicts a 1.9 economic multiplier for tourism within the study area. Applying these two Nebraska multipliers to the average annual expenditure within Nebraska of \$671.72, an average respondent to the survey contributed (in direct, indirect, and induced expenditures) between \$1,276 and \$1,814 per year to the Nebraska economy.

The cumulative economic effect of birding along the Platte, regardless of where the expenditure was made, ranged between \$21.8 and \$48.5 million.

Yet, in the above estimates there is no accounting for the economic contributions of single-day visitors, nor for Platte River wildlife watchers who did not visit the Platte during the crane season of 1996 (and therefore would have escaped the population estimate). Approximately 60,000 single-day visitors traveled to the Middle Platte during the crane season. Using the Nebraska Department of Economic Development's spending estimate of \$28.90 per day for single-day visitors, and applying the state and local multipliers, day-trippers generated an additional economic output of between \$3.3 million and \$4.7 million. With this additional contribution from single-day visitors, the economic impact increased to between \$25.1 million and \$53 million.

Respondents indicated a willingness to pay an additional \$192.75 annually before they would cancel their trip. Combining consumer's surplus with the expenditures (and multiplier effects) of residents and nonresidents gives the estimated total value of wildlife watching along the Platte River between \$27.9 million and \$57.5 million.

Using contingent valuation scenarios established a significant relationship between hypothetical shifts in Sandhill Crane populations (species abundance) along the Platte River, and respondents' willingness to pay for their conservation. However, hypothetical changes in species diversity (species richness) did not influence willingness-to-pay in a significant manner. This study also revealed that the more avid the birder, the more likely the participant was to respond favorably to the scenario which called for management of the river to provide habitat, and was willing to bear the burden of the increased cost. Conversely, a respondent's higher perceived skill as a birder was negatively (and significantly) related to the willingness to bear management costs for a specific management scenario.

This research established a value for birding along the Platte River in Nebraska, and, by extension, demonstrated a value for the Platte River wildlife resources themselves. Respondents expressed a willingness to bear the cost for the conservation of Platte River wildlife, particularly Sandhill Cranes. The value these recreationists placed upon the Platte's wildlife resources would be expected to influence their future behavior. If opportunities for birding and wildlife watching along the Platte increased in the future, birders would be expected to respond with additional or more extended trips to the area. Conversely, if wildlife populations (particularly Sandhill Cranes) decreased, or birding opportunities became more restricted, the interest in traveling to the Platte River to bird would be expected to diminish. According to the Fermata study, any strategy to promote nature tourism along the Platte must be built upon a foundation of resource conservation and the expansion of recreational activities.

A Snapshot of the Average Respondent to the Survey

Using the average values reported in the survey, the typical person watching the Sandhill Cranes on the Platte would be described as a 53-year-old white female Nebraskan, who traveled with her husband or a friend, still worked, earned more than \$59,904 a year (household income), and who had completed more than 16.5 years of formal education. There were 2.34 people living at home. Even though she had birded for over 17 years, she would not describe herself as a serious birder. In fact, she considered herself less skilled than other birders in general.

During the past year, she birded 15 days in Nebraska, with 7 of those days spent on the Middle Platte. While she devoted most of her birding on the Platte to the spring (3.94 days), she also spent a little more than a day there each season of the year. She birded an additional 17 days in other states, including 1.5 days outside of the United States (24.6% of respondents traveled outside of U.S. to bird). During the past year, she took 7.34 trips away from home just to go birding, averaging 2.89 days per trip. If forced to replace all of her birding equipment, she would have to spend \$1,506. She ranked enjoying the sights, smells, and sounds of nature highest on her list of reasons to go birding.

Although she belonged to a local, state or national birding organization, she learned about the Sandhill Cranes on the Platte from a magazine or newspaper article. In 1996, she and her spouse more than likely joined a group of birdwatching friends when traveling to the Platte. However, if she had to go alone, she did not hesitate (average group size 5.39 with 56% in parties of two or less). On her most recent trip, she and her companions drove 347 miles one-way from their home to come to the Middle Platte, spending 3 days and 2 nights in the area. They devoted most of that time (2.74 days) to birding and watching other wildlife. If she traveled by air (9% of respondents), she probably transited through the airport in Omaha (43.8%) or Lincoln (39.3%).

She spent \$238 dollars (her-share) in the Middle Platte area and an additional \$48 in Nebraska during her most recent trip. She probably went to Fort Kearny State Historical Park and Recreation Area or the Lillian Annette Rowe Sanctuary (or both) to see the cranes. She would have been willing to buy additional goods and services had they been available in the area. For the most part, the cranes and other wildlife were her only interest in the area. She had a very satisfying experience, and planned to visit again within the next 12 months. However, if her average trip expense increased by more than \$130, she would likely quit making trips to the Middle Platte.

Crane Tourism Conclusions

In Spring 1996, between 14,000 and 22,715 birders and general wildlife watchers visited the Middle Platte River in Nebraska. Over 60,000 single-day tourists

traveled to the Platte as well. The economic output of these travelers upon gross output were considerable, ranging (depending upon the population estimate and the economic multiplier used) between \$25.1 million and \$53.1 million.

Platte River birders expressed a willingness to bear the cost of resource conservation along the Platte, particularly those expenses related to efforts to protect Sandhill Cranes and their habitats. In other words, Platte River birders recognized a relationship between their recreation (birding), and the resources that their activities depended upon (Sandhill Cranes and the Platte River ecosystem). Platte River birders perceived a decline in the Platte River crane population as a diminishment in value, and therefore impacts that might result in lower numbers of migrating cranes would be expected to lead to decreased visitation of recreationists.

However, respondents to the survey were less supportive of the survey's hypothetical programs to conserve or enhance wildlife diversity along the Platte, although the results (while not statistically significant) were still positive. Platte River birders were generally attracted to the river by its wildlife spectacle (the Sandhill Cranes) rather than any particular unusual or unique species. As a result, respondents valued species diversity (the number of species) less than species abundance (the number of Sandhill Cranes). In a real sense, Sandhill Cranes served as a metaphor for the wildlife of the Platte as a whole.

Platte River birders expressed high levels of satisfaction with their visits. Nearly 70% planned to return within the next twelve months. Although this survey concentrated on birders who had traveled to the Platte to experience the spring staging of Sandhill Cranes, respondents also indicated they had visited the region throughout the year. Coupled with the growth in the industry itself, Platte River tourism interests appear to be assured of a consistently expanding market and an ever-broadening set of economic opportunities if (and only if) the resources that attract these recreationists are conserved.

Yet wildlife watching, as an outdoor recreational industry, is still in its infancy along the Platte River in Nebraska. Although the appropriate nature resources are available, the strategy by which communities and individuals may take advantage of these resources and activities for the benefit of both residents and wildlife does not exist. In a real sense, the wildlife watching industry has developed along the Platte ad hoc, or without significant planning or direction.

No one anticipates that tourism will eclipse agriculture as the dominant economic stimulus in the Platte River Valley. Yet the economic impacts of alternative uses of the nature resources in the Platte River Valley accrue to different economic sectors, buffering the regional economy against the vagaries of the global agricultural products market. Since local residents also participate in these activities, the Platte River nature resources potentially contribute to the social and cultural qualities of the region. The dollars generated by hunters, anglers,

hikers, campers, bikers, and birders along the Platte River can have a tangible, measurable impact upon the regional communities that supply goods and services to these recreationists, and supply hard evidence for supporting the conservation of these nature resources in the region. Management efforts to conserve habitats for Sandhill Cranes and other wildlife along the Platte River will protect the economic viability of this important nature tourism industry as well.

Recommendations of the Platte River Nature Recreation Study

With abundant nature resources and a satisfied clientele, resulting in a growing market, the Platte River communities are well situated to expand their positions within the tourism industry. Despite this optimistic appraisal, the Platte River communities and their decision makers have a number of challenges to face before outdoor recreation and tourism become significant influences and contributors to the Platte River economy. The following are but a few of the tasks that need to be accomplished for this industry to unfold:

Comprehensive Business Development Strategy

The nature tourists visiting the Platte River are a mobile group of consumers, eager to experience a variety of destinations. As has been documented in many studies, wildlife watchers (in this case birders) are inveterate wanderers, shifting from one site to another in the quest for new wildlife experiences. In this way the Platte River Valley, the Rainwater Basin, the Pine Ridge of northwestern Nebraska, the Sandhills, the Niobrara River, and the Missouri River riparian forests reinforce each other, and present a potential nature tourism package where the whole is truly greater than the sum of the parts.

Yet without state-level cooperation and planning, these destinations are destined to operate in isolation, each site competing, rather than cooperating, with its neighbors. Therefore, Nebraska would be well served to develop a nature tourism strategy, perhaps as a joint effort of the Nebraska Game and Parks Commission and the Nebraska Division of Travel and Tourism. Other states have found such a formal approach to be extremely beneficial in coordinating the efforts of state agencies, local governments, business interests, organizations, and landholders. The recent efforts of the Nebraska Department of Economic Development to revise its Tourism Industry Development Plan should be recognized as a positive step toward coordinating the tourism interests in the state. However, it is worth noting that the Nebraska Select Committee on Tourism (SCOT) lacked, as of this report, a member from the nature tourism industry or a representative from the Nebraska Game and Parks Commission. The economic opportunities within the nature tourism market are so significant as to warrant a distinct role in these efforts to coordinate, promote, and deliver tourism products within the state.

Expanded Public Access and Opportunity

Even though the Platte River crosses the entire state of Nebraska from west to east, the river itself is difficult for the public to access. Virtually all of the land bordering the river is privately owned, and the public is limited to a few access points (such as the Fort Kearny State Recreational Area). Interstate 80 parallels the Platte River for most of its length. According to the Nebraska Department of Economic Development, I-80 is "the most traveled transcontinental highway in the U.S." The Nebraska Department of Economic Development repeats the view (held by many) that "I-80 is the state's single greatest asset for tourism. " Yet without access to the river and its resources, and with little information available regarding the few public access points that do exist, these travelers are far more likely to continue through Nebraska unchecked.

Additional turnouts and viewing points should be established along I-80. Travel information concerning the wildlife watching sites located in Nebraska should be available at all highway information offices and booths. Wildlife watching guides and maps should be developed to inform and direct tourists to the sites (and communities) of interest, and this information should be made available through a variety of media (including the Internet).

Expanded Public Education and Interpretation

Of the public sites available along the Platte within the study area, few offer the opportunity for face-to-face interpretation of the resources the sites contain. Observers are on their own, with little guidance or assistance provided by local parks (there are obvious exceptions, such as the Rowe and Crane Meadows sanctuaries). As this study has demonstrated, most of the wildlife watchers along the Platte are casual observers, not experienced nature experts or naturalists. Conservation education and information efforts along the Platte should emphasize the relationship between the health of the Sandhill Crane and other wildlife populations and the viability of the river's ecosystem as a whole. Interpretation enhances the observer's experience, increasing satisfaction levels and return rates. An expanded public education and resource interpretation program is in the best economic interest of local communities and businesses, as well as the state as a whole.

Private Land Opportunities

The land along the Platte River is largely controlled by private entities. Few of the benefits of wildlife watching now accrue to these owners. In fact, the difficulties presented by crane watchers blocking local roads and trespassing on farmlands exceed what little economic benefit the landowners may receive. Yet as the demands for outdoor recreational opportunities increase (particularly from urbanites from Omaha, Lincoln, and elsewhere), these landowners could benefit by diversifying their individual economic strategies and offering access to the river through their lands for a fee. In addition, providing viewing blinds and

photographic opportunities could expand the economic incentives for these landholders. Legislation may be required to limit the landholders' liability inherent in such visitations, as other states have enacted in recent years. Landholders along the Platte are an important component in this burgeoning industry, and efforts should be made to invest them in this expanding economic opportunity.

Resource Conservation

The economic benefits of wildlife watching along the Platte River are derived from the wildlife resources that reside there. Just as many Nebraska farmers depend upon Platte River water (a natural resource) to irrigate their crops, Nebraska tourism interests depend upon Platte River wildlife (which itself is another natural resource) to attract visitors to the state. The conservation of Platte River wildlife, particularly Sandhill Cranes, also extends protection and opportunities to the nature tourism industry.

