2001

2001 Platte River Basin Ecosystem Symposium Proceedings

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2001 Platte River Basin Ecosystem Symposium
February 27, 2001: Kearney, Nebraska

Program

- 2001 Symposium Program

Forward

Over 75 people braved the wintry weather to attend the Eleventh Platte River Basin Ecosystem Symposium that convened in Kearney on 27 February 2001. Icy roads lead to cancellation of only 2 papers. Seventeen papers were presented and 5 posters were on display. Nebraska Public Radio and NTV News covered the event. The presentations were excellent and participants were well satisfied with not only the program but also the food. This year the symposium broadened its charge to include more discussion on community-based environmental protection, sustainable development, and policy-making.

The Symposium was sponsored by the University of Nebraska Cooperative Extension Platte Watershed Program in cooperation with the U.S. Environmental Protection Agency - Region VII, the U.S. Department of Agriculture/CSREES, the U.S. Fish and Wildlife Service, and the University of Nebraska Water Center.

- Part I of the proceedings contains papers submitted for publication.
- Part II contains a complete set of abstracts of oral and poster presentations.

Disclaimer: The views expressed in these proceedings are those of the author/authors and should not be construed as endorsements, recommendations, or the official position of those of the Platte Watershed Program or any of the other sponsors of this Symposium. None of the materials submitted were peer reviewed for accuracy and their content was not edited in any form.

Gary Lingle, Compiling Editor
Platte Watershed Program Coordinator

Part I: Papers

Instream Flow Rights for the Platte River- A Major Tributary of the Missouri River
Eugene J. Zuerlein, J.L. Hutchinson, Steve Schainost, and Ross Lock. Nebraska Game and Parks Commission

Endangered Species Act / Recovery Drives Platte River Cooperative Agreement
Jerry Vandersnick, Kearney NE
**Converting Row Crop Area to Permanent Pasture**
Bob Scriven, UN Coop Extension, Kearney NE

**Do You See What I See?: Looking at Conservation and Sustainability in the Central Platte Valley from an Anthropological Perspective**
John T. Heaston, The Nature Conservancy, Aurora, NE

**Wintering Bald Eagle Survey of the CNPPID Supply Canal and Lake McConaughy 1992-1999**
Mark M. Peyton, Central Nebraska Public Power and Irrigation District, Gothenburg, NE

**Upper Platte River Fish Diversity and Abundance Sampling 1997 and 1998**
Mark M. Peyton, Central Nebraska Public Power and Irrigation District, Gothenburg, NE

### Part II: Abstracts

**Mapping Sandhill Crane Roost Sites Along the Central Platte River Using Aerial Infrared Videography**

Is Stability of the Platte River Myth or Reality?
A. Steele Becker and Jacqueline V. Becker, Department of Geography and Earth Science, University of Nebraska at Kearney, Kearney NE | Abstract

**Soil Vegetation Correlations along Hydrologic Gradients in the Platte River Wet Meadows**
Andrew W. Simpson and Harold G. Nagel, Department of Biology, University of Nebraska at Kearney, NE | Abstract

**From Main Channel to Riverine Landscape: Maintaining Hydrological Connectivity on the Platte River Floodplain**
Wanli Wu, School of Natural Resource Sciences, University of Nebraska-Lincoln, Lincoln, NE | Abstract

**Linking the Hydroperiod to Riparian Grassland Plant Species of the Platte River in central Nebraska**
Robert J. Henszey and Kent Pfeiffer, Platte River Whooping Crane Maintenance Trust, Wood River, NE; Janet Keough, USGS Patuxent Wildlife Research Center, Laurel, MD | Abstract

**Land Management Effects on Invertebrate Diversity in Riparian Meadows of the Platte River in South-Central Nebraska**
Justin R. Krahulik and W. Wyatt Hoback, Department of Biology, University of Nebraska at Kearney, Kearney NE; Craig A. Davis, Whooping Crane Maintenance Trust, Inc., Wood River NE | Abstract

**Alternative Methods to Maintain and Enhance Wet Meadow Habitat Along the Platte River, Nebraska**
Mark M. Czaplewski, Central Platte NRD, Grand Island NE; James J. Jenniges, Nebraska
Public Power District, Kearney NE; **Mark J. Humpert**, Nebraska Game and Parks Commission, Kearney NE; **Mark M. Peyton**, Central Nebraska Public Power and Irrigation District, Gothenburg NE | [Abstract](#)

**Platte River Color-Infrared Orthophotographs Available through the Internet**  
**Michael Starbuck**, U.S. Geological Survey, Mid-Continent Mapping Center, Rolla, Missouri | [Abstract](#)

**Reflections on EPAs CBEP Project**  
**Robert Fenemore**, Project Manager, U.S. EPA Region VII, Kansas City MO | [Abstract](#)

**The Platte River Corridor Initiative**  
**William S. Whitney**, Prairie Plains Resource Institute, Aurora NE | [Abstract](#)

**Influencing the Nest Site Selection of Least Terns and Piping Plovers**  
**Jeffrey F. Marcus**, University of Nebraska, Lincoln, NE; **John J. Dinan**, Nebraska Game and Parks Commission; Lincoln, NE; **Ron J. Johnson**, University of Nebraska, **Erin E. Blankenship**, University of Nebraska, and **Jeanine Lackey**, University of Nebraska | [Abstract](#)

**Factors Influencing Soil Macroinvertebrate Communities in Riparian Grasslands of the Central Platte River Flood Plain**  
**Craig A. Davis**, Platte River Whooping Crane Maintenance Trust, Wood River, NE; **Jane E. Austin**, USGS Biological Resources Division, Northern Prairie Wildlife Research Center, Jamestown, ND | [Abstract](#)

**Changes in Abundance and Distribution of Wintering Canada Geese Along the Platte Rivers of Nebraska, 1960-2000**  
**Mark P. Vrtiska**, Nebraska Game and Parks Commission, Lincoln, NE; **Nick Lyman**, Nebraska Game and Parks Commission, North Platte, NE | [Abstract](#)

**Changes in Waste Corn Availability Affect Fat Storage by Sandhill Cranes Staging in the Central Platte River Valley, Nebraska**  
**Gary L. Krapu** and **David A. Brandt**. USGS, Northern Prairie Wildlife Research Center, Jamestown, ND | [Abstract](#)

**Yellow-billed Cuckoo Subspecies Designation Along the North Platte River and Other Locations in Nebraska, a New Endangered Taxon?**  
**William C. Scharf**, Ecological Inventory, Traverse City, MI | [Abstract](#)
THE 11th PLATTE RIVER BASIN ECOSYSTEM SYMPOSIUM
27 February 2001 • Ramada Inn • Kearney, Nebraska

Program

8:00 am  Registration (Ramada Inn Lobby)

8:30 am  Opening Remarks, Gary Lingle, Platte Watershed Program Coordinator, Univ. of
Nebraska Cooperative Extension

8:40 am  Habitat/GIS/Hydrology Moderator Robert Henszey

**Mapping Sandhill Crane Roost Sites Along the Central Platte River Using Aerial Infrared
Videography. Paul Kinzel, et al., USGS.

**Soil Vegetation Correlations along Hydrologic Gradients in the Platte River Wet Meadows.
Andrew Simpson and H. Nagel, Dept of Biology, UNK. Cancelled.

**From Main Channel to Riverine Landscape: Maintaining Hydrological Connectivity on the
Platte River Floodplain. Wanli Wu, UNL.

**Linking the Hydroperiod to Riparian Grassland Plant Species of the Platte River in Central

10:20 am  POSTER PRESENTATIONS (with refreshments)

**Instream Flow Rights for the Platte River- A Major Tributary of the Missouri River. Eugene
Zuerlein, et al., NGPC.

**Land Management Effects on Invertebrate Diversity in Riparian Meadows of the Platte River
in South-Central Nebraska. Justin Krahulik, et al., UNK.

*Alternative Methods to Maintain and Enhance Wet Meadow Habitat Along the Platte River,
Nebraska. Mark Czaplewski, et al., Central Platte NRD.

**Platte River Color-Infrared Orthophotographs Available through the Internet. Michael
Starbuck, USGS.
10:50 am  **Cooperative Agreement Activities** Moderator John Heaston

*Endangered Species Act / Recovery Drives Platte River Cooperative Agreement. Jerry Vandersnick, Nebraska DNR.