Conversely, threats to Platte River wildlife undermine the viability of nature tourism, especially wildlife watching, along the Platte. Any strategy to promote nature tourism along the Platte must be built upon a foundation of resource conservation. An abundance of wildlife defines the Platte in the minds of many Americans, and the conservation of these wildlife resources is, in a sense, an effort to conserve the river itself. Economic sustainability may be achieved if society uses its resources wisely without depleting them. Platte River wildlife, in this sense, represents an economic inventory. Once these resources are depleted, the nature tourism business will fail. Only by protecting their wildlife resources will Platte River communities be assured of sustaining the economic opportunities associated with nature tourism into the future.

Hunting and Fishing Impacts in the Middle Platte

In addition to the impact of crane watching, Fermata, Inc. also examined the impact of hunting and fishing in the Middle Platte region. The following information is derived from the special report entitled "Wildlife-Associated Recreation Along Nebraska's Platte River," published in February 1999.

In 1996, 176,000 people (residents and non-residents) hunted in Nebraska. Of this total, 131,000 (74%) were residents, and 45,000 (26%) were non-residents. Of these hunters, 51,000 people 16 years or older engaged in migratory bird hunting in Nebraska. These hunters pursued their recreation a total of 398,000 days, for an average of 7.8 days per hunter per year. The annual total gross economic value of migratory bird hunting along the Middle Platte ranged between \$14.3 million and \$19.5 million.

In 1996, 247,000 freshwater anglers fished the waters of Nebraska. Of this total, 187,000 (76%) were residents, and 60,000 (24%) were non-residents.

Freshwater anglers spent 3,004,000 days fishing in Nebraska in 1996, for an average of 12 days fishing per year. Of this total number of days fishing, 88% involved residents with the remaining 12% attributed to non-residents. The annual total gross economic value of fishing along the Middle Platte in Nebraska ranged between \$28.4 million and \$38.8 million.

Combining migratory bird hunting and freshwater fishing in the Middle Platte River of Nebraska (by both residents and non-residents), the annual total gross economic value to the region from these wildlife-associated activities in 1996 extended from a low estimate of \$42.7 million to a high estimate of \$58.3 million.

In the initial assessment of the economic value of wildlife watching along the Platte River, the survey results indicated that, depending on the economic multiplier used, the annual gross economic value of wildlife watching along the Middle Platte River ranged between \$27.9 million and \$57.5 million. Now, combined with the contributions of hunting and fishing, the cumulative annual gross economic value in 1996/1997 of wildlife-associated recreation in the region is projected to have ranged between \$70.6 million and \$115.8 million. Even at its most conservative estimate (with cautious estimates of participants, economic stimulation, and equipment-related investments), wildlife-associated recreation along the Middle Platte must be recognized as an industry of significant economic importance and potential.

Data sources included information from Nebraska Game and Park Commission, U.S. Fish and Wildlife, and interviews with hunters, anglers, and other recreationists. Within the resident population of this region, 25% fished and 14% hunted, which are higher than the national averages of 17% and 7% respectively. While a variety of hunting opportunities exist along the Middle Platte, the focus of the study was aimed at migratory waterfowl hunting. In studying the impact of fishing, an assessment of the value of that recreation along the Platte River would be deficient without including Lake McConaughy, which technically lies just west of the study area. All fishing numbers included in this report include activity at McConaughy.

**Wildlife-associated recreation's total economic value for
Nebraska's Middle Platte Region**

Recreation	Amount	1.9X Multiplier	2.7xMultiplier
Hunting	\$ 7.53 million	\$14.3 million	\$19.5 million
Fishing	\$14.95 million	\$28.4 million	\$38.8 million
Wildlife watching	<u>\$14.68 million</u>	<u>\$27.9 million</u>	<u>\$57.5 million</u>
Total	\$37.16 million	\$70.6 million	\$115.8 million

While the first objective of the Fermata study was to add fishing and hunting impacts to the wildlife watching impacts discussed earlier, its primary objective was the development of recommendations concerning tourism opportunities that decision-makers could consider in a timely fashion.

Recommendations from the Fermata, Inc. study:

Education

To "make the most" of what Nebraska has, and to market its appeal to others, the State must first educate (expose) its own populace to its natural, cultural, and historical assets and the life-enhancing opportunities these resources represent. As one high school senior stated in a recent New York Times article, as he commented on the criteria he had adopted for selecting a college, "one of my main criteria--leaving Nebraska." Yet, as one Nebraska official commented during an interview for this study, "our students know more about the rain forests in South America than the prairies in Nebraska." Would this same student be as eager to leave if he engaged in the incredible variety of outdoor and nature-related recreational opportunities afforded by his native state?

By exposing the residents of Nebraska to the natural wonders within their home state, what on one hand might appear routine and mundane suddenly becomes inviting, even exotic, on the other. The Ponderosa Pines of the Pine Ridge, the braided channels of the Platte River, the dappled Sandhills with their crystalline lakes, and the lush prairies along the western border are as far removed from cornfields, feed lots, and packing plants as Omaha, Nebraska is from Quito, Ecuador. What Nebraskans must realize is that other worlds are only a short step away, and one not need travel to Ecuador (or Colorado, California, or Texas, for that matter) to experience nature in its most pristine and untarnished form.

The grand massing of Sandhill Cranes along the Middle Platte cannot be characterized as a subtle event. Even the most inexperienced observer cannot help but participate in this marvelous gathering. In the same way, waterfowl hunting along the Platte is suitable for the most inexperienced shooter. For the novice hunter, waterfowl hunting along the Platte offers an excellent

apprenticeship. The game is plentiful, and guided hunts allow easy entry into this sport.

Nature in the Great Plains, now absent the immense herds of bison, wapiti, and antelope, is often understated, even transparent. But such subtlety only requires an observer to look a bit closer. In addition, what may be ordinary to rural residents may be rare, even exquisite, to urbanites. As Americans continue to migrate to the cities, the need to "get away," to enjoy the sights, smells, and sounds of nature, will increase proportionately. The sight of a Bald Eagle scattering the ducks roosting on the Platte River in the early morning mist, while hardly a rare event, will stir even the most hardened of souls.

By exposing the populace to the magic of nature (if you doubt the magic, have someone tell you the story of the blowout penstemon, endemic to the Nebraska Sandhills), a foundation for outdoor recreation and resource valuation is invariably laid. Until that time, Nebraska will continue to be a state where "pride of place," an obvious characteristic of the residents of adjacent states such as Colorado and Minnesota will be invested only in its college football team. Nebraska will continue to be a state where young people will be convinced "there's a lot happening in the world that isn't really happening in Nebraska."

Recommendation: Emphasize the environmental, cultural, historical, and recreational resources of Nebraska to its residents through the education system, media, and promotional campaigns (such as public service announcements on radio and television). Develop a broad media campaign to educate the public as to the outdoor recreation opportunities in the State. Establish a goal of emphasizing "Pride of Place" in Nebraska, perhaps using the "Texas - It's Like a Whole Other Country" campaign as a model.

Promotion

In the eyes of the experiential tourist, Nebraska, absent the Sandhill Crane migration, appears to hold little interest. Unfortunately, only a few know this not the case. Nebraska is blessed with a rich inventory of nature, cultural, and historical assets. Yet Nebraska, in the eyes of the potential tourist, must make its case before it can be to be considered a destination against competition such as Florida, California, Colorado, or Texas.

Perhaps Nebraskans have yet to acknowledge to themselves that this diversity of nature resources exists within the State. Perhaps Nebraskans do realize this diversity, but would rather keep access to these resources limited to themselves. More likely, Nebraskans have yet to grasp that the "Genuine Nebraska," those authentic natural, cultural, historical, and recreational assets scattered throughout the State, holds the most appeal for the tourists and travelers who now see Nebraska only as a thinly populated, monotonous pasture.

In 1997, Texas spent \$25.1 million on promoting tourism through its tourism office. Illinois spent \$35.3 million, and Hawaii (understandably) invested \$27.7 million in tourism promotion. The 1997 budget for the Nebraska Division of Tourism totaled \$2.7 million, and ranked 46 out of 48 reporting states. Nebraska exceeded only Rhode Island and North Dakota in its tourism investment, and suffered even more when compared to neighboring Midwestern states such as Iowa (\$5.4 million), Kansas (\$4.25), and Missouri (\$13.2 million). Even South Dakota invested nearly double (\$4.21 million) Nebraska's tourism budget. There are zoos in the U.S. that spend more on promotion than Nebraska.

In fairness to the Nebraska Division of Tourism, in recent years outdoor recreation and nature tourism have become important priorities. The 1996 Nebraska Tourism Industry Development Plan suggested a number of recommendations concerning nature and cultural tourism. In October 1998, the theme of the Nebraska Tourism Conference was "Nebraska's Great Outdoors." Most recently, the Division of Tourism adopted the "Genuine Nebraska" marketing theme (and what could be more genuine than nature?). Yet the present level of funding, in the professional opinion of Fermata Inc., is simply inadequate to allow Nebraska to even begin to compete within the experiential tourism market. Nebraska possesses the resources. Nebraska possesses the talent. What Nebraska is lacking is the investment to take advantage of this expanding market.

Recommendation: Greatly expand the budget of the Nebraska Division of Tourism, allowing this agency to effectively compete with adjacent Midwestern states and other states that have chosen nature tourism as a primary marketing focus. Through the office of the Governor, establish a nature tourism and outdoor recreation working group comprised of representatives of the Nebraska Division of Tourism, the Nebraska Department of Economic Development, the Nebraska Game and Parks Commission, the Nebraska Department of Agriculture, the Nebraska Natural Resources Commission, the Nebraska Department of Roads, the Nebraska Rural Development Commission, the University of Nebraska and representatives from related non-governmental organizations (NGO's) to devise a cohesive strategy for advancing nature tourism and outdoor recreational opportunities in the State.

For example, the Nebraska Department of Roads will oversee the distribution of TEA 21 (Transportation Equity Act for the 21st Century) funds in Nebraska. Enhancement provisions in TEA 21 allow funding for trail development (both motorized and non-motorized) and the establishment of welcome centers through the scenic and historic byways program. Why not use TEA 21 funds to develop a nature trail along 1-80, attracting transient travelers to slow their rush through the State and allow them to enjoy many of the lesser-known natural sites along the Platte? Cooperation between the agencies would lead to a more efficient use of

these federal funds for enhancing nature, cultural, historical, and recreation tourism in the State (particularly at the local community level).

In addition, provide expanded funding and technical support for those communities wishing to take advantage of their nature resources and develop their own nature tourism strategy. Many rural communities simply lack the expertise to develop such strategies, and are often unable to compete with larger cities for grant dollars. Nature tourism development must be a community-driven effort, yet small rural areas inevitably reach moments when they require outside nurturing, assistance, and guidance.

Political Will and Commitment

Few topics are more likely to attract the ire of government agencies or personnel than to question their political will or commitment to a specific effort or cause. Yet, taking advantage of our role as outsiders, that is precisely our conclusion as it relates to what seems to be a rather significant disconnect in Nebraska between local community interests and the political response to those interests (in particular, related to nature tourism). Nebraska is not exempt from the global economic and social changes that all states will experience in the next century. Creative, innovative solutions demand creative, imaginative leadership. Such guidance, risky as it may seem, is required from leaders throughout the State, from the Governor's Office to agency heads, from university departments to chambers of commerce, from industry executives to conservationists. But nature tourism is not a risk; nature tourism is an opportunity! The brightest and most innovative of leaders will be needed to recognize these phenomenal opportunities.

Recommendation: Nature tourism needs champions in Nebraska. For example, during the past decade, under two governors from separate parties, Texas has been blessed with political leaders who were willing to speak to the value of tourism in the State, particularly tourism related to nature, culture, and history. In Nebraska, these voices have been silent, and without a clear message delivered from statewide leaders, tourism will continue to receive short shrift in the State.

Conservation and Restoration

No evidence is more vivid as to the positive effects of conservation than the North American Waterfowl Plan. From a concern about the continued viability of waterfowl populations within the Great Plains, conservation efforts have allowed these populations to restore to levels not seen in recent decades. In one highly publicized case, that of the Snow Goose, populations have grown so massive that extensive damage is being done to their fragile breeding grounds in the Nearctic tundra and population controls are being implemented. Conservation in this century has proven that when there is a will, there will always be a way.

Yet in Nebraska, perhaps due to the long-standing feuds over the Platte River, Fermata Inc. has perceived wills and ways to be invariably at odds. In the years that we have worked in Nebraska, we cannot recall a single public meeting where the lines of battle were not quickly drawn. For example, any results from our research that suggested values for the Platte River other than for those related to agriculture were immediately questioned and criticized by the agricultural interests. Conversely, when we suggested that certain agricultural practices might actually benefit waterfowl watching along the Platte, the conservationists who praised our economic valuations were shocked with the contention that agriculture might be a contributor to that recreational value.

Tourists make no distinction between the various components that contribute to their travel experience, or even know about the disputes that may embroil their destination. All a tourist returns home with is a general sense of satisfaction or displeasure with their trip. The fact that Sandhill Cranes feed in the corn fields during the day is relevant only in the sense that such behavior allows for rather intimate looks at the birds. The fact that migratory waterfowl roost in the shallows of the Platte River is important to a hunter only in that such refuge provides hunting opportunities in other areas of the Middle Platte.

In this sense, the various local principals, always appearing locked in interminable battle, are in fact married by a common interest. Nebraska can only benefit from a diverse and vibrant economy. Tourism, presently the third most significant industry in Nebraska, has only barely been tapped (as evidenced by the tourism promotion budgets listed above). Experiential tourism (nature, cultural, historical) is among the fastest growing sectors in the world, and Nebraska possesses the resources necessary to compete within this global market. Rather than threaten a rural way of life, experiential tourism, in fact, is one industry that allows communities and individuals to maintain their chosen life styles. All one must remember is that, in the end, tourists go home!

Nebraska has treated its tourism as an afterthought, not as an opportunity to expand and diversity the State's economy. Yet what evidence exists that nature tourism and agriculture (or any other industry, for that matter), cannot find ways to coexist or even compliment each other's interests. For example, the three largest timber companies in East Texas, owning a combined six million acres of timber lands, are now working with the Texas Parks and Wildlife Department on ways to provide recreation on parcels of their lands. There are private landowners in many states working to diversify their economic strategies by adding recreation and tourism to their traditional mix.

Yet to accomplish such a lofty goal, one cannot avoid the reality that the nature resources must be protected for such a diversification to be possible. In blunt language, without nature there are no nature tourists! The challenge is to find that fine line, that balance, which allows traditional industries to continue while

conserving the resources necessary for travel and tourism to flourish. Without cooperation, such a balance will be achieved only through governmental mandate (a resolution that may not be sustainable). Until that cooperation is achieved, Nebraska will continue to ride the seesaw, with the heftiest party in any issue always capable of flinging the lightweights from their seats.

Finally, this is not a static economic market. Other states are aggressively pursuing nature tourism, and Nebraska, rather than running in place, is actually losing ground. The Middle Platte River is internationally renowned, so Nebraska has its own version of the Everglades or the Blue Ridge Mountains on which to construct this industry. But time is of the essence, and Nebraska cannot continue to keep pace without a clear, substantial, and resolute commitment to education, exposure, promotion, restoration, and conservation. Without such steps, nature tourists will continue to view Nebraska as the "topographically challenged" space between the Great Lakes and the Rockies – the heart of the Great American Desert.

Recommendation: The recently negotiated cooperative agreement for the management of the Platte River between Colorado, Wyoming, and Nebraska has given the warring parties some hope that the days of incessant battle over the Platte are finally coming to a close. Yet the hands of government and the courts still hold the Sword of Damocles that swings precariously over the heads of the various negotiators. For nature tourism to succeed along the Platte River (or elsewhere in Nebraska), each vested interest must look beyond their most immediate and parochial interests to what is ultimately best for Nebraska and its residents. In truth, no one's ox need be gored in order to develop a socio-economic and conservation strategy that allows each interest to pursue its goals.

Perhaps the solutions will originate outside the State. Perhaps people for whom Nebraska is simply a featureless shape on a map will generate the resolutions. The solutions, however, need to be grounded in trustworthy information about the resources and activities these efforts are being focused on. The lack of consistent, defensible, and broad-based information about the relationship between the people and their River through recreation and tourism is disconcerting, even indefensible. Nebraska simply must commit itself to coordinating its data gathering efforts, and ensuring that management, policies, and economic decisions relating to the River are based on fact, not faulty, flawed data, flimsy suppositions or someone's imagination.

Nature tourism is a valuable economic and conservation tool. Through nature tourism and recreation, communities and landowners are able to diversify their economic strategies. Through nature tourism and recreation, conservation is provided a means of paying for itself. No threat to anyone's status quo is embedded in these conclusions, only potential and opportunity. The sooner the various Nebraska Platte River interests place their biases, distrusts, and enmities aside, and accept the economic and conservation opportunities that are standing

before them, the sooner the Platte River and Nebraska will rise to its rightful recognition as one of America's natural treasures.

Non-Survey Based Information Lodging Tax Evidence

The preceding information, developed through the Fermata surveys, gives an estimate of the impact of nature-based tourism. Surveys are always subject to a variety of criticisms, so it is important to see if other evidence supports the survey results. In this particular case, it is possible to find non-survey evidence of the economic impact of crane watchers by examining changes in lodging tax revenue. The following discussion is an update of the lodging tax example first developed in the 1996 Baseline Report.

Because crane watching is dispersed over a multi-county area, estimating the number of participants is difficult. Clearly, however, most crane watching activity is concentrated in the Kearney - Grand Island area. This is due to the lodging accommodations available, the number of cranes in this immediate area, and the availability of crane viewing blinds and public access areas. Fort Kearney State Historical Park provides a popular crane watching location. In 1994, 9,654 people visited the park during the crane-watching season. Visitors came from forty different states and seven foreign countries. In 1995 the number of visitors dropped to 8,291, probably because of an unusually cold, wet spring. With the exception of the down year in 1995, Fort Kearney has witnessed a 20 percent yearly increase in crane watchers during the past decade. Rowe Sanctuary has witnessed a similar pattern, increasing from 850 crane watchers in 1990 to 4050 in 1997. Crane Meadows Nature Center has seen even greater increases, jumping from 747 on-site visitors in 1993 to 13,800 in 1996.

One indicator of the number of visitors to the area is the amount spent on lodging. In Nebraska, communities have the option of enacting a lodging tax. By examining the pattern of lodging tax receipts, one can determine seasonal and yearly patterns and trends. By comparing lodging tax receipts in various counties, one can isolate the effect of a local amenity. For example, most crane watching is localized in the Big Bend Region of the Platte. While a small number of cranes arrive as early as February, the majority of cranes, and crane watchers, arrive in the area in March. By comparing the lodging tax receipts from these two counties with other counties outside the crane watching region, it is possible to determine whether or not there is a statistically significant tourism effect for March.

Nebraska County Lodging Tax

The Nebraska Visitors Development Act, enacted in 1980, imposed a one percent State lodging tax on all hotels, motels, campgrounds, and bed & breakfast establishments. The Act also granted authority to each county to collect a lodging tax at all commercial lodging facilities. By 1997, 51 counties had adopted a local lodging tax. This is politically popular tax because most of

the revenue collected comes from visitors, not from residents of the county. All tax collections are sent to the Department of Revenue, which retains the State lodging tax, takes 3 percent of the county tax to cover administrative costs, then returns 97 percent of the county tax back to the county of origin.

Lodging Tax and Seasonal Visitation Patterns

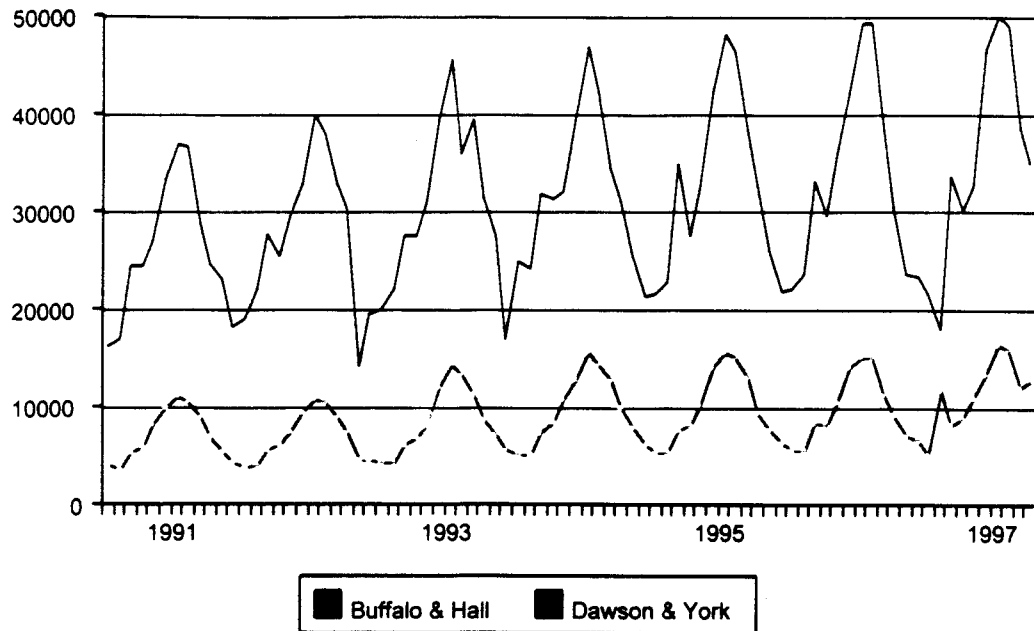
There are significant incentives for lodging establishment operators to send tax collections to the Department of Revenue in a timely fashion. They receive collection fees if they send the tax receipts to the Department of Revenue within 25 days of the calendar month in which the lodging tax was collected. Therefore, lodging tax collections correspond closely with the time each visitor was in the area. The Department of Revenue is able to identify the month in which the tax was originally paid by a customer.

Most Nebraska counties, particularly those along Interstate 80, have a strong seasonal pattern in lodging activity. Much of the local tourist traffic is merely pass-through traffic on the way to other destinations. Thus, winter months produce little tax revenue, revenues increase during the spring, reach a peak in July and August, then decline in the fall. Because the tax is assessed as a percentage of room cost, and because room rates vary according to quality, location, and time of year, it is impossible to determine the exact number of rooms generating a specific tax amount. However, the general seasonal pattern is evident across a variety of counties. It is reasonable to assume that seasonal room rates are changing in a generally similar pattern throughout the region.

Lodging Tax Evidence

Because the lodging tax is collected by the Department of Revenue in a reliable and consistent manner, changes in the pattern of visitors to various Nebraska counties can be tracked. To determine whether there is an identifiable tourism effect in March, a regression model is used to compare the pattern of lodging tax in Hall and Buffalo counties with two other counties. Dawson and York counties, located on either side of the study area, were selected for this comparison because they capture the normal Interstate 80 traffic flow just outside the crane viewing region, thus providing an appropriate benchmark. The following graph illustrates the monthly lodging tax pattern for these two pairs of counties from 1991 through 1997.

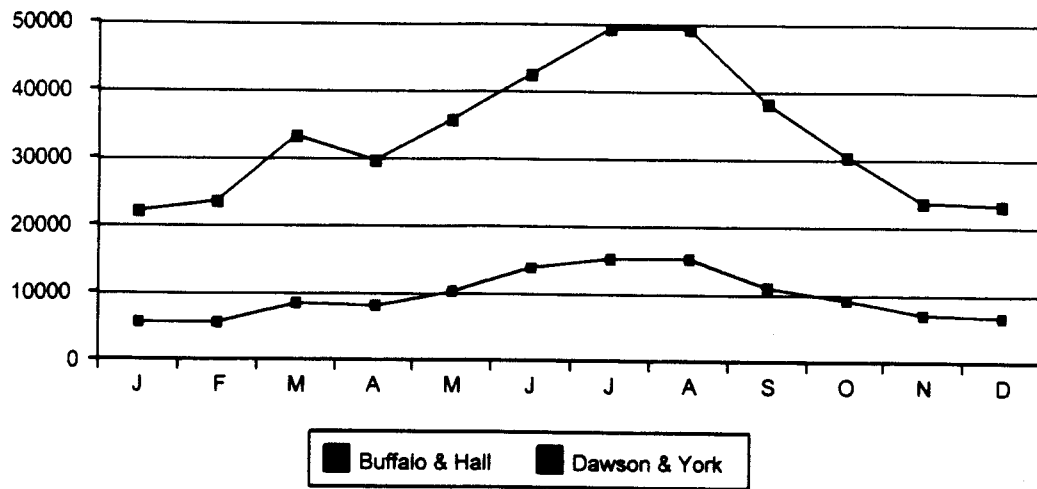
Monthly Lodging Tax, In Dollars 1991-1997



Source: Nebraska Department of Revenue

As is obvious from the graph, there is generally more lodging activity in Buffalo and Hall counties than in Dawson and York counties. Visually, one notices the strong seasonable pattern discussed earlier. A visual examination also reveals a March upturn in Buffalo and Hall counties that is not present in Dawson and York counties. By examining the graph of an individual year, this March upturn is very apparent.