*Cooperative Agreement Update.  Clayton Derby, WEST Inc., Cheyenne.

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12:00 noon  **Luncheon. School of Natural Resource Sciences.**  Dr. Ted Elliot, UNL.

1:00 pm  **Sustainability and Community-Based Environmental Protection Along the Platte**

Moderator Brent Lathrop

**Converting Row Crop Area to Permanent Pasture.** Bob Scriven, UN Coop Extension.

**Reflections on EPA's CBEP Project.** Bob Fenemore, U.S. EPA Region VII.


2:20 pm  **Break (with refreshments)**

2:50 pm  **Biology** Moderator Mark Czaplewski

**Influencing the Nest Site Selection of Least Terns and Piping Plovers.** Jeffery Marcus et al., University of Nebraska

* Factors Influencing Soil Macroinvertebrate Communities in Riparian Grasslands of the Central Platte River Flood Plain. Davis et al., Platte River Trust.

**Wintering Bald Eagle Survey of the CNPPID Supply Canal and Lake McConaughy 1992-1999.** Mark Peyton, CNPPID.

**Upper Platte River Fish Diversity and Abundance Sampling 1997 and 1998.** Mark Peyton, CNPPID.

**Changes in Abundance and Distribution of Wintering Canada Geese Along the Platte Rivers of Nebraska, 1960-2000.** Mark Vrtiska and N. Lyman, NGPC. Cancelled.

**Changes in Waste Corn Availability Affect Fat Storage by Sandhill Cranes Staging in the Central Platte River Valley, Nebraska.** Gary Krapu and D. Brandt, Northern Prairie Wildl. Res Center.
** Yellow-billed Cuckoo Subspecies Designation Along the North Platte River and Other Locations in Nebraska, a New Endangered Taxon? William Scharf, consultant, Travis City MI.

5:10 pm Adjourn

* = progress report  ** = completed research
Instream Flow Rights for the Platte River - A Major Tributary of the Missouri River

Eugene J. Zuerlein, J.L. Hutchinson, Steve Schainost, and Ross Lock. Nebraska Game and Parks Commission, 2200 North 33 St., Lincoln, NE 68503, zuerlein@ngpc.state.ne.us, lhutch@ngpc.state.ne.us, schainost@ngpc.state.ne.us, rlock@ngpc.state.ne.us

Abstract

The Platte River is the largest interior river in Nebraska but diversions of more than 70% of its natural flow have created problems for fish and wildlife. For instance, the reach between Cozad and Columbus experienced fish kills in 13 of the 23 years between 1974 and 1996. In addition, substantial whooping crane migratory roosting habitat as well as least tern and piping plover nesting habitat has been lost or degraded. Requests for additional water diversions continue. Between 1976 and 1990, six major surface water diversion applications filed with the Nebraska Department of Water Resources (NDWR) were denied.

In 1982, the Nebraska Game and Parks Commission (NGPC) initiated state and federal cooperative efforts to determine instream flow needs for public trust fish and wildlife purposes. Hydraulic and habitat data were collected. Microhabitat suitability criteria were developed for fish species and for whooping crane roosting habitat. Additional studies included: hydrologic evaluation of gage records, flow versus water temperature, temperature tolerances of native fish, social and economic evaluations of instream flow protection versus future potential out-of-stream uses, and the relationship of river stage to wet meadow groundwater and vegetation. Using this information, NGPC filed five applications to appropriate instream flows with the NDWR on November 30th, 1993. The applications were for protection of whooping crane roosting habitat, wet meadow maintenance and fish habitat. They did not address flow needs for channel maintenance or the endangered pallid sturgeon.

A contested hearing conducted by the NDWR began on September 25th, 1996 and ended on April 8th, 1997. In a decision issued on June 26th, 1998, NDWR denied the wet meadow habitat application and affirmed many of the whooping crane roosting and fish habitat flows. The approved instream flow rights provide substantial protection for fish and wildlife habitat in the lower 250 miles of the Platte River.

Introduction

The objective of this study was to obtain legal instream flow protection for fish and wildlife resources dependant upon 250 miles of the central and lower Platte River in Nebraska. Development of western lands, including Nebraska in the 1800's, depended upon utilization of surface water from local streams and rivers. When competition for valuable water resources became intense, the Nebraska Legislature adopted the "First in Time is First in Right" appropriation doctrine in 1895. Eighty-nine years later and after an extensive Policy Issue Study by the Nebraska Natural Resources Commission (NNRC 1982), instream flow legislation was passed in 1984. Instream flow appropriations for fish, wildlife, and recreation can only be acquired by the NGPC or any of the twenty-three Natural Resource Districts (NRDs). To obtain
an instream appropriation, the Director of NDWR must consider five criteria and two public interest factors.

Criteria:

1. unappropriated water available 20% during the time period requested.

2. necessity of application to maintain existing recreational uses or needs of fish and wildlife species.

3. the appropriation will not interfere with senior surface water appropriations.

4. the rate and timing of the flow are the minimum necessary to maintain existing recreational uses or needs of fish and wildlife species; and

5. the application is in the public interest.

Public Interest Factors:

1. the economic, social, and environmental value of the instream use or uses including, but not limiting to, recreation, fish and wildlife, induced recharge for municipal water systems, water quality maintenance, and

2. the economic, social, and environmental value of reasonably foreseeable alternative out-of-stream uses of water that will be foregone or accorded junior status if the appropriation is granted.

The Platte River basin (Figure 1) drains approximately 89,189 square miles along 1,212 miles of main stem river originating from the headwaters of the South Platte and the North Platte in eastern and northern Colorado and south central Wyoming, respectively. Additionally, from where these two tributaries meet at North Platte, Nebraska, the river proper traverses 350 miles eastward and enters the Missouri River at Plattsmouth, Nebraska. Mean annual discharge at the mouth is 6,976 cfs.

The Platte River in Nebraska provides riverine and riparian wetland habitats used by a variety of resident and migratory fish and wildlife species, including 230 bird species (Currier et al. 1985) and 55 fish species (Johnson 1942, Morris 1960, Peters et al. 1989 and 1992). Included among these species are state and federal listed species (i.e. whooping crane, piping plover, interior least tern, bald eagle, river otter and lake sturgeon (state listed only), and pallid sturgeon). The endangered whooping crane currently utilizes 70 miles of the central Platte River for foraging and roosting activities during spring and fall migrations. Further, 58 miles of the central Platte reach is designated as critical habitat by the U.S. Department of the Interior for the whooping crane. The threatened piping plover and endangered interior least tern nest and rear young on riverine sandbars. Piping plovers forage mostly on aquatic invertebrates at the waters edge while least terns prey on minnow species. The combination of wide, unobstructed river channel and
adjacent wet meadows are essential to the migrational ecology and physiological conditioning of sandhill cranes prior to the breeding season.

The Platte River fish community is used extensively as prey by bald eagles while overwintering along the Platte as well as by the state threatened river otter throughout the year. The endangered pallid sturgeon is known to occur in the lower Platte in the vicinity of the Elkhorn River confluence. Finally, the state listed endangered sturgeon chub (a federal candidate species) and lake sturgeon have been documented in the lower reach of the Platte. The perilous status of so many species, the prevalence of documented fish kills in 57% of the 23 years between 1974 and 1996, along with ongoing competition for use of remaining surface flows prompted the effort to seek instream flows on the lower 250 miles of the Platte River for public trust fish and wildlife resources.

Study Area

Whooping cranes historically used approximately 180 miles of the Platte River between North Platte and Chapman (12 miles east of Grand Island) for roosting activities during spring and fall migration periods. Suitable habitat is now restricted to 70 river miles between Overton and Chapman. Habitat data were collected at sixteen sites on the river where whooping cranes were known to have roosted.

Wet meadows are native grasslands in and adjacent to the central Platte. Characteristically, they have high ground water tables, with soils that are poorly drained, organic in nature, overlaying deposits of sand, and are usually saturated in the spring when river stage and precipitation are high. Three representative wet meadows in and along the 70 mile reach of the central Platte River were chosen to be studied because they represented a variety of topography, drainage, and vegetation types important to sandhill cranes, whooping cranes, and many other migratory and breeding birds.

For fishery purposes, the study area consisted of the lower 250 miles of the Platte River. This area was divided into three reaches. The 150 mile central Platte reach ran from the J-2 return (located about 5 miles east of Lexington) downstream to the mouth of the Loup River near Columbus. The second reach ran from the mouth of the Loup River downstream to the mouth of the Elkhorn River. The third reach ran from the mouth of the Elkhorn River (a few miles upstream of Ashland) downstream to the mouth of the Platte River. Gaging stations in each respective reach were located at Overton, Odessa, Grand Island, and Duncan; North Bend; Ashland and Louisville. Aerial photographs, U.S. Geological Survey (USGS) maps, hydrologic data, and field inspections were utilized to segment the entire 250 miles of river into one-mile increments and then representative study sites were selected for each reach. For the highly braided 150 mile central Platte reach, sixteen study sites were deemed appropriate. For the 100 mile reach from the mouth of the Loup River downstream to the mouth of the Platte, three representative sites were deemed appropriate. Hydraulic and habitat data were collected from each study site at multiple discharges between 1983-1989.

Methods and Materials
Field studies were conducted between 1982 and 1993 and involved application of the Instream Flow Incremental Methodology (IFIM) (Bovee 1982, Milhous et al. 1984). For habitat quantification purposes, the Physical Habitat Simulation (PHABSIM) analytical process of IFIM was utilized to help determine flow recommendations for whooping cranes and fishery resources.

**Whooping crane roosting.** To determine flows needed to support whooping crane roosting habitat needs, the PHABSIM (Milhous et al. 1984) model of the IFIM (Bovee 1982) method was utilized. Four principal habitat parameters were used to describe the main attributes of whooping crane roosting sites: unobstructed channel width, water width (wetted width) within the channel, distribution of depths across the wetted portion of the channel, and river length (Wingfield 1993). Shenk and Armbruster (1986) and the U.S. Fish and Wildlife Service (USFWS 1987) developed habitat suitability criteria and habitat suitability indices for physical habitat variables used in the modeling effort. Because criteria describing whooping crane roosting habitat differ from criteria typically used in IFIM fishery analysis, a unique habitat computer code was written specifically to produce the habitat versus discharge output. This program is the functional equivalent of the HABTAT program of PHABSIM and is regarded as a special application to PHABSIM (Ziewitz 1987).

**Wet meadows.** Instream flows needed to sustain wet meadows were determined from data collected from a study conducted by Henszey and Wesche (1993) which described the hydrologic parameters influencing the condition of wet meadows. Other vital information used to justify needed flows included more than thirty scientific reports and publications describing ecological, hydrological, and biological interactions and river processes.

The three representative wet meadows studied each had a weather station, a cross-valley well transect, a well grid equipped with continuous monitoring of groundwater levels, and one or more river-stage gaging stations with continuous recorders. Historic (1942–1992) depth to groundwater duration curves were generated from daily mean groundwater depths and river stages. These curves represented cumulative frequency distributions showing percent of time a particular depth or stage was equaled or above that level for the time period specified. Linear regression was used to determine the relationship between river stage and river discharge as measured by an adjacent USGS gaging station. Correlation analysis was used to separate the effects of river stage, precipitation, and evaporation on the groundwater level.

**Fish community.** Site specific fish habitat use criteria were developed in order to utilize PHABSIM modeling (Bunnel 1988, Callam 1989, Peters et al. 1989, Holland and Peters 1994). In these analyses all species/life stages (Table 1) were weighted equally. Weighted usable area (WUA) versus flow, a normal output of PHABSIM, was converted to percent optimum habitat (POH) versus flow for each species/life stage. Finally, the POH of all species was averaged in order to develop a fish community POH versus discharge relationship for each respective river reach for which instream flows were being prepared.

**Table 1.** Fish species for which Platte River habitat determinations were made.
<table>
<thead>
<tr>
<th>Species</th>
<th>Life stage</th>
<th>River reach Central Lower</th>
</tr>
</thead>
<tbody>
<tr>
<td>Western silvery minnow</td>
<td>adult</td>
<td>x x</td>
</tr>
<tr>
<td>Plains minnow</td>
<td>adult</td>
<td>x x</td>
</tr>
<tr>
<td>Speckled chub</td>
<td>adult</td>
<td>x x</td>
</tr>
<tr>
<td>Flathead chub</td>
<td>adult</td>
<td>x</td>
</tr>
<tr>
<td>River shiner</td>
<td>juvenile, adult</td>
<td>x x</td>
</tr>
<tr>
<td>Red shiner</td>
<td>juvenile, adult</td>
<td>x x</td>
</tr>
<tr>
<td>Sand shiner</td>
<td>juvenile, adult</td>
<td>x x</td>
</tr>
<tr>
<td>River carpsucker</td>
<td>juvenile</td>
<td>x x</td>
</tr>
<tr>
<td>Channel catfish</td>
<td>juvenile, adult</td>
<td>x x</td>
</tr>
<tr>
<td>Flathead catfish</td>
<td>adult</td>
<td>x</td>
</tr>
<tr>
<td>Plains killifish</td>
<td>adult</td>
<td>x x</td>
</tr>
<tr>
<td>Carp</td>
<td>adult</td>
<td>x x</td>
</tr>
</tbody>
</table>

River water temperature. Most of the documented central Platte River fish kills between 1974 and 1996 were believed to be related to summer low flows and high water temperatures. A temperature of 104 EF was recorded during one fish kill. On site and laboratory Critical Thermal Maxima (CTM) studies of Platte River species were conducted (Fessel et al. 1995, Fessel 1996). In addition, three independent analytical water temperature methods were used to evaluate summer water temperature versus flow/discharge relationships. The USFWS utilized the Stream
Network Temperature (SNTEMP) model developed to simulate daily mean temperature (Dinan 1993). Sinokrot et al. (1996) of the St. Anthony Falls Hydraulic Laboratory, University of Minnesota, used the Mainstream (MNSTREM) model to simulate water temperatures on an hourly basis and Zander (1995) utilized actual river temperature and river discharge data to statistically analyze correlations between hourly water temperature data with daily flow data.

Results and Discussion

Whooping crane roosting. Whooping cranes migrate north and south through the Platte River valley twice each year; primarily April 1 to May 10 and October 1 to November 10. Special application of the PHABSIM technique resulted in a composite discharge versus habitat curve which indicated that a river flow of 2,400 cfs would optimize roosting habitat during the spring and fall migration periods. Table 2 shows the NGPC instream flow appropriations approved by the NDWR.

Wet meadows. From February through June, river stage is the dominant influence on groundwater regimes in wet meadows followed by precipitation, and then evapotranspiration (Hensey and Wesche 1993). Specific findings of this study included the following: 1) between February and April, mean monthly groundwater levels are at or above the surface 25% to 75% of the time, 2) mean monthly groundwater levels reach their highest level in May and June, 3) mean monthly groundwater depths between February and June are within 0.5 feet of the surface 55% to 80% of the time in wet plant communities, but, are never within 0.5 feet of the surface in transitional or dry plant communities, and 4) groundwater levels are relatively constant in February through April and are at or above the surface more often than in May and June.

Since plants and animals residing in wet meadows are adapted to and depend upon the groundwater regime that has occurred in the past, the rate and timing of any instream flow appropriation should emulate the natural pattern of flows that occurred historically (1942 to 1992); the appropriation should maintain mean monthly groundwater depths that occurred 85% of the time upon which a variety of vertebrates and invertebrates depend; and finally instream flows should protect the rise in groundwater levels that typically occurs with increases in spring discharge and the initiation of soil thaw which stimulates biological activity (Henszey and Wesche 1993).

Based upon the above results, instream flow requests for wet meadows in the central Platte reach for the months of February through June at the Grand Island gage were made as follows: February 2,700 cfs, March 3,200 cfs, April 2,800 cfs, and May-June 5,900 cfs (Table 2). Appropriations for wet meadows were not approved by the NDWR because: 1) the Director was not convinced that the evidence presented represented a compelling hydrological or geological basis upon which to claim evidence of a river-aquifer linkage, and 2) since the benefits to wildlife from an instream flow appropriation would accrue outside the banks of the Platte River channels, the Director concluded that the request for the appropriation did not qualify as an instream flow application.