Monthly Lodging Tax, in Dollars 1996



Source: Nebraska Department of Revenue

Using multiple regression, patterns from the two pairs of counties are compared. Regression analysis indicates that there is a strong statistical correlation between the two data sets. The specific regression results are presented in the following table.

Lodging Tax Regression Results

Dependent Variable - Buffalo & Hall County Lodging Tax
 Independent Variable - York & Dawson County Lodging Tax

Regression Statistics

Multiple R	0.950	Standard Error	2842.01
R Square	0.902	Observations	178
Adjusted R Square	0.900		

Analysis of Variance

	df	SS	MS	F	Significance F
Regression	3	12919344020	4306448007	533.17283	1.90986E-87
Residual	174	1405401608	8077021		
Total	177	14324745628			

	Coefficients	Standard Error	t Stat	P-value
Intercept	7524.4804	512.6206	14.6785	2.9202E-32
Dawson & York	2.5043	0.0637	39.3011	1.8709E-88
March Dummy Intercept	396.1755	2499.8508	0.1585	0.87426265
March Dummy Slope	0.6871	0.4371	1.5721	0.11774715

These results indicate a statistically significant March tourism impact at the 95 percent confidence level. Using a March "dummy" slope to isolate the critical month, the results show that regression line passing through the March data has a different intercept than the overall regression and a different slope. (99 percent confidence level)

While there clearly is a statistically significant deviation from the general lodging pattern in March, can this impact be reasonably attributed to crane watching activity? In Hall and Buffalo counties, the only major non-crane related event during this period is Thoroughbred Horse Racing at Fonner Park in Grand Island. The racing season runs from March 1 through May 15. Thus, if horse racing visitors were determining the lodging tax pattern, there would not be a substantial decrease in April. Additional support comes from an examination of the pattern of attendance at state parks and recreation areas. For example, Fort Kearney State Park, one of the most popular crane watching sites, receives approximately 60 percent of its visitors during the summer months. Sherman County Lake, located just north of Buffalo County, receives more than 80 percent of its visitors in the summer. Lake McConaughy, located west of the crane-watching region, receives 75 percent of its visitors during the summer. The pattern of park attendance, like that of lodging tax, differs in the crane-viewing area.

The increasing interest in crane viewing presents a significant economic opportunity for south central Nebraska, particularly in Buffalo and Hall counties. Because the crane viewing does not occur during the summertime peak of motel use, it presents an opportunity to more efficiently use the existing motel space. As the number of crane watchers increase, their economic impact on south central Nebraska will become more important.

For decision-makers, the new opportunities presented by nature-based tourism must be evaluated in terms of regional economic impacts. To accomplish this, Dr. Ron Konecny of the University of Nebraska at Kearney developed a computer model of the eleven-county Middle Platte Region. This model, as described in the next section, allows an individual to develop a scenario and trace its economic impact on the region in an interactive manner. In addition to tracing the impact of tourism, the model also tracks the effects of changes in agricultural patterns.

Regional Sectoral Model

The following information is derived from the Middle Platte Regional Sector Model by Dr. Ron Konecny, Associate Professor of Management/Marketing at the University of Nebraska at Kearney.

The sectoral model developed in this project focuses on the inherent connection of water with community development and economic activity in south central Nebraska. Given the nature of the issues being considered in regard to the Platte River, input/output analysis provides decision-makers with a measure of the trade-offs and opportunities resulting from allocation decisions and development options.

As a modeling tool, input/output analysis is able to identify economic impacts of actual events or proposed scenarios. The thirty-four sector 'demand-side' model developed for the Platte Watershed Program included in the Baseline Report was updated with more recent information and was modified to permit dynamic multi-year impacts. To increase confidence in the model, an accompanying technical document was developed and an independent evaluator reviewed the model. The updated model was also adapted to operate in a Microsoft Excel spreadsheet environment to facilitate use of the model by non-specialists and to encourage decision-makers to evaluate impacts in an interactive manner.

By design, the model focuses on Middle Platte economic impacts caused by changes in land use, changes in agricultural practices, changes in consumptive tourism, and changes in non-consumptive tourism. The economic linkages associated with these components have been well documented through numerous studies. A dynamic component was built into the model to facilitate tracking multi-year impacts on the economy. This component enables a decision-maker to phase-in or ramp-up particular changes over time. For

example, net farm income may be averaged over time. A certain year may see exceptional net farm income, however, the excess income earned in one year may be spent over a multi-year period. In addition to the time dynamic component, multiple types of impacts can be evaluated simultaneously. Impacts from the reduction in irrigated cropland revenues may be partially offset by an increase in dry-land crop revenues or by grazing revenues.

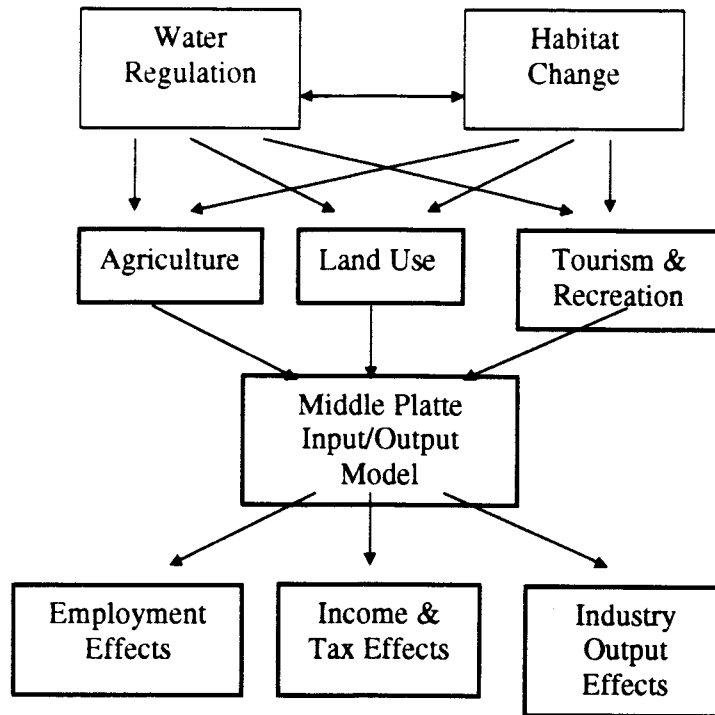
Tourism comes in a variety of packages. Hunting, fishing, bird watching, and outdoor recreation create different expenditure patterns and have substantially different effects on the Middle Platte economy. Detailed information regarding these activities has been included in the model. The existing model uses the expenditure patterns identified in the Fermata regional studies. If future studies find that these expenditure patterns have changed, the model can be modified to incorporate the new information.

Due to the scope and design of the model there are a variety of impacts that are not addressed. These include the impact of flood control, changes in municipal and industrial water demands, changes in instream flows that affect power generation, changes in habitat, and changes in land valuation. Though such impacts are of concern, it would require the construction of a different model to capture these interrelated activities on a local and regional level.

The impacts of the model are measured in only one direction. That is, the impact of nature based expenditures on the regional economy is measured, the impact of changes in tourism stemming from changes in the regional economy are not. The model does not assert or infer any linkages from the general economy to land use, habitat change, or water regulation policy. In other words, water regulation, land use, and habitat change are viewed as exogenous variables to the model. For example, the current law regarding conjunctive use of ground and surface water in determining water usage is the result of a political process, not as the result of model estimation.

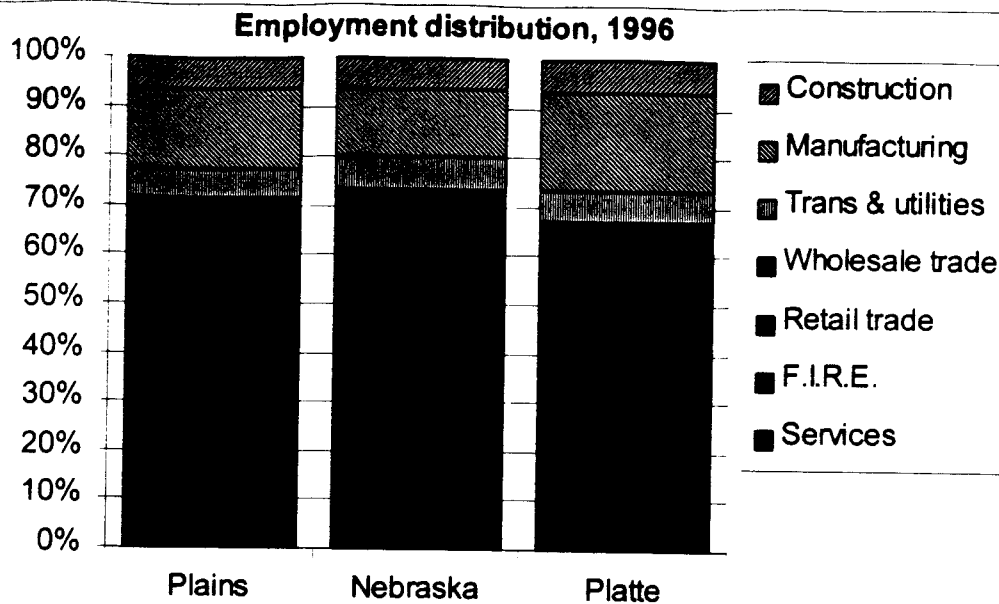
There is considerable historical information concerning some of the model linkages. For example, the importance of agriculture to the local economy is well documented. However, other linkages are more problematic. While there is some type of linkage between habitat change and tourism, the exact nature of this particular linkage is not currently established for the Middle Platte. Regional models are designed to emulate local economic activity. In this emulation process, it is possible to estimate the benefit derived from past activity and forecast such benefits into the future. In particular, input/output models generally estimate changes in employment, personal income, industry (sector) output, and net taxes. The following illustration shows the flow of information through the model. The linkages between water regulation, habitat change, agricultural practices, land use, and bio-diversity are best understood by the landscape ecologists. However, given that there are changes in each of these areas that

can be quantified, it is possible to measure the impact of these effects on the regional economy.



1996 Economic Baseline

A region's particular economic performance depends upon its resource endowment, human capital, diversity and integration over time. By examining the distribution of employment across the Middle Platte region it is possible to see how the region compares with the state and surrounding states. The following table illustrates that the Middle Platte region is generally similar to the larger regions. Essentially, the distribution of employment shows that Middle Platte region is not deficient in any particular area.



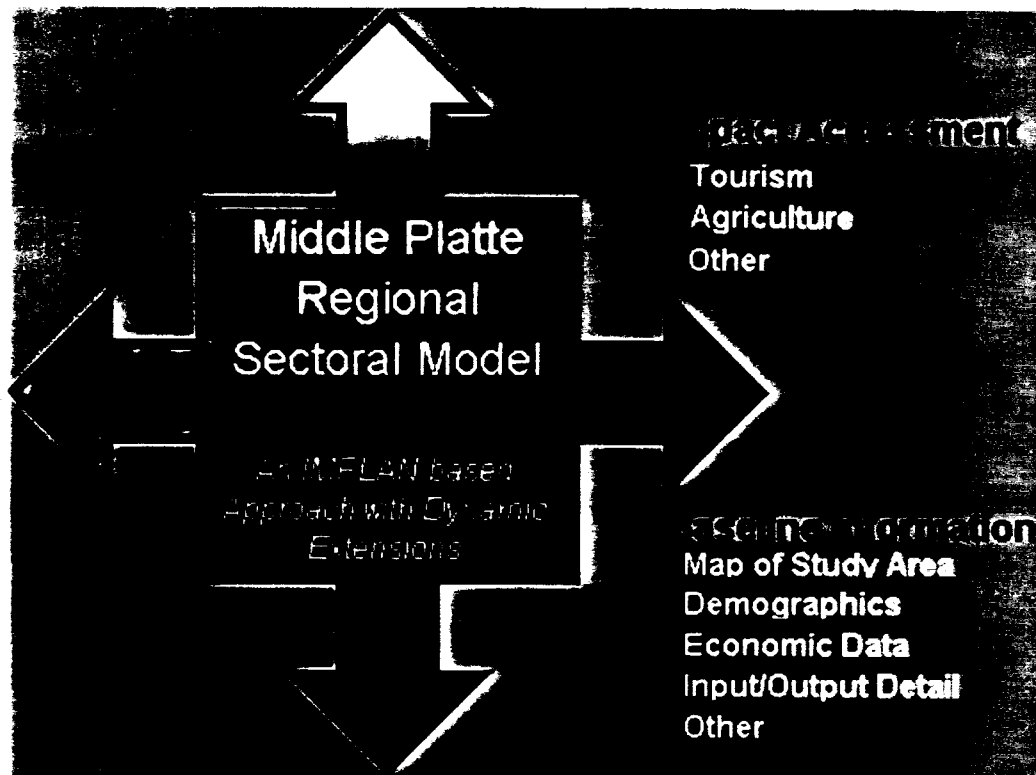
Total employment in the region varies as the local economy moves through economic cycles. The national growth years of the 1980's did not reach this region until 1987. A troubled banking industry and a long-term farm crisis had a dampening effect on all industries. Since 1987, there has been a strong and steady increase in employment in all sectors of the economy, especially agriculture. What is of particular interest is that the proportion of employment in the different economic sectors remained relatively stable during both growth and recessionary periods.