Fish community/river water temperature. For the fish community in the central Platte River reach which had experienced the majority of all fish kills, PHABSIM analysis by itself indicated that
650 cfs would be sufficient. The NGPC’s appropriation request was for 1,000 cfs because additional analysis with the Tennant (1976) method, a USFWS fish guild PHABSIM study, a habitat richness analysis, and a water temperature versus river discharge analysis indicated that 650 cfs would be insufficient to protect the resource. Based on PHABSIM analysis for the reach from the Loup River to the Elkhorn River and the reach from the Elkhorn River to the mouth of the Platte, the NGPC requested 1,800 cfs and 3,700 cfs respectively. Table 2 illustrates the NGPC instream flow appropriations that were approved by the NDWR. Table 3 denotes instream flow appropriations held by NGPC and the Central Platte Natural Resource District (CPNRD).

Figure 2 depicts graphically the combined instream flow appropriations granted to the NGPC and the CPNRD while Table 3 shows it in tabular form. Had the instream flow request for wet meadows been granted, spring flows in the central Platte River reach would have emulated a natural hydrograph. Not only are magnitude, frequency, duration, timing, and rate of change important to recharging aquifers and riparian habitats, including wet meadows; higher spring flows are responsible for moving water and sediments downstream and providing a life essential cue for reproduction and recruitment of riverine fish species at the same time.

Table 2. Platte River instream flows (in cubic feet per second) appropriated by the NDWR to the NGPC on June 26th, 1998 effective November 30th, 1993 by purpose, segment, time period, and gage location (does not include previous instream appropriations granted to the CPNRD for the central Platte River reach).

<table>
<thead>
<tr>
<th>Application and flow requested by time period</th>
<th>Purpose</th>
<th>River segment</th>
<th>Time period</th>
<th>Central Platte River reach</th>
<th>Lower Platte River reach</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-17329 1,000 cfs Jan-Dec</td>
<td>Fish community</td>
<td>Kearney Canal diversion downstream to Loup Power return at Columbus</td>
<td>Jun 1-Jun 23</td>
<td>500</td>
<td>500</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Jun 24-Jul 31</td>
<td>400</td>
<td>400</td>
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<td></td>
<td></td>
<td>Aug 1- Aug 22</td>
<td>200</td>
<td>300</td>
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<td></td>
<td>Aug 23-Aug 31</td>
<td>300</td>
<td>400</td>
</tr>
<tr>
<td>A-17330</td>
<td>Fish community</td>
<td>Loup Power Canal return downstream to confluence with Elkhorn River</td>
<td>Entire year</td>
<td>1,800</td>
<td></td>
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<tr>
<td>A-17331</td>
<td>Fish community</td>
<td>Elkhorn River downstream to mouth of Platte River</td>
<td>January</td>
<td>3,100</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Feb-Jul 31</td>
<td>3,700</td>
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<td></td>
<td></td>
<td>August</td>
<td>3,500</td>
<td></td>
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<td></td>
<td>September</td>
<td>3,200</td>
<td></td>
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<td></td>
<td></td>
<td>Oct 1-Dec 31</td>
<td>3,700</td>
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<tr>
<td>A-17332</td>
<td>Whooping crane roost habitat</td>
<td>Kearney Canal diversion downstream to U.S. Hwy 281 bridge at Grand Island</td>
<td>Apr 1- Apr 14</td>
<td>50</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>May 4 -May 10</td>
<td>1,350</td>
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<td></td>
<td>Oct 1- Oct 11</td>
<td>1,350</td>
<td></td>
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<tr>
<td>A-17333</td>
<td>Wet meadow habitat</td>
<td>J-2 return downstream to Chapman, just east of Grand Island</td>
<td>Feb - Jun</td>
<td>denied</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>denied</td>
<td>denied</td>
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<td></td>
<td>denied</td>
<td>denied</td>
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<td></td>
<td></td>
<td>denied</td>
<td>denied</td>
<td></td>
</tr>
</tbody>
</table>
Superscript note:

1 = Central Platte River reach instream flows granted to the NGPC are in addition to previous instream appropriations granted to the CPNRD

Table 3. Total instream flows (in cubic feet per second) appropriated for the central and lower Platte River when CPNRD appropriations (effective July 25, 1990) are combined with NGPC appropriations (effective November 30, 1993) by time period and gage location.

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Central Platte River reach</th>
<th>Lower Platte River reach</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Overton gage ¹</td>
<td>Odessa &amp; Grand Island gage</td>
</tr>
<tr>
<td>January</td>
<td>500</td>
<td>500 ¹</td>
</tr>
<tr>
<td>February</td>
<td>500</td>
<td>500 ¹</td>
</tr>
<tr>
<td>March</td>
<td>1,100</td>
<td>1,100 ¹</td>
</tr>
<tr>
<td>April 1 - 14</td>
<td>1,300</td>
<td>1,350 ²</td>
</tr>
<tr>
<td>April 15 - 30</td>
<td>1,500</td>
<td>1,500 ¹</td>
</tr>
<tr>
<td>May 1 - 3</td>
<td>1,500</td>
<td>1,500 ¹</td>
</tr>
<tr>
<td>May 4 - 10</td>
<td>500</td>
<td>1,350 ³</td>
</tr>
<tr>
<td>May 11 - 31</td>
<td>500</td>
<td>500 ¹</td>
</tr>
<tr>
<td>June 1 - 23</td>
<td>500</td>
<td>1,000 ⁴</td>
</tr>
<tr>
<td>June 24 - 30</td>
<td>600</td>
<td>1,000 ⁵</td>
</tr>
<tr>
<td>July 1 - 31</td>
<td>600</td>
<td>1,000 ⁵</td>
</tr>
<tr>
<td>August 1 - 22</td>
<td>600</td>
<td>800 ⁶,¹⁰</td>
</tr>
<tr>
<td>August 23 - 31</td>
<td>500</td>
<td>800 (^7,10)</td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td>-------------</td>
</tr>
<tr>
<td>September</td>
<td>500</td>
<td>500 (^1)</td>
</tr>
<tr>
<td>October 1 - 11</td>
<td>1,100</td>
<td>1,350 (^3)</td>
</tr>
<tr>
<td>October 12 - 31</td>
<td>1,500</td>
<td>1,500 (^1)</td>
</tr>
<tr>
<td>November 1 - 10</td>
<td>1,500</td>
<td>1,500 (^1)</td>
</tr>
<tr>
<td>November 11 - 30</td>
<td>500</td>
<td>500 (^1)</td>
</tr>
<tr>
<td>December</td>
<td>500</td>
<td>500 (^1)</td>
</tr>
<tr>
<td><strong>Annual Mean Discharge</strong>&lt;br&gt; and period of record</td>
<td>1,619 (\text{(1942-1991)})</td>
<td>1,602 (\text{(1942-1997)})</td>
</tr>
</tbody>
</table>

1. = CPNRD  
2. = NGPC (50 cfs) plus CPNRD (1,300 cfs)  
3. = NGPC  
4. = NGPC (500 cfs) plus CPNRD (500 cfs)  
5. = NGPC (400 cfs) plus CPNRD (600 cfs)  
6. = NGPC (200 cfs) plus CPNRD (600 cfs)  
7. = NGPC (300 cfs) plus CPNRD (500 cfs)  
8. = NGPC (300 cfs) plus CPNRD (600 cfs)  
9. = NGPC (400 cfs) plus CPNRD (500 cfs)  

10 = NDWR reduced the instream flow request because it exceeded the 20 percent exceedence flow limit set by statute.

**References Cited**


Peters, Edward J., R.S. Holland, M.A. Callam, and D. L. Bunnell. 1989. Platte River suitability criteria ... habitat utilization, preference, and suitability index criteria for fish and aquatic invertebrates in the lower Platte River. Nebraska Technical Series No. 17. Nebraska Game and
Acknowledgements

Funding for this instream flow work came principally from the Federal Aid in Sport Fish and Wildlife Restoration Program, Project FW-19-R, Nebraska.
Endangered Species Act / Recovery Drives Platte River Cooperative Agreement

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Executive Summary

On July 1, 1997, Nebraska, Colorado, Wyoming and the United States Department of the Interior entered into a partnership to develop a basin-wide recovery "program" for threatened and endangered species in the Central Platte River Basin. The program’s primary purpose is to provide recovery oriented habitat and water for the whooping crane, piping plover and the interior least tern. The pallid sturgeon, which uses the Platte only near its mouth, is also a target species for the proposed program. For now it is uncertain what types of efforts if any will be directed specifically towards sturgeon recovery.

Each party entered into the agreement voluntarily and each could opt out at any time. The proposed program takes a phased, adaptive management approach and has three primary components; the Water Action Plan (WAP), the Depletion Plan, and a Habitat Plan. The WAP is designed to put "new water" into the river (water that would not normally be there, at that time). Water goals for the program relate to "target flows", which have been identified by the USFWS. The Depletion Plan is designed to prevent increased shortages to target flows caused by new or expanded uses of water. New uses that contribute to target flow shortages would be subject to mitigation, either with water or with dollars that could be used to produce water. The Habitat Plan has a first increment goal to develop and/or protect at least 10,000 acres of terrestrial habitat between Lexington and Chapman. This habitat would be acquired from willing participants via leasing, conservation easements, and (as a last option) through purchase. Focus would be placed on riverine and wet meadow type habitat.

Nebraska has undertaken a comprehensive study called the Cooperative Hydrology Study (COHYST), to determine to what extent ground water is hydrologically connected to surface water and how new ground water uses adversely effect the Platte and its tributaries. Nebraska and the other states are also contracting with an independent consultant for a study to determine whether and how improving flows to better meet target flows might impact sediment load in the river, and what (if any) effect that might have on the depth and width of the streambed.

A Draft Environmental Impact Statement for the proposed program is to be released in early 2002. One of the alternatives to be considered in the draft EIS is the proposed "program". Another is called the "No Action" alternative, which is basically no "program". Under the "No Action" alternative the obligation for overcoming adverse effects would rest with individual citizens and water project operators instead of with the "program".

Sometime in late 2002 or early 2003, Nebraska will be presented with a "program" document and with a decision about whether to sign on. The best we can do until then is to stay informed, as this program is being drafted and revised continually.
Introduction

Nebraska, Colorado, Wyoming and the United States Department of the Interior have entered into a partnership to develop a basin-wide recovery program for threatened and endangered species in the Central Platte River Basin. The program’s primary purpose is to provide recovery oriented habitat and water for the whooping crane, piping plover and the interior least tern. The pallid sturgeon, which uses the Platte only near its mouth, is also a target species for the proposed program. For now it is uncertain what types of efforts if any will be directed specifically towards sturgeon recovery.

The "Cooperative Agreement" (CA), or the "agreement to try to reach and agreement" on a basin wide recovery program, was signed on July 1, 1997 by Secretary of Interior Bruce Babbit and the Governors of Nebraska, Colorado, and Wyoming. Each party entered into the agreement voluntarily and each could opt out at any time.

The proposed "program" takes a phased, adaptive management approach. Adaptive management means that initial actions may be modified as determined by the results of those actions. Assuming the cooperating partners agree to the terms of the program, the first phase is expected to be 10 to 13 years in length.

A ten-member governing body call the Governance Committee (GC) has been responsible for the activities undertaken to date. The GC includes representatives from the U.S. Fish and Wildlife Service (USFWS), the U.S. Bureau if Reclamation, each of the three states, water users from three geographic areas in the Platte River Basin, and environmental organizations. Dale Strickland of West Inc., an environmental consulting firm out of Cheyenne, WY is the acting Executive Director. The Executive Director is responsible for assisting the parties in developing the different elements of the proposed program. The proposed recovery program has three primary components; Water Action Plan, Depletion Plan, and a Habitat Plan. Following is a brief description and the current status of each.

Water Action Plan (WAP)

The USFWS has identified target flows for the endangered species in the Central Platte; i.e. flow levels the USFWS believes are needed to provide adequate habitat for those species. The USFWS believes that actual daily flows currently fall short of those target flows, in the aggregate, by an average of approximately 417,000 acre feet (af) per year. To put this into perspective, one cubic feet per second (cfs) of river flow is equal to approximately 2 af per day, so an average increase in flow of 570 cfs would be needed to produce an average daily increase of 1,140 af, which, in turn, would result in an annual total increase of 416,100 af. It should be noted that such an analysis greatly oversimplifies the target flow issue. There are times during most years when flows in excess of the target flows occur; if those excesses could be retimed so they would be added to the river during times of shortage, that would reduce the amount of water that would actually have to be added to the river on an annual basis. Also, there is substantial disagreement on whether the identified target flows are biologically or hydrologically necessary or even beneficial to the habitat and/or recovery of the species. The USFWS is willing to review and possibly revise the target flows as better science becomes available.
In the meantime, incremental improvements in flows would be sought. The goal during the first increment of the proposed program would be to reduce shortages to the current target flows at Grand Island by an average of 130,000 to 150,000 af per year. Three projects already being implemented or planned by the three States will produce an estimated 80,000 af per year. The first project is an "environmental account" (EA) in Lake McConaughy, where 10% of the storable inflows between October and April are stored, managed and released in a manner to reduce shortages to target flows. There is a cap of 100,000 af that can be stored annually and a carryover limit of 100,000 af, leaving a 200,000 af total storage cap. The year 2000 was the first year of operation for the EA and favorable weather in previous years resulted in a 137,000 af balance to start the water year. In June of 2000 the USFWS released the first EA water out of Lake McConaughy and because of very dry conditions, releases continued throughout most of the summer, usually at a rate of 400 to 550 cfs. The EA release total for water year 2000 (Oct 1, 1999 to Sept. 30, 2000) was 82,810 af. After seepage and evaporation losses were factored in the EA balance at the end of September, 2000, was 44,026 af.

The second project is an enlargement of Pathfinder Reservoir in Wyoming. Water from that project will be managed with a similar objective; it is still in the planning stage. The third project is the Tamarack Project in Colorado. The Tamarack Project would take water out of the river during times of excess flows (most often during the winter months) and temporarily store it in shallow alluvial aquifers where it would naturally return to the river at times when flow shortages are more likely (in the spring or summer months). Tamarack is under construction and currently is partially operational.

The additional 50,000 to 70,000 af necessary to realize the 130,000 to 150,000 af goal for the first increment will be obtained through other projects. These projects will be selected throughout the basin, must be acceptable to the states, and will be implemented throughout the first increment of the program. These projects are most likely to be storage and retiming and/or conservation oriented.

A Draft Water Action Plan which lists the projects now proposed was completed in September, 2000, and will be revised as necessary. Inclusion of projects in the WAP simply means that they will be advanced to the feasibility level of study to undergo further analysis (i.e. engineering studies, economic and social impacts studies, etc.). Changes are likely before final decisions are made. Finally, participation in these projects by entities or individuals is intended to be voluntary and incentive based. Eligible parties would decide on their own whether they want to participate and, to the extent their arrangement relating to that participation would allow, could opt out of the projects at their discretion.

Projects proposed for Nebraska at the present time include: (1) small storage and retiming reservoir(s) located on or near the supply canal for Central Nebraska Public Power and Irrigation District (CNPPID) somewhere between Brady and Lexington, (2) water rights leasing, (3) agriculture related water management incentives, (4) management of the Gosper, Phelps and Kearney County ground water mound, (5) drainage cutoffs located in the Tri Basin NRD, (6) Dawson and Gothenburg Canal groundwater recharge in Dawson County, (7) power interference (retaining water in a reservoir that would otherwise be released for off season hydropower production so it could be released later when flow shortages occur, and (8) additional
environmental account water from CNPPID’s system (attained from conservation measures already being implemented).

Sediment

Flowing water by nature needs to carry sediment. In many storage and retiming projects the sediment carried by the stream settles out and the water, when later released is sediment "hungry". This sediment hungry water will get the required sediment from wherever it can, i.e. from the streambed and/or bank. There is some concern about how improving flows to better meet target flows might impact sediment load and transport, and what (if any) effect that might have on the depth and width of the streambed. Nebraska and the other states are contracting with an independent consultant for a study to determine what impacts of that type might be associated with augmenting current flows.