What Is the Multiplier for This Region?

Everyone understands that any initial change in a local economy will start a ripple of additional activity. Every Chamber of Commerce uses the idea of a multiplier to explain the impact of new business activity. Though a single multiplier can be calculated for an entire system it is of little worth and is often misapplied. Such use of a multiplier may be compared to asking, "What is the average age of a Nebraskan?" Though this number could be calculated, it would be of little use. A better question regarding age would be "What is the average age of a person who purchases clothing from my store?" The answer to such a question could be of great value. Input/output analysis calculates a great many multipliers. For each of the 34 sectors, the model can calculate industry output multipliers, income multipliers, final demand multipliers, and employment multipliers. Input/output multipliers are unique to the specific type of impact being investigated. For example, the income multiplier for a hunting trip is different from a fishing trip because the expenditure patterns for both activities are not exactly the same. The employment multiplier for a birding trip taken by a local resident, a birding trip taken by a state resident, and a birding trip for a non-Nebraskan are different.

Using the Sectoral Model

The open ended nature of the Middle Platte Sectoral Model permits a variety of impact estimations. To actually use the model, go to <http://platteriver.unk.edu>. The following graphic illustrates the introductory page of the model. On the opening screen the user may choose to run a tourism impact or an agricultural impact. Tourism impacts include hunting, fishing, and bird watching. Agricultural impacts are designed to identify changes in farming operation and land use. The model is designed to be interactive, and will provide guidance necessary for an inexperienced user. The data incorporated in the model comes from the previous Platte Watershed Program studies and other established sources. For example, the expenditures pattern included in the tourism impact scenario is derived from the Fermata, Inc. Platte River Nature Recreation Study. The agricultural costs are derived from the annual University of Nebraska at Lincoln's Institute of Natural Resources' publications on farm operating costs in the state. The model allows a non-specialist to develop specific "what if" scenarios to estimate a variety of impacts from possible changes in the Middle Platte region.





Tourism

Evaluate the following activities

Hunting

Fishing

Bird Watching

Return to Introduction Page

Estimation of Tourism impacts in the Middle Platte region requires the following steps.

- Choose Hunting, Fishing, or Bird Watching in the above list by clicking on the appropriate word with the mouse.
- Multiple columns of provided to permit multiple year impacts.

Activity Name

Year

Activity Expenses

Food & Lodging

Transportation

other expenses

Total

Hunting	
Year	1996
Food & Lodging	9.93
Transportation	8.99
other expenses	5.78
Total	24.70

Activity Name

Year

Activity Expenses

Food & Lodging

Transportation

other expenses

Total

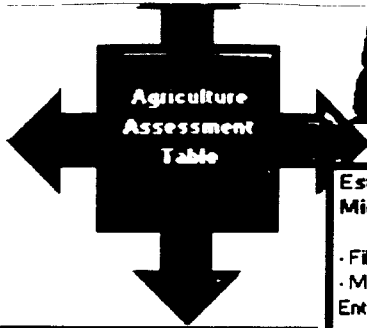
Fishing	
Year	1996
Food & Lodging	9.93
Transportation	8.99
other expenses	5.78
Total	24.70



Tourism Birding

Return to Tourism Assessment Page

Activity Name	Bird Watching		
	<i>Within NPSRA</i>	<i>Nebraska Non-NPSRA</i>	<i>Outside Nebraska</i>
Residence of Birder			
Year	<i>1996</i>	<i>1996</i>	<i>1996</i>
Number of Tourists(trips)			
EXPENSES PER TRIP			
Transportation Expenses			
Air/Train/Bus fares	1.53	0.37	33.11
Personal Vehicle/Fuel	19.92	23.58	29.24
Rental Vehicle/Fuel	2.16	1.52	12.63
Lodging			
Hotel/Motel	34.68	29.98	102.62
Bed and Breakfast	2.70	1.36	2.16
Camping	0.78	1.54	0.98
R/V Park	0.08	0.10	0.57
Food			
Restaurants	30.01	28.87	69.62
Groceries(snacks, ice ...)	6.44	7.37	11.98
Miscellaneous			
Equipment	3.27	1.29	16.56
Souvenirs	9.41	6.97	24.43
Entrance/Registration fees	7.63	6.40	16.09
All other expenses	1.36	5.06	14.66
Total	119.97	114.41	334.65



Agriculture

Estimation of agricultural production impacts in the Middle Platte region requires the following steps.

- Fill in Table A. Press the 'Display Results' button to view impacts.
- Multiple columns of provided to permit multiple year impacts. Enter appropriate values for expenses as well as the number of acres effected.
- For changes in land use, enter a positive number of acres for the new use and a negative number of acres for the old use.
- Acreage change is relative to the base year. Year to year changes in acreage can be treated accumulatively in the 'acres changed'.

Return to Introduction

Display Results

Land Use Name	Examples		Impact Ent
	Pivot	Dryland	
Year	1996	1996	
Acres changed	3200	-3200	
Production Expenses(per acre)			
Fuel & Lubrication	35.40	7.33	
Repairs on Power Equipment	12.53	5.41	
Repairs on Implements	11.93	4.05	
Seed Corn	28.94	14.91	
Fertilizer	35.75	17.50	
Chemicals	18.69	7.32	
Custom Labor	30.10	14.30	
Interest on Operating Capital	11.56	4.72	
<i>Operation Cost Subtotal</i>	184.90	75.54	
<i>Overhead</i>	9.95	4.23	
Real Estate Taxes	20.00	12.00	
Land Interest	49.69	40.25	
Irrigation Interest	23.52		
Irrigation Depreciation	37.40		
<i>Land Subtotal</i>	130.60	52.25	
Machine Interest	24.85	20.91	
Machine Depreciation	33.88	28.05	
<i>Machine Subtotal</i>	58.73	48.96	
Unallocated costs	27.51	15.56	
Total Cost/acre	411.69	196.43	
Expected Yield	135.00	65.00	
Total Cost/bushel	3.05	3.02	

Public Attitudes and Awareness

Community Surveys Report

The following information is derived from a special survey undertaken by Dr. John Allen, rural sociologist at the University of Nebraska at Lincoln. This project was designed to provide insight into small communities adjacent to the Platte River in Nebraska. Multiple methodologies were used to develop a database to examine how these small town residents view their community, its relationship to other communities and, to the management of a natural resource base, the Platte River.

Historically, the communities studied had similar populations. The base population for each of these communities began their development with several hundred residents. Timing of settlement was also similar among the communities. The railroad brought settlers and the end of the Civil War provided additional impetus for the movement of settlers to the Great Plains. Yet, while population size and settlement timing were similar, the range of diversity among the communities was great. Communities often were separated by ethnicity. German residents dominated communities such as Cedar Bluffs and Scottish and Irish settlers formed the basis for the Heartwell community. Immigrants from Sweden and other Northern European communities provided the cultural basis for the development of many of the communities. Communities with mixed ethnicity also were established in North Bend, Gibbon and Silver Creek. Native Americans were scattered across the landscape as settlement began with Pawnee located north of Polk County on a reservation. This reservation disappeared as the Pawnee numbers declined and European immigrants increased in numbers.

These ethnic heritages provided a focal point for early development within these communities. The diversity of businesses in these early towns illustrates the connection to Europe. Neck tie manufacturers, specialized bakeries, and butcher shops were more often the norm than not. The agricultural crops raised in proximity to these new towns also support a European connection. Potatoes, oats, barley and spring wheat were grown with cabbage and other vegetables to support local families. Hogs, cattle and sheep were reported mixed with turkeys and chickens as local agricultural producers provided for a local and regional market. Entrepreneurial efforts related to agricultural production were often identified in historical accounts with one example being the growing of hemp beginning in 1892 for making twine, including manila and sisal.

As the towns developed, voluntary organizations grew in number. These included volunteer fire fighting units and fraternal organizations.

How residents arrived in Nebraska:

Small town residents studied during this project said that there were as many reasons for settling in their community as there were residents. For some it was simply where they got off the wagon train or railroad car. For others it was a planned move with others to claim land and build a future located around a specific community. For those residents today, their relationship to these early settlers is a primary motivator for remaining in their home community. As one resident said, "I have lived here all of my Life." These sentiments are often imbedded among small town residents throughout our study communities.

Agriculture: A Treadmill of Production:

Agricultural production is still seen as the key to economic survival by most of the small towns studied. Although the competition between farmers for land has created an environment, according to some residents, where farmers are so involved in managing their risk that they cannot help one another as they did in the past. Local small town residents are accepting of the inputs used by agriculture as the "cost of living in rural Nebraska." The residents don't question, on average, the use of pesticides or herbicides although they believe there has been a negative impact on wildlife because of the use of these chemicals.

Local business owners see the survival of agriculture as a key to their being able to stay open in these small communities. The leasing of hunting rights to outsiders, limiting the hunting availability for local residents, was seen as an issue that crates a division between landowners and other community residents.

Platte River Relationship

Residents were unanimous in their opinion about one issue relating to the Platte River. ACCESS was indicated as a major problem among most of the communities studied. Management changes by Platte River managers have impacted local residents. Residents speak of low levels of water in the Platte before the dam building began up stream. They argue that before the dam building activities, the water was slower, more shallow, and less dangerous for swimming by children and young adults.

An interesting finding of this study is that Platte River recreational numbers may be low. When these small town residents were asked about where they recreate, many indicated sandpits or backwater areas rather than the Platte River itself. They perceived a difference even though the water is connected. This finding may indicate that small town residents have higher uses of the Platte River for recreation than previously believed.

The community residents reported that they believe there are less fish in the river today and that crawdads (bait) are often difficult to find now as compared to times past. Recreational attachment to the Platte River was historically centered around fishing, boating and swimming. Today airboats are becoming popular along the eastern edge of the Platte River. This new activity has enthusiasts, but

also those who believe that noise and pollution degrade the quality of life along the river.

Future Community Development

Many of these small towns believe their future development is linked very closely to retail trade hubs that dot the Platte River geography. North Bend and Cedar Bluffs see Fremont, Lincoln, and Columbus as their linkage to employment and services such as health care, while Gibbon residents look to Kearney.

Residents also see small communities banding together to meet their needs such as schooling, employment, and recreational opportunities.

Residents have mixed feelings about development adjacent to the Platte River. Many are worried that their "quality of life" will be diminished if more residents move into their communities, yet they often respond that they want to retain their youth in their communities. This dialectic creates a tension among residents as they evaluate change, whether it relates to community development or changing Platte River management plans.

Zoning was mentioned in several communities as an issue related to future growth and change.

Linkages with retail hubs such as Columbus are limited according to some residents because of lack of access across the river. Bellwood residents supported a bridge being built to support traffic from their community to Columbus. This linkage is looked at as an economic development strategy.

Issues Impacting the Future of Small Towns Adjacent to the Platte River: Adequate and available housing, maintaining schools, employment opportunities for current and new members, water quality, and changing quality of life were issues that were seen as impacting the future of these communities. Their strong connections to retail hubs and for some, such as Gibbon, tourists traveling along the I-80 corridor, provide them their "life link" for employment and services. The changing structure of agriculture, continued growth in size of farms, and the development of confinement facilities was also identified as issues that must be dealt with to maintain quality of life in these communities.

Learning to work with newcomers is another issue facing those communities that are growing as well as those who have had continued declines in population. As some residents explained, "newcomers bring the city with them." By this they mean lack of community involvement is an issue that many of these communities are facing. Community leaders were seen as the key to whether a community thrives and maintains quality of life or struggles and reacts to strictly external forces.

Linked to the issue of community building, many residents complained of the lack of time available by community residents. As one resident explained, "We didn't have to make appointments before stopping by before." This lack of time is linked to commuting to work, to school activities, recreation, and shopping outside the community. The traditional quality of life, which was based on imbedded social relationships, is mentioned as being threatened as employment and other linkages are external to each individual community.

As the residents tell their stories about their community, its past, present and potential future, several issues were identified as important for their continued high quality of life. First, access to the Platte River is important to provide recreational opportunities as well as places for community dialogue and continued cohesion building among residents. Second, diversity, the basis for many of these small towns' existence is being replaced by specialization. How to retain a social, economic and environmental balance is a question many residents see a problem to be dealt with as they face the future. Third, linkages among local residents and other community residents, including retail hub employers, are believed to need to be enhanced. These have such structural definitions such as bridges across the Platte River to development of committees which cross township boundaries. Fourth, small town residents adjacent to the Platte River see themselves outside the decision making process about the Platte River. They feel alienated from the process and don't necessarily believe their voices or needs are being heard as current decisions are being discussed. And finally, these small town residents see their lives entwined with their past by their familial connections and their cultural heritages. These have provided the basis for their continued community cohesion. When residents looked to the future, they were almost unanimous in believing that they would continue to survive in some form. While the smaller communities didn't necessarily see growth in their future, they did not believe that they would die as a community.

Decisions about the future of the Platte River region in Nebraska should take into consideration those residents who may not be landowners, who commute to retail trade centers for employment, or who have "lived their life" in these communities, so that special interest groups are not the dominant voice about the future of this area of Nebraska.

General Findings

Occupation is a key factor in perceptions about the Platte River

Agricultural producers were less supportive of changes in management practises.

Younger professionals who had located here within the past five years were more supportive of environmental efforts.

Almost one half of respondents believed that irrigation was the best use of Platte water.

Approximately 40 % of respondents viewed the combination of habitat and recreation as the best use.

Residents were optimistic that a compromise plan that protects the environment, supports irrigation, and fosters local growth is possible.

While optimistic about the possibility of compromise, respondents were unsure who would take the lead in such an effort.

Respondents felt excluded from the decision process regarding the Platte River.

While the Allen surveys were generally aimed at average residents of the small communities along the river, other Platte Watershed researchers focused attention on more visible stakeholders. The following section describes the results of this effort.

Stakeholder Interviews

The following information is derived from interviews conducted with Platte River stakeholders by Michael T. Eckert, University of Nebraska Cooperative Extension, Platte Watershed Program Coordinator and Dr. Thomas G. Franti, Assistant Professor, Department of Biological Systems Engineering, University of Nebraska-Lincoln.

In late 1994 the University of Nebraska Cooperative Extension's Platte Watershed Program (PWP) initiated an information and education program based on stakeholders' needs. Designing a program based on the needs of the stakeholders in the region was a critical component in developing program objectives that were not only functional, but also responsive to the current and changing needs of stakeholders. A secondary goal of this process was to promote stakeholder buy-in to the role of the PWP by soliciting their input as plan developers and not just plan reviewers. The process employed was based on four fundamental components.

- I) Interviewing a wide range of stakeholders, soliciting their concerns and needs in the watershed and asking them how the PWP can assist them.
- II) Organizing the consistent themes uncovered in the interviews, surveying the stakeholders and having them prioritize those items.
- III) Taking the top priorities from the survey and reflecting on the institutional capabilities available to deliver such programs with an UNL advisory committee.
- IV) Integrating the current context of information and education needs as demonstrated by current events.

Interviewing Stakeholders

The interviewing process took several months. Thirty-one individual interviews with a diverse range of stakeholders from throughout the basin were initially conducted. The interviews included members of natural resource districts, federal and state agencies, conservation organizations, irrigation and power districts, extension officials, agricultural producers, and representatives from agricultural interests groups.

The interviews were deliberately performed on a one-on-one basis and their structure was highly informal. They were designed to produce an open-discussion forum in which the stakeholders could freely and confidently express their concerns, fears, needs, and desires. Often times the feedback in the interviews was directed toward general, all encompassing issues that were perceived as general large-scale problems in the watershed's management controversies. Once these issues were uncovered and documented, the questioning was then specifically directed toward possible programs that the PWP could implement to begin addressing these general concerns on an achievable scale. During this refocusing process, detailed examples of how the PWP could materialize its role in the watershed were quickly identified.

During and after the interviews, detailed information was recorded and analyzed, to be incorporated into a priority-ranking survey that was to be distributed to each individual interviewee. The issues selected for the priority-ranking survey were those common concerns that were reiterated in a number of the interviews. Although the range of ideas on how the PWP could play a role in the watershed were extremely diverse, after several interviews, consistent themes and desires were clearly present. Therefore, those issues were targeted for redefinition and prioritization in the priority-ranking survey.

Once the interviewing process was complete and the priority-ranking survey was established, the previously interviewed stakeholders prioritized eleven objectives that the PWP would consider for its workplan. The objectives being ranked in the survey were those that had significant reoccurrence in the interviewing process. The eleven objectives were listed on the survey form and stakeholders were asked to give a ranking to each one using a Likert scale, from 1-5, based on: 1) High Priority, 2) Basic Priority, 3) Neutral, 4) Low Priority, 5) No Priority.

Twenty-two of the 31 stakeholders that were interviewed responded to the survey. The results indicated that seven of the eleven objectives outlined in the survey were consistently ranked as at least a basic priority. In order of significance the objectives were to:

- 1) Establish a bibliographic database of Platte River research.
- 2) Develop, publish and distribute timely informational material.
- 3) Sponsor symposiums to discuss Platte River ecological research.

- 4) Organize and host workshops and meetings on management issues.
- 5) Establish a mailing list for organizations to utilize for announcements.
- 6) Establish a "Stakeholder Advisory Committee" to guide the Platte Watershed Program.
- 7) Develop periodic newsletters that focus on basinwide developments.

Utilizing UNL Advisory Committee

During this developmental stage of the PWP, meetings with a University of Nebraska-Lincoln advisory committee were conducted. This committee was composed of four faculty members from UNL with considerable experience dealing with Platte watershed issues. They included:

Dean Eisenhauer, Professor, Department of Biological Systems Engineering
Bob Kuzelka, Assistant to the Director, Water Center/Environmental Programs
Ed Peter, Professor, Department of Forestry, Fisheries, and Wildlife
Bob Volk, Director, Water Center/Environmental Programs

The committee was asked to fill out the same priority-ranking survey that the stakeholders completed. The advisory committee filled out their surveys before they were shown the results of the stakeholders' prioritization so that the results of the latter results would not influence their prioritization. Additionally the committee was asked to list the pro's and con's of each of the eleven objectives in the survey. Although there were some differences between the highest priorities suggested by the faculty and those suggested by the stakeholders, the results were relatively similar. As a result, the PWP then focused on the written pro's and con's that the committee had detailed and further evaluated the highest priorities with that information.

Integrating Additional Informational Resources

Beyond the integration of the stakeholder interviews and surveys and the recommendation of the advisory committee, the PWP utilized the information presented at various conferences, symposiums, and workshops. The diverse and divisive issues present on the Platte provide for a number of large conferences and meetings that are regularly scheduled in the basin. These meetings presented an excellent opportunity for the PWP to further evaluate the current issues that are straining the information sharing among stakeholders in the watershed.

Additionally, these forums allowed the PWP to continually re-evaluate the current direction of its objective and constantly monitor changes and new initiatives that were needed by the stakeholders. As a result, regular attendance at these meetings and conferences served two vital purposes. Firstly, information on current issues was gathered and integrated into the on-going objectives of the PWP. Secondly, they served an invaluable role in propagating the rapport established with stakeholders in the interviewing process. This up-to-the-minute

knowledge and rapport-building time proved to be a critical component to the successful implementation of the PWP objectives while sustaining stakeholder buy-in to the program.

Benefits of the Stakeholder Needs Assessment Process

Performing a stakeholder needs assessment has led to several positive benefits for all groups involved. These benefits include increased buy-in and cooperation, interactive communication promoting the monitoring and re-assessment of needs, and a continued validation in the PWP's objectives.

Firstly, the process has promoted a sense of cooperation and problem solving and buy-in between the University of Nebraska and the stakeholders in the watershed. The stakeholders that the PWP has worked with clearly see the program as resource for addressing information and education issues that exist within the basin. This result is seen in their buy-in to the goals of the PWP and their cooperation and contribution toward the delivery of specific objectives. This cooperative attitude has fostered a rapport with the PWP that allows the efficient and informal exchange of information to take place on significant issues that arise in the watershed.

Secondly, the process has opened up clear communication channels with the stakeholders that allows continual interaction with the PWP. This interaction is extremely beneficial as it allows the PWP to constantly monitor the progress of their objectives and stay in-tune with future needs of stakeholders. This component is especially critical due to complex and diverse nature of the Platte Watershed. Critical education needs in the basin can change quickly and the ability to quickly adjust to those needs is vital to the success of the PWP. Efficient lines of communication with the stakeholders will allow the PWP to constantly monitor and re-assess the effectiveness and impact of its objectives.

Person	Stakeholders Interviewed Affiliation	Location
Ann Bleed	Dept. of Water Resources	Lincoln
Mark Brohman	NE Game and Parks Commision	Lincoln
Jim Cook	Natural Resources Comm	Lincoln
Tammy Hays	Ctr For Env Solutions	Lincoln
Sara Kay	NE Water Users Association	Lincoln
Glenn Johnson	LPS NRD	Lincoln
Steve Walker	NDEQ	Lincoln
Jamie Green	NE Dept of Ag	Lincoln
Brian Barels	NPPD (FERC Coord)	Columbus
Mark Czaplewski	NPPD (Environ Mng)	Columbus
Mike Guntzmer	NPPD	Columbus
John Shadle	NPPD	Columbus
Bill Whitney	Prairie Plains Res Inst	Aurora
Brent Lathrop	Nature Conservancy	Aurora
Bob McCue	FWS (Field Supvsr)	Grand Island
Steve Anschutz	FWS (Asst Field Sup)	Grand Island
Milt Moravik	Ctrl Platte NRD	Grand Island
Paul Currier	Platte R Whooping Crane Trst	Grand Island
Gary Lingle	Platte R Whooping Crane Trst	Grand Island
Beth Goldowicz	Platte R Whooping Crane Trst	Grand Island
Ron Bishop	Central Platte NRD	Grand Island
Rick Anderbery	Tri-Basin NRD	Holdrege
Dave Mazour	CNPPID (Asst. Manager)	Holdrege
Jay Mather	CNPPID (FERC Coord)	Holdrege
Jim Lundgren	NE Water Users	Lexington
Frank Kwapnioski	NPPD	North Platte
Kent Miller	Twin Platte NRD	North Platte
Ron Cacek	North Platte NRD	Scottsbluff
Jim Schild	Scotts Bluff Co Ext	Scottsbluff
Dean Yonts	Panhandle Res Ext Ctr	Scottsbluff
Mike Jess	Dept of Water Resources	Lincoln
Nate Donovan	Legal Counsel (Senator Beutler)	Lincoln
Steve Moran	NRCS Rnwtr Basin Jt Venture	Grand Island
Dick Mercer	Ag. Producer	Kearney
Paul Tebbel	Audubon	Kearney
Norm Klocke	West Ctrl Res Ext Ctr	North Platte
Jim Goeke	West Ctrl Res Ext Ctr	North Platte
Bob Erickson	US EPA Region VIII	Denver, CO
Tom Huntzinger	USGS	Lawrence,KS

Legal Issues/Public Policies That Impact the Middle Platte Region

The Legal Environment

Attempts to control Platte River flows have sparked many legislative and judicial actions. Within Nebraska, water law developed incrementally as the early state legislators attempted to set priorities and define water rights. The development of Nebraska water law was complicated by geographic characteristics and settlement patterns. Nebraska has the unusual distinction of having dual systems of surface water law, recognizing both riparian rights and prior appropriation. Importantly, all flowing water is considered the property of the state, not the property of the adjoining landowner.