Depletion Plan

While the WAP is designed to put "new water" into the river (water that would not normally be there, at that time), the Depletion Plan is designed to prevent increased shortages to target flows caused by new or expanded uses of water. New uses that contribute to target flow shortages would be subject to mitigation, either with water or with dollars that could be used to produce water. A new depletion is defined as – new or expanded water related activities begun on or after July 1, 1997, including new or expanded uses of surface water or hydrologically connected ground water which adversely affect Platte River target flows in the Lexington to Chapman reach or which adversely effect at least some water right holders above Chapman. Remember, the overall goal of the program is to reduce shortages to target flows. Each state is responsible for developing it’s own depletion plan and Nebraska is still working on it’s plan.

Nebraska has undertaken a comprehensive study called the Cooperative Hydrology Study (COHYST), to determine to what extent ground water is hydrologically connected to surface water and how new ground water uses adversely effect the Platte and it’s tributaries. The first results of this study are expected to become available sometime towards the end of 2001.

A brief overview of Nebraska’s current New Depletion proposal follows:

- uses prior to 7-1-1997 would be grandfathered (this is written into the July, 1997 CA document)
- the "State" would assume mitigation responsibility for new uses begun from 7-1-1997 to 12-31-2003
- the user would assume at least part of the mitigation responsibility for new uses begun after 12-31-2003, with the state potentially picking up the remainder
- mitigation would be required on qualifying uses that reduce flows during times of target flow shortages and when existing water rights are shorted
- mitigation would be in water or in dollars which would be used to produce water
- the need to mitigate would be based on "consumptive use" so, replacement wells for similar acres and similar crops would not be "new" uses
- would apply to all new uses: agriculture, industrial, and municipal
Where will mitigation water or dollars come from?

Projections show that some of the WAP projects located in Nebraska should produce more water than Nebraska is proposing to contribute to the "program" water account. To what extent the extra water produced by these projects would be used to offset new depletions for which the state would assume full responsibility (those begun between 7-1-1997 and 12-31-2003) and to what extent this water would be used to offset new depletions begun after 12-31-2003 has not been determined.

Water right leasing and water banking

Water right leasing and water banking are a couple of other potential ways to secure water for offset purposes. Legislation does not exist in Nebraska right now for either; it has been proposed in the past without being adopted, and probably will be proposed again in a future session. Through "water right leasing", one could obtain or transfer the right to use X amount of water at X price. A water bank would simply be an entity that would serve the same function as the bank you write your checks on – except it would hold (on paper) and do the accounting for the water transferred – sort of a water broker. If a party needed offset water for a new depletion, they could go to the water bank and buy water from the bank to offset the new depletion. Deposits into the bank could result from retiring an existing use, reducing a consumptive use, or retiming excess supplies. Again, willing participant, in this case willing buyer, willing seller would be the rule. The water bank could potentially be managed by an NRD, an irrigation district, the state or a newly created institution.

Land Component

Terrestrial habitat is also necessary to meet the needs of the species. The proposed program would over time result in the development and protection of 29,000 acres of terrestrial riverine habitat between Lexington and Chapman. This, however could change as a result of adaptive management. The goal for the first increment of the proposed program would be to develop and/or protect at least 10,000 acres. NPPD’s Cottonwood Ranch property located between Overton and Elm Creek (2,650 acres) has been dedicated to the program. This leaves an unmet first increment need of 7,350 acres. This habitat would be acquired from willing participants via leasing, conservation easements, and (as a last option) through purchase. Focus would be placed on riverine and wet meadow type habitat.

The Platte River Whooping Crane Maintenance Trust, the Nebraska Game and Parks Commission, the Nature Conservancy, and the Audubon Society currently own 9,000 to 10,000 acres of potentially eligible habitat. Eventually, those holdings are expected to contribute to meeting the 29,000 acre goal, but they will not count toward the 10,000 acre first increment goal.

NEPA Review

The National Environmental Policy Act (NEPA) requires that any federal agency prepare an Environmental Impact Statement (EIS) when proposing a major action which could cause significant environmental impact. A Draft Environmental Impact Statement for the proposed
program is to be released in early 2002. It will evaluate a number of alternatives and identify a Preferred Alternative. A comment period will follow (about four months is now planned), and the Final EIS, which must address all written comments, will then be released. The goal for release of the official Record of Decision by the Department of Interior is late 2002 or early 2003. It will then be presented to the Secretary of Interior for his or her signature. Each of the three States will also be assessing the proposed program and making a decision whether it should be approved. With this timeline, the States would have a proposed program document to serve as an impetus for related 2003 legislative activity. A Cooperative Agreement to implement a program would be signed by June 30, 2003. If required, the Governance Committee could extend the Cooperative Agreement (deadline) an additional six months.

One of the alternatives to be considered in the draft EIS is the proposed "program". Another is called the "No Action" alternative. The No Action alternative is not the "status quo". The USFWS has issued the opinion that the species are "in jeopardy". Consequently, some type of recovery oriented action will be required. The No Action alternative is basically no "program" or no basin-wide cooperative recovery effort. Instead of the obligation for overcoming adverse effects resting with the "program", individual citizens and water project operators would have to assume that responsibility under the "no action" alternative. With this comes individual Section 7 consultations on any activities with a federal "nexus". Nexus means connection or relationship. A Section 7 consultation is an evaluation to determine if the action has or potentially could have a negative impact on the endangered species. This would include any projects which utilize federal permits, dollars, expertise or any other type of assistance. Ag programs and irrigation projects could be affected, though the full extent of what may later be determined to have a federal nexus is not now known.

Bottom Line

The states (including Nebraska) have considerable work to do prior to deciding whether to implement a program. Funding availability as well as budget timetables are a common concern and Nebraska needs to finalize it’s depletion plan. Affected NRD’s will also play a major role in implementation, especially the new depletions plan and the boards of those districts will have difficult decisions to make.

As stated earlier "status quo" is not an option. Recovery efforts will be required by the USFWS. However, until a state officially signs the agreement it is not bound in any sense of the word to the actions outlined in the agreement. Even if a state signs the agreement it may opt out at any time if it concludes that continued participation is no longer in it’s best interest. Some important questions to consider include: Are Nebraskans better off participating in a cooperative basin-wide recovery effort? Or would we be better off leaving the decisions to the US Fish and Wildlife Service? What activities will need Section 7 consultations if there is no program and how burdensome will the results be? To what extent will groundwater be involved? What impacts will meeting target flows have on sediment loads and ultimately the streambed and/or bank? There are many unanswered questions. The COHYST and sediment studies mentioned earlier will provide some very valuable information but they won’t answer all the questions.
Sometime in late 2002 or early 2003, Nebraska will be presented with a "program" document and with a decision about whether to sign on. The best we can do until then is to stay informed, as this program is being drafted and revised continually. For more information on the CA including meeting schedules and locations try the internet at www.platteriver.org or for information and updates on COHYST try www.cohyst.org.
Converting Row Crop Area to Permanent Pasture

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There are several reasons to consider converting row crop area to permanent pasture in a typical crop/livestock operation in Nebraska. When the land area to be converted lies within the drainage basin of the Platte River in Central Nebraska, perhaps the most critical reason is to reduce the risk of traditional farm chemicals, fertilizers, and even soil into the river.

To be successful in this conversion from an economically sound measure, the site should either be irrigated or have a sufficiently high groundwater table to provide the necessary moisture for optimum grass growth. This paper will generally limit its discussion to an irrigation system, although many of the techniques are applicable to sub-irrigated and non-irrigated conditions.

In order to maximize the negative effect of the established pasture to the river, we should consider establishing a permanent pasture as compared to using annual forage crops. There are several ways to accomplish this. First we might irrigate existing pastures. Second, we could convert an existing irrigated crop field to grass and use the existing irrigation system. Or third, we might have to establish both the grass and the irrigation system on some previously non-irrigated cropland.

Are there other reasons to do this besides reducing river contamination? To answer this question, I believe you have to know the goals and objectives of your livestock operation. And you have to have an inventory of your available land resources. Now ask yourself several questions: Do you have sufficient pasture to meet current goals and objectives? Are the pastures arranged to allow for efficient management, or should some of them be changed? Would you be better served by changing the amount of time, effort and money invested in livestock as compared to your cropping operation? How much time do you have to establish new pastures? How does your current situation affect the environment around you? When answers to these questions (and others) indicate that more acres or more efficient acres of grazing land would best meet the goals and objectives, we can consider how an irrigated pasture component might provide this opportunity.