The first non-native settlers established themselves along the eastern borders of Nebraska where water supplies were relatively abundant. Eastern settlers followed the doctrine of riparian rights, which allows a landowner whose property borders a river or stream to claim use of the water for reasonable purposes. However, as settlements moved west, farmers moved into the semiarid portions of the state. As irrigation developed, the economic importance of access to water led to legislation in 1895 that authorized the doctrine of prior appropriation in Nebraska.

Prior appropriation is often described as "first in time, first in right." Water users are given a permit to withdraw a specific quantity of water from a river or stream. Priority is based upon the date of the permit. During dry periods, after senior users take their allotment there may be insufficient water remaining for junior users. Although the 1895 water legislation established prior appropriation, court decisions in the state held that riparian rights were not abolished. This complicates water issues in Nebraska because the two approaches are not necessarily compatible with one another.

The Nebraska Constitution and various statutes specifically recognize that the state's water resources may be used for domestic, agricultural, manufacturing, and hydroelectric power purposes. State law gives domestic use first priority, followed by agricultural use, then manufacturing use. While Nebraska law does not give a specific priority to recreational, environmental, or scenic use, as a general rule, the Nebraska Supreme Court has shown concern for water management and has favored those uses which benefit the public. This approach is consistent with state law that holds that the water belongs to the public, not to individual landowners, and that the resource is dedicated to the use of the people of the state.

Although surface water and groundwater are inherently interrelated in the hydrology cycle, Nebraska law has historically treated each separately. Over time, the Legislature and courts developed specific statutes and different case

law for both kinds of water. Unlike surface water, groundwater has received little regulatory attention from the state. Nebraska adopted a modified "American Rule," which recognized that the property owner has the right to use groundwater for beneficial purposes. The landowner has the right to use the groundwater but is not the owner of the resource. The locally-controlled Natural Resource Districts (NRDs) are the primary groundwater regulatory institutions.

In April 1996, Nebraska enacted a new "conjunctive use" law that recognizes underground water and the flows in nearby rivers are intrinsically connected. Thus, for the first time in state law, the potential impact of groundwater irrigation on river flows is considered. Enactment of this law removes a major objection raised by Colorado and Wyoming in the ongoing Platte allocation negotiations. The upstream states had resisted releasing additional water for habitat improvement in the central Platte because, they argued, Nebraska could not prevent local groundwater irrigators from removing the supplemental flows by pumping riverside wells. With more than 25 thousand wells in the Middle Platte region, the potential impact of groundwater pumping on Platte River flows is considerable.

Recreational and Habitat Rights

In *Kinkhead vs. Turgeon* the Court adopted the rule that landowners owning land alongside a river own the bed to the center of the stream, subject to a public easement for navigation. Thus, even though the public may have a right to float the Platte, access must be gained without trespassing upon private property. To use the Platte for recreational purposes such as canoeing, one must gain access from public lands or obtain permission from the private landowner. Because the vast majority of the land along the Platte is privately owned, public access to the river is limited.

Several Western states have specific constitutional and statutory provisions recognizing recreational, environmental, and scenic uses. Recent legislation and court decisions have shown that Nebraska is beginning to recognize the need to provide sufficient water flows for these alternative purposes. Legislation enacted in 1984 allows the state Game and Parks Commission or a Natural Resource District to apply for an instream flow to meet recreational or habitat needs.

Interstate Water Issues

Colorado, Wyoming, and Nebraska have battled over the Platte's flows for many years. One important case, *Nebraska v Wyoming*, was initiated in 1934 when Nebraska brought suit against Wyoming (later expanded to include Colorado) seeking equitable apportionment of the North Platte. Nebraska argued that the upstream states were diverting too much water into irrigation projects. In 1945 the U.S. Supreme Court rendered its decision, allocating the available water between the three states. Even after this decision, the states continued to battle over the water. The original decree was modified in 1953, and, in 1986

Nebraska requested that the case be reopened. In the latest request, Nebraska asked that the allocation plan include sufficient water for habitat conservation in the Middle Platte region. It is anticipated that this new Court decision, when it finally arrives, will impact the entire water allocation system in the western United States.

Nebraska and Colorado also battled over construction of the proposed Two Forks Dam on the South Platte southwest of Denver. The Denver Water Department proposed a new 1.1 million acre-feet reservoir on the South Platte River to increase the water supply for the Denver metropolitan area. Nebraska, joined by a number of environmental groups, opposed Two Forks because it would further reduce instream flows in the Platte and would have an adverse impact on wildlife habitat in the Middle Platte region.

The Two Forks project was canceled in 1991 after the Environmental Protection Agency determined that the additional water diversion would have adverse environmental consequences on the Middle Platte. A U. S. Fish and Wildlife Service study determined that storing water in the reservoir would leave only minimal flows in a 116 mile stretch of the Central Platte during dry years. This, in turn, would lead to fish kills, degraded whooping crane habitat, and higher mortality rates for endangered least terns and threatened piping plovers.

The Endangered Species Act

The Endangered Species Act, enacted in 1973, is having a significant impact upon the current debate over Platte River flows. The Endangered Species Act is recognized as one of the world's strictest environmental laws. The law requires that the U. S. Fish and Wildlife Service of the Department of the Interior identifies non-marine endangered and threatened species. The decision to add or remove a species from the endangered list must be based solely on the relevant scientific data, specifically excluding economic considerations from the listing process. The fundamental goal of the Endangered Species Act, set forth in Section 2(b), is to:

provide a means whereby the ecosystems upon which endangered species and threatened species depend may be conserved, to provide a program for the conservation of such endangered species and threatened species, and to take such steps as may be appropriate to achieve the purposes of the [international conservation] treaties and conventions...

Enforcement of the Endangered Species Act has always been controversial, partially due to the fact that courts have generally held a strict interpretation of its provisions. The regulatory power created by the Endangered Species Act for non-marine species is controlled by the Secretary of Interior through the Fish and Wildlife Service. A major provision of the Act is that Federal agencies are prohibited from funding or carrying out projects which would have a negative impact on listed species or their critical habitat. Section 7 of the Endangered

Species Act provides statutory protection for endangered species by mandating that any action by a Federal agency may not jeopardize the continued existence of a listed species. Through the consultation process defined in Section 7, the Fish and Wildlife Service provides a written statement, called a biological opinion, if a proposed Federal action may jeopardize a species.

All Federal agencies, even the Department of Defense, must consult with the Fish and Wildlife Service before beginning a project. If the initial review determines that the proposed action will harm a listed species, the Fish and Wildlife Service must recommend "reasonable and prudent" alternatives that will meet the project goals without jeopardizing the endangered species. The Endangered Species Act requires that the alternatives are "economically and technologically feasible." Critics of the Endangered Species Act complain that the act is too restrictive and stops development. However, of 98,237 interagency consultations between 1987 and 1992, only 55 projects were actually stopped. Most of the halted projects were proposed timber sales by the Bureau of Land Management. While the ESA is criticized by some as overly restrictive, it enjoys wide popular support.

There are nine recognized endangered or threatened species that may use the Platte. Interior Least Terns (endangered) and Piping Plovers (threatened) nest in the Middle Platte region on sandbars historically scoured clear of vegetation by high springtime flows. Approximately 10 percent of the Interior Least Tern population and 3 percent of the Northern Great Plains population of Piping Plovers use the Platte River. The Middle Platte also provides critical migratory habitat for a variety of species, including two of the highest profile species, the Whooping Crane and the Bald Eagle. The Bald Eagle was listed as an endangered species until August 11, 1995, when it was reclassified as a threatened species. Endangered Peregrine Falcons occasionally migrate through the region. A Fish and Wildlife Service biologist reported the sighting of a single endangered Eskimo Curlew near Grand Island in 1987, but the sighting was rejected by the Nebraska Ornithological Union. In addition to high profile species like the Whooping Crane and Bald Eagle, the Middle Platte region also contains populations of the endangered Western Prairie Fringed Orchid and the endangered American Burying Beetle. The lower Platte, just upstream from entering the Missouri River, holds a population of the endangered Pallid Sturgeon.

The Impact of the Endangered Species Act

Platte River water users recognized the need for a basinwide approach after witnessing the difficulty Nebraska Public Power District and Central Nebraska Public Power and Irrigation District experienced in obtaining new operating licenses for two of their hydroelectric plants. Kingsley Dam operated by Central Nebraska Public Power and Irrigation District and the North Platte Hydro (Sutherland Project) operated by Nebraska Public Power District, were the first projects on the Platte River to begin the application process after passage of the

Endangered Species Act. These power plants were constructed in the 1930s as part of the Works Progress Administration, and were originally granted fifty-year operating licenses. At the time of construction, there was no concern about endangered species. By the time the hydroplants on the Platte attempted to renew their operating licenses in the 1980s through the Federal Energy Regulatory Commission, they had to address the possible impact of their facilities on endangered species. The relicensing effort, initiated in 1984, proved very difficult. The Federal Energy Regulatory Commission rejected the first applications on the basis of inadequate provisions for mitigating the local impact on endangered species. After fourteen years of negotiations, with the two power districts spending \$35 million dollars on legal fees, ecological studies, and habitat improvement, the new forty-year operating licenses were finally granted on July 29, 1998.

The prospect of fighting a similar battle on relicensing each of the hundreds of facilities on the Platte in Nebraska, Wyoming and Colorado was viewed with great concern. Even before the operating licenses were granted, in 1994 Secretary of the Interior Bruce Babbitt proposed a basin-wide approach to endangered species issues on the Platte. The initial action was the drafting and signing of a Memorandum of Agreement between the three states and the Department of Interior in 1994 to work collectively to meet the endangered species requirement.

In essence, the Memorandum of Agreement was an agreement by the Governors to agree to work cooperatively on the development of a Basinwide Recovery Program for the four threatened and endangered species most closely tied to the Platte – whooping crane, piping plover, interior least tern, and pallid sturgeon.

Three State MOA

As NPPD and Central struggled to acquire their operating licenses, other users of Platte River water realized that they would face the same process in the future. Recognizing that using litigation and the courts to resolve Platte River issues is costly, ineffective, and ponderous, Colorado, Wyoming, and Nebraska began to discuss alternative approaches. In June 1994, the three states, along with the U.S. Department of Interior, signed a Memorandum of Agreement (MOA). The intent of the MOA is to provide a vehicle for cooperation rather than legal confrontation. According to the document:

The purpose of this MOA is to initiate the development of a mutually acceptable Platte River Basin Endangered Species Recovery Implementation Program (Program) that would help conserve and recover federally listed species associated with the Platte River Basin in Nebraska upstream of the confluence with the Loup River; help protect designated critical habitat for such species; and help prevent the need to list more basin associated species pursuant to the Endangered Species Act (Act). The signatories' intent is that the Program, when developed and approved by all the signatories, will provide reasonable and prudent alternatives to

avoid the likelihood of jeopardy to federally listed species and to offset any adverse modifications to designated critical habitat so existing water projects in the basin subject to section 7 consultation under the Act can continue to operate and receive any required permits, licenses, funding, or other approvals and be in compliance with the Act and so existing federal projects can be in compliance with the Act.

After a year-long series of meetings attended by Federal and State government officials, representatives of environmental groups, power district employees, and irrigation groups, the MOA process was in trouble. There was some disagreement regarding each state's relative contribution. However, the major point of contention stemmed from the magnitude of the Fish and Wildlife Service's estimation of the flows required to satisfy the endangered species requirements. Fish and Wildlife biologists estimated that an annual flow of 417,000 acre feet of water is needed to sustain critical habitat in the Central Platte. The three states contend that this estimate is far beyond the flows required to meet habitat needs. For example, the "Nebraska Plan" proposed in early MOA negotiations would set aside 60,000 acre feet of water for release to help specific species.

While the negotiations took several years, the end result of the Memorandum of Agreement was the creation of a basinwide plan that will be submitted for review under the National Environmental Policy Act. This plan, known as the Cooperative Agreement, is designed to provide "regulatory certainty" for new and existing water projects on the Platte. The Cooperative Agreement will act as an environmental assessment umbrella, allowing individual water-using projects on the Platte to operate without going through the separate lengthy environmental impact assessment that would otherwise be required by the National Environmental Policy Act to ensure there were no adverse impacts on endangered species.

The Cooperative Agreement

After three years of negotiation, the three governors and Secretary Babbitt signed the Cooperative Agreement on July 1, 1997. The Cooperative Agreement describes the actions that will be undertaken while the overall plan is reviewed under the National Environmental Policy Act – a process expected to take three to four years. The agreement also describes actions proposed for the program's first increment, expected to last ten to thirteen years after the National Environmental Policy Act review. Recognizing that a wide variety of groups have an interest in management decisions, the Cooperative Agreement creates an administrative structure that includes representatives from multiple stakeholder groups. The governance committee includes one representative from each of the following: North Platte water users, South Platte water users, Middle Platte water users, Fish and Wildlife Service, Bureau of Reclamation, State of Wyoming, State of Colorado, and State of Nebraska. Environmental groups

were granted three positions on the governance committee, but only given two votes. The initial environmental representatives were Audubon Society of Nebraska, the Environmental Defense fund of Colorado, and the Platte River Whooping Crane Maintenance Trust. To assist the governance committee, a land committee, a water committee, and a technical committee were also created.

The central element of the proposed plan is the creation of an "adaptive management" strategy that will coordinate, monitor and refine management practices over the initial increment's ten to thirteen year period. Adaptive management, a concept first developed in the mid 1970s by ecologists working with C. S. Holling, is based upon the recognition that uncertainty and change are always characteristics of dynamic ecosystems. Using the adaptive management approach, the area is continually monitored and, as the ecosystem changes or as new scientific findings become available, management practices are adjusted accordingly. For the Cooperative Agreement, adaptive management, as opposed to a strict command and control regulatory approach, was selected because there are still important biological issues that are not yet resolved. For example, the Fish and Wildlife Service has specified target flows to meet the habitat needs of the various endangered species. The current target flows indicate a shortfall of 400,000 acre-feet of water per year in the Middle Platte necessary to maintain habitat. However, many biologists do not agree with the Fish and Wildlife Service target flows. Following the adaptive management strategy, as new studies refine the habitat/flow requirements, the existing target flows will be adjusted accordingly.

An important long-term goal of the program, once the ultimate target flows are eventually determined, is the provision of increased flows to meet these targets. To begin this process, three actions will begin immediately. First, an "environmental account" of up to 200,000 acre-feet of water is being set aside in Lake McConaughy. This water will be released by a Fish and Wildlife Service account manager to directly assist the flow requirements of the listed species. An additional 34,000 acre-feet of water will be made available to the environmental account by increasing the capacity of Pathfinder Reservoir in Wyoming. Colorado's contribution is the construction of the Tamarack Project in the northeast corner of the state, which will remove water from the South Platte during times of high flows and return it to the river through groundwater recharge during dry periods. The short-term goal is to reduce the identified shortages by 130,000 acre-feet of water during the first phase of the program.

In addition to increasing the flow of water, the program also seeks to expand available river and riparian habitat. The ultimate program goal is to protect and develop 29,000 acres in the Middle Platte region in ten habitat complexes between Lexington and Chapman. The goal of the first increment is to protect/develop 10,000 acres. The states and Interior have agreed that they will

not use the power of eminent domain -- all habitat land will come from willing owners through sale, lease, or conservation easements.

The Cooperative Agreement will also attempt to assess the local social, political, and economic impacts created by the program. For example, a "Third Party" impact study is planned to examine issues stemming from the conversion of farmland to endangered species habitat. Local economic impacts resulting from the subsequent decrease in agricultural inputs and output, tax effects on local governments dependent upon property taxes, and changes in agricultural opportunities will be examined.

Program Costs

The total costs of the NEPA review period and the initial ten-thirteen year increment of the Basinwide Recovery Program are estimated at 75 million dollars. The Federal government will provide half of this amount, the states will split the remaining half. State efforts to conserve water, acquire habitat, and restore habitat count as part of their contribution. Thus, in the first increment, Nebraska will contribute \$700,000 in cash, the water in the Lake McConaughy environmental account (valued at \$9 million), and several habitat acquisition and restoration efforts in the Middle Platte region. Wyoming will contribute \$4,000,000 and the additional water from Pathfinder Reservoir. Colorado will contribute \$10,800,000 in cash and will begin construction of the Tamarack project.

While the state contributions represent a considerable expenditure, the total cost of the basinwide approach is much lower than the cost of handling endangered species issues on an individual project basis. This provides a powerful incentive for the three states to cooperate. The states are not legally bound to continue to participate, and can drop out of the Cooperative Agreement at any time. However, each state realizes that it is in its best interest to work with the other states to share information and defray costs.

Assuming the National Environmental Policy Act assessment is generally positive, over the next fifteen years the program will attempt to meet the initial water and land components of the recovery plan. Once the first increment is underway, progress will be evaluated, program adaptations will take place, and the planning for a second increment will begin. While the recovery plan will continue, it is unlikely that annual expenditures will remain at the first increment level, simply because some of the proposed actions are one-time events. For example, increasing the capacity of Pathfinder Reservoir requires major expenditures only one time. Barring fundamental changes in the Endangered Species Act or an unexpected change in the listed species, the program will continue indefinitely. Obviously, if the whooping crane, pallid sturgeon, interior least tern, or piping plover become extinct, the Cooperative Agreement would be altered to reflect the new reality. If the listed species recovered to the point where they no longer had endangered or threatened status, the project could be

terminated. Realistically, it is not likely that all four species will prosper sufficiently to alter their endangered/threatened status in the foreseeable future. Long-term monitoring of flows, habitat conditions, nesting success of terns and plovers, the population status of pallid sturgeon, whooping crane migratory use of the Platte, and overall program impact will continue.

Summary Report Conclusions

Management of the Platte River is inherently complex – biologically, legally, and politically. Protecting the Platte's unique qualities presents a daunting task. If the diverse stakeholders on the Cooperative Agreement Governance Committee can maintain a working relationship; if the biological connections between flows, habitat, and species can be identified; and if the various stakeholders can find common ground to initiate compromise, the Platte can be maintained as a national treasure.

The increasing interest in crane viewing presents a significant economic opportunity for south central Nebraska, particularly in Buffalo and Hall counties. Because the crane viewing does not occur during the summertime peak of motel use, it presents an opportunity to more efficiently use the existing motel space. Given the national trends associated with nature-based tourism, it is likely that an increasing number of crane watchers will be attracted to the region. The question is whether this will be done in a systematic way, attempting to increase regional economic opportunity while minimizing any negative impact of the tourists on the cranes or rural residents, or if it will continue in a relatively unplanned fashion.

The economic role of tourism relative to agriculture and power generation will evolve over the next decade. Stakeholders interested in joining the Great Platte River Debate on the allocation of limited flows must have access to fundamental information about the river and about development options. Through forums like the annual Platte River Basin Symposium, and through ongoing research projects, the Platte Watershed Program will attempt to meet these information needs.

Reference Information Regarding Platte River Issues

- Boohar, J. A. and Walczyk, V.C. 1998. *Water Resources Data: Nebraska Water Year 1997*. United States Geological Survey Report Ne-97-1. United States Department of Interior, Washington D. C.
- Brown, G. and J. Shogren. 1998. "Economics of the Endangered Species Act," *Journal of Economic Perspectives*. Volume 12, Number 3, Summer 1998, pg. 3-20.
- Chadwick, D. 1995. Dead or Alive: The Endangered Species Act. *National Geographic*, Vol.187, 3: 1-41.
- Clark, T. and R. Brunner. 1996. Making Partnerships Work in Endangered Species Conservation: An Introduction to the Decision Process. *Endangered Species UPDATE*, September.
- Central Nebraska Public Power and Irrigation District. 1994. A Journey Through the Central District. Holdrege, Nebraska.
- Central Nebraska Public Power and Irrigation District. 1995. Reservoir Storage in the Platte Basin. (map) Central Nebraska Public Power and Irrigation District, Holdrege, Nebraska.
- Condra, C. 1995. An Environment for Reform. *Wall Street Journal*, Jan. 23: A18.
- Department of the Interior. 1997. *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats Along the Central Platte River, Nebraska*. U. S. Printing Office, Washington, D. C.
- Courtelyou, R. 1987. "Eskimo Curlew Sighted," *The Nebraska Bird Review*, Vol 55, No.4.
- Currier, P. 1996. Woody Vegetation Expansion and Continuing Declines in Open Channel Habitat on the Platte River in Nebraska. *Proceedings of the North American Crane Workshop 7*.
- Czech, B. and P. Krausman. 1997. Public Opinion on Species and Endangered Species Conservation. *Endangered Species UPDATE*, May/June.
- Davis, P. 1992. Economy, politics threaten species act renewal. *Congressional Quarterly Weekly Report* Volume 50, January 4: 16-18.
- DiSilvestro, R. 1989. *The Endangered Kingdom*. New York. John Wiley and Sons, Inc.

Farrar, J. 1991. "The Impact of Crane Watching," NEBRASKAland Magazine, Vol. 69, No. 2, March, pg. 8 – 23.

Fritz, M. 1993. "Western Prairie Fringed Orchid – A Threatened Species," Nebraska's Threatened and Endangered Species Series, Nebraska Game and Parks Commission, Lincoln, Nebraska.

Hofpar, R. and Peters E. 1996. "Distribution, Habitat Use and Food Habits of Sturgeon in the Lower Platte River, Nebraska," Proceedings of the Platte River Basin Ecosystem Symposium, University of Nebraska, U. S. Environmental Protection Agency, U. S. Fish and Wildlife Service. Kearney, Nebraska, Pg. 60.

Innes, R., S. Polasky and J. Tschirhart, 1998. "Takings, Compensation and Endangered Species Protection on Private Lands," *Journal of Economic Perspectives*. Volume 12, Number 3, Summer 1998, pg. 35-52.

Johnson, W. C. 1996. "Channel Equilibrium in the Platte River, 1986-1995," a special report for the Nebraska Public Power District. Department of Horticulture, Forestry, Landscape, and Parks, South Dakota State University, Brookings, South Dakota.

Johnson, W. C. 1994. "Woodland Expansion in the Platte River, Nebraska: Patterns and Causes," *Ecological Monographs*, Vol. 64, No. 1 pp. 45-84.

Kwapnioski, F. and E. Dekleva. 1997. The Myth of Platte Water Depletion – A Work in Progress," *Proceedings of the 1997 Platte River Basin Ecosystem Symposium*, University of Nebraska p. 53-76.

Miller, G. 1992. *Living in the Environment*. Wadsworth Publishing Co.

Nebraska Agricultural Statistics Service. 1998. Buffalo County Profile. Nebraska Department of Agriculture. <http://www.agr.state.ne.us>.

Nebraska Ornithologists' Union Records Committee, 1988. "The Official List of the Birds of Nebraska," *The Nebraska Bird Review*, Vol. 56, No. 4, pg. 90.

NEBRASKAland Magazine, 1997. Spring Migration Guide, Nebraska Game and Parks Commission, Lincoln, NE.

Nebraska Public Power District, Environmental Division. Islands and Sand Pits: An Alternative Solution for Least Tern and Piping Plover Nesting Habitat in the Central Platte Valley, brochure, no date, in use 1994.

Nebraska Public Power District. 1996. Answers about: Relicensing NPPD's Sutherland Project and Balancing the Competing Interests for Platte River Water, brochure, Nebraska Public Power District.

Nebraska Public Power District. 1997. "Good Nesting Year for Terns, Plovers," *Land and Water*, Volume 5, No. 2. Pg. 8.

Peyton, M. 1995. "A Report on the Capture of 40 Specimens of the American Burying Beetle in South Central Nebraska," *Proceedings of the Platte River Basin Ecosystem Symposium*, Kearney, Nebraska. University of Nebraska Extension Service. pg. 65-70.

Springer, J. 1993. Tradition of the Sandhill Cranes. *The Platte River: An Atlas of the Big Bend Region*, A. Jenkins, ed. University of Nebraska - Kearney, p. 44-51.

Stone, M. 1993. Climate *The Platte River: An Atlas of the Big Bend Region*, A. Jenkins, ed. University of Nebraska - Kearney, p. 13-17.

Williams, G. 1978. The Case of the Shrinking Channels - the North Platte and Platte Rivers in Nebraska, Geological Survey Circular 781, 45 p.

Useful Internet Sites

Cooperative Agreement website:
<http://www.platteriver.org/>

Nebraska Department of Economic Development:
<http://www.ded.state.ne.us/>

Northern Prairies Wildlife Research Center
<http://www.npwrc.usgs.gov/resource/othrdata/platte2/platte2.htm>

United States Fish and Wildlife Service website:
<http://www.fws.gov>

University of Nebraska at Kearney Platte-related website:
<http://platteriver.unk.edu/>

For Census, Agricultural Census, and Regional Economic Information:
Oregon State Government Information Sharing Project:
<http://govinfo.kerr.orst.edu/>