If you are in the grazing business, the only product you have to "sell" is grass. And about the only way to sell it is through livestock of some kind that can eat this grass and convert it to meat, milk, or eggs. To grow grass we need the soil base that provides the nutrients, lots of sunshine and some time. We also need the correct temperature and adequate moisture at the same time. When it rains in the summer, we get grass growth. When it doesn’t rain, the grass will not grow. Irrigation simply gives us the opportunity to not depend on rainfall for maximum growth during this growing period. Moisture can be added at the appropriate time to utilize the sunshine, temperature and other conditions that Mother Nature supplies us.

Type of Forage
Irrigation is an added cost to forage production. Therefore, selection of the appropriate grasses and legumes is necessary to efficiently utilize this added expense. In this area, cool season grasses are preferred to warm season grasses in an irrigated pasture. The quality of forage needed will dictate whether a mixture of grasses species or a single forage species will work best. The more uniform the site is (with respect to soil type, lay of the land, etc.), the more a monoculture will be successful. Most sites, however, will benefit from a mixture of three or more species. Examples of cool season grasses to consider include, but are not limited to, smooth brome, meadow brome, Garrison’s creeping foxtail, intermediate wheatgrass, orchard grass, tall fescue, and timothy. Other cool season grasses that might be used under special circumstances include perennial ryegrass, kemal festulolium (meadow fescue/perennial ryegrass cross), virginia wild rye, reed canary grass, and matua prairie grass. Each of these grasses have unique characteristics that may or may not be beneficial in a specific mixture.

The use of legumes in a perennial cool season grass mixture is generally important. These legumes provide needed nitrogen for increased grass growth as well as increasing production tonnage and increased overall quality of the forage mix. Legumes to consider include alfalfa, white clover, red clover, birdsfoot trefoil, or kura clover. Alsike clover, cicer milkvetch and other vetches, and sweetclover may also be considered.

Seeding rates of 80 to 120 seeds per square foot are common in order to establish a healthy stand of forage. The following chart lists some grasses and legumes indicating the number of seeds per pound in thousands:

<table>
<thead>
<tr>
<th>Grasses</th>
<th>Legumes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Crested Wheatgrass</td>
<td>175-190</td>
</tr>
<tr>
<td>Garrison Creeping Foxtail</td>
<td>600-750</td>
</tr>
<tr>
<td>Intermediate Wheatgrass</td>
<td>90-100</td>
</tr>
<tr>
<td>Meadow Brome</td>
<td>80-90</td>
</tr>
<tr>
<td>Orchardgrass</td>
<td>600-650</td>
</tr>
<tr>
<td>Perennial Ryegrass</td>
<td>227</td>
</tr>
<tr>
<td>Reed Canarygrass</td>
<td>533-610</td>
</tr>
<tr>
<td>Smooth Brome</td>
<td>135</td>
</tr>
<tr>
<td>Tall Fescue</td>
<td>220</td>
</tr>
<tr>
<td>Timothy</td>
<td>1230-1300</td>
</tr>
</tbody>
</table>
Do You See What I See?: Looking at Conservation and Sustainability in the Central Platte Valley from an Anthropological Perspective

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ABSTRACT

As we enter the 21st Century, the role of resource conservation becomes increasingly important. Traditional forms of conservation may not be sufficient to meet the increasing and changing demands of the world’s increasing population. Divergent definitions of conservation and parallel action toward conservation goals has left all parties concerned short of where they feel that they need to be. A critical factor, that has been under-evaluated in conservation action, is the role of human interaction. Groups and individuals have focused on their own definitions of conservation and resources management and not on what can be done collectively. However, the new century brings new possibilities. By working to understand cultural, environmental, and economic differences in current conservation practices, collaborative efforts can be made to focus on mutual concerns and develop conservation models based on similarities rather than divergences between groups. In this paper I will discuss some of the historical dynamics of conservation practice in the Central Platte Valley of Nebraska, the current social, economic and ecological conditions of the area, and the importance of applied social science in developing a sustainable future for the area. In conclusion this paper will discuss opportunities to develop holistic resource management practices, watershed type thinking and collaborative conservation in South Central Nebraska.

"The surgeon at this post insists that the entire Platte Valley is susceptible of as high a state of culture and fertility as that of the Nile. For the sake of... the future State of Nebraska I sincerely hope he may be right." James Meline 1866 (Mates 1969:239)

This quote was taken from a settler’s journal over a century ago, but it could not be more poignant. The Platte Valley and its people are unique and independent. The scenic beauty of the Platte River as it meanders across three states is unparalleled. The economic potential of the Platte Valley is equally staggering. As populations grow along the watershed, increased and divergent demands on water, land and community have created significant tensions. In the paper I will discuss a brief history of the Central Platte Valley of south central Nebraska and its residents and look at the potentials for change, conservation and development for the future of the watershed.

As the world increases in population and demands on freshwater become greater, the concept of river basin scale planning becomes more favorable. Rivers often transcend local, state, and sometimes international boundaries. Because the flows of a river do not heed to political will of any single entity, often times the specter of conflict arises. Competing definitions of best use and appropriation between different sectors of the population often lead to tensions and often litigation. The Platte River Watershed is no exception. As the primary watershed of Wyoming, Nebraska and Colorado, the Platte Watershed is subject to many demands. The values of these demands have been, and will continue to be, hotly contested. Competing definitions of the rivers
use creates a fractionalized view of the situation to all involved. Rather than looking for consensus, interest groups have become ardent advocates for their position on the river's use. Rather than taking an approach that would develop a river usage pattern that would allow all interests to achieve balance, hard line positions have been drawn and consensus has not been reached.

The problems associated with the Platte River may vary in detail but not in process. An increasingly important part of natural resource management and long term strategic planning is the use of social science. No matter what the nature of a problem is the conflict almost always lies with the people involved and not the landscape. By understanding the importance of social interaction in such scenarios problems can be solved, or avoided altogether. In the Central Platte Valley there has been a long history of conflict and discord about the fate of the river and the people and animals that rely upon it for their livelihood. In this paper I will discuss the importance of understanding social variables in making resource management decisions and planning a sustainable future that allows all participants to work together and develop a comprehensive vision of the environment in which they live and/or hope to protect.

GEOGRAPHY AND ECOLOGY

The Platte River gently flows across three states. It begins as two cold-water streams in the foothills of the Front Range of the Rockies. Less than 100 miles apart the North and South Platte Rivers start their journey with the South Platte winding through northern Colorado and the North Platte winding up into southern Wyoming. As these two streams travel east they traverse a wide-open gently sloping landscape to converge in Nebraska to form the Platte River. The Platte River then doggedly flows across the southern portion of Nebraska, eventually flowing into the Missouri River near Omaha. The Big Bend, or Central Platte Valley (CPV) is a stretch of the river that begins at the confluence of the North and South Platte Rivers east of North Platte and then travels southeast to Kearney where it begins to flow north east to its confluence with the Loup River at Columbus.

The Big Bend Region is characterized with wide shallow channels that intersect and diverge creating large flat islands in the channel giving the river a braided effect when viewed from above. Prior to European settlement, the river was largely an open grassland river with few trees and very wide bluff lines in places (>20miles). The river meandered back and forth between bluff lines scouring wide shallow riverbeds of sand and gravel. The region was the occasional home to the great herds of bison that migrated on the Great Plains.

The Big Bend Region also marks the ‘bottleneck’ or most narrow point of the central North American migratory flyway. This area is a critical stopping point for migratory birds of the North American continent, and every spring is one of the largest single congregations of birds in the world. It is estimated that 11 million birds stop on the Platte every year on their migratory journeys.
HUMAN HISTORY

The Central Platte Valley has a long history of human occupation. Beginning with Native American tribes that lived a transhumant existence in the area between 10 and 25 thousand years ago (Homgren, Schuyler & Davis 1993). These groups most likely followed the large herd animals that traversed the Great Plains and subsisted mainly as hunters.

Around the period of contact (1500’s AD) the Pawnee Nation settled this area. They lived in two separate bands along the Central Platte Valley and subsisted mainly as horticulturalists and supplementing their diet with bison meat. (ibid). The Sioux, Cheyenne, and Arapaho were occasional interlopers to the region, often warring with the Pawnee.

By the 18th Century, the Central Platte Valley began to see its share of European visitors. The French and Spanish both used the Platte as a river to trap fur as well as a guide to the Rockies. The Spanish explored the area looking for Coronado’s fabled cities of gold and attempting to forge alliances with Native American groups along the way. When they reached the Central Platte Valley they were unsuccessful in forming an alliance with the Pawnee because they had already made treaties with the French. The Pawnee alliance with the French led the Pawnee to attack a Spanish expedition in 1720 led by Lieutenant-General Don Pedro Villasur. The battle was quick and decisive for the Pawnee killing all but 61 of Villasur’s garrison (ibid).

Early 19th century explorers viewed the Big Bend region, as well as Nebraska in general, as uninhabitable. There were prohibitions against settlement in Nebraska until mid-century. The fact that people weren’t allowed to settle in Nebraska did not keep people from traversing the state and especially the Big Bend region. The flat wide valley that the Platte offered made it the preferred trail of settlers moving west. The California Gold Rush Trail, the Mormon Trail, and the Oregon Trail all used the Central Platte Valley to make their way west. The relative ease of travel through the Platte Valley would cause the railroad to follow. The Platte valley continued to be a travel corridor throughout the 20th century and beyond as the Lincoln Highway (the first transcontinental highway) passes through the Big Bend region, as does Interstate 80.

Following the Homestead Act, the Big Bend region was settled very quickly and has been continuously occupied primarily by farmers of European descent. Once thought to be a vast desert, the Platte quickly became a farming region when people realized the quality of the soils were unsurpassed. It wasn’t long before the new residents of the area realized that, although they had rich soils, they did not have sufficient or predictable rainfall. This led to the construction of irrigation systems diverting water from the river through ditches to crop fields. By harnessing water the communities of the Big Bend were able to transform themselves from water stops for the railroad to vibrant farming communities (ibid).

THE CENTRAL PLATTE VALLEY TODAY

The last 25 years represent perhaps the most turbulent times for the Central Platte Valley and it’s inhabitants. Technological advancements in irrigation, such as the center pivot, and increased usage of High Yielding Varieties of market grain seed such as corn and soybeans allowed for an increase in the amount of land under production watershed wide. With increased production
demands came increased water demands, declining flows and a steady declination of wild lands in the valley. This chain of events led to the declaration by the United States Fish and Wildlife Service (FWS) that a large portion of the Big Bend region was critical habitat for endangered species.

In May of 1978, FWS, using the Endangered Species Act (ESA), declared the reach of the Platte River from Lexington to Shelton a critical staging area for the endangered whooping crane (Aiken 1999). The significance of this designation changed the social, economic, and environmental dynamics of the Platte watershed dramatically. Prior to this act, the primary use for the water in the river was for irrigation, power generation, and human consumption, now the watershed faced a crisis unlike any in its past.

The first problem is the scope. The Platte River watershed encompasses the states of Nebraska, Colorado, and Wyoming. Each of these states built strong economies by utilizing the water that the Platte provides. To change the flow regime and demand restoration and improvement of habitats along the river posed a threat to present and future economic development in each of the states. Each state felt it had legal and moral standing to claim the water rights that they held and were reluctant to relinquish any of them.

The second is the historical legacy of river basin development on the Platte. Most of the water appropriation projects on the Platte watershed were done prior to the enactment of the National Environmental Protection Act, or NEPA. NEPA requires a thorough examination and mitigation of all factors associated with the implementation of a federal act or project prior to enactment. Thus the dams and canals of the Platte watershed were not examined for anything other than potential for return on investment and development of water poor regions.

One of the criticisms of river basin development agencies is their failure to examine the effect of water control schemes on local communities at the micro level. The need for this research stems from an apparent consistency in the development and implementation policies associated with water resource development. There are several problems that arise from the building of water control projects including environmental impact, social impact, economic impact, etc. These problems are expected and are dealt with in a somewhat limited fashion. They are dealt with in a bureaucratic fashion in most cases, through the implementation of an Environmental Impact Statement (EIS). The EIS is a standard method of inquiry associated with all projects that require federal funding. The requirement of doing an EIS comes from the implementation of the National Environmental Policy Act (NEPA) (van Willigen 1993).

According to the tenants of NEPA all federal agencies are expected to:

Include in every recommendation or report on proposals for legislation and other major federal actions significantly affecting the quality of the human environment, a detailed statement by the responsible official on --(I) the environmental impact of the proposed action (II) any adverse environmental effects which cannot be avoided should the proposal be implemented, (III) alternatives to the proposed action, (IV) the relationship between local short-term uses of man’s environment and maintenance and enhancement of long-term productivity, and (V) any reversible and irrevocable commitments of resources.
The creation of this act however has mixed blessings. The requirement of such procedures creates a forum for issues of social well being to be addressed. However the terminology of the act allows for much speculation over the meaning of terms such as ‘quality of the human environment’ and ‘long-term productivity’ many times allows for the disregard of many pertinent issues. Van Willigen demonstrates this discrepancy in his account of the El Liano Project in New Mexico. This project was a dam project constructed mainly for the purposes of agricultural irrigation. Through careful examination of the local social organization the researcher (Sue-Ellen Jacobs) was able to ascertain that there were important local social structures that would prove to be very effective in the implementation and continued success of the El Liano project. This is an example of a successful assessment. However not all assessments are successful and all assessments are subject to the same misgiving, the demand that they forecast change. Van Willigen also demonstrates that this is a very difficult thing to do. It is very precocious to presume that one could make concrete projections about the impact of planned change on local populations, but this is a necessary part of the EIS process.

However long term analysis of such projects is almost never realized. In order to understand the implications of water development these issues must be addressed. Questions arise due to inconsistencies in projections and misrepresentation of information, such as:

What will become of the community(s) impacted/displaced directly by the construction or change in use of water projects?

What will be the long-term consequences of developing such projects?

What is the right of local communities in determining the usage and management of such projects?

What responsibility does the sponsoring agency and/or the state have to the community(s) in question?

Theoretically these questions are dealt with in the EIS, however the projections of a report and the occurrences on the ground are rarely congruent.

The third and perhaps most crucial problem that has developed from the ESA designation is a lack of comprehensive understanding of all participants impacted by it. Federal involvement in the future of the Platte, though well intentioned, began in a way that created tensions and divisions between the people and groups affected. Following the ESA designation the development of water projects on the Platte were brought to a complete standstill. Concern of federal intervention and uncertainty of the long-term implications of such interventions placed most, if not all, participants in a defensive posture.

In 1994 the three states and the Department of the Interior drafted a memorandum of understanding agreeing to work together to determine the future of the Platte River Watershed
and more specifically the ESA designated stretch in the Central Platte Valley. In 1997 all parties signed the memorandum and began working toward developing a plan that would satisfy all participants and plan the future of the watershed. Since that time a great deal of work was done on organizational structure and addressing issues of concern, however there has been little implementation on the ground. A project of this scale is predestined to move slowly so that it will address all issues. The timetable for completion is not an issue of right and wrong, but the perception has become one of frustration. As people from many different disciplines and backgrounds work to develop an action plan that will work to protect the watershed, the perception of the public at large is that there is a great deal of bureaucracy and inaction which serves to heighten anxiety about the future of the river and its residents. An intense treatment of the political activity stemming from the ESA designation is beyond the scope of this paper, but suffice it to say that 20 years of political debate and environmental evaluation have left an indelible mark on the social, political, economic and environmental landscape of the Central Platte Valley.

LESSON TO LEARN

Traditional governmental approaches to natural resource issues often lead to conflict scenarios where one or more parties perceive that they are being reprimanded for their activities and ultimately punished. Top down unfounded mandates from centralized authorities can leave the impression that persons on the ground do not know what they are doing and/or lack the capacity to learn. Such command and control methodologies often lead to disenfranchisement and discord among the participants.

Though there are difficult days ahead for the Central Platte Valley, all is not lost. Much of the dispute relating to the river lies in content and not process. Differing groups have become passionate advocates for the position they hold. They have and will continue to spend a great deal of time and money to bolster their position relative to the river. This approach has merit but is not complete. It focuses on content specific to the group represented. For example, FWS have spent a lot of time and money to determine what they feel is the best course of action for the river based upon their goals and mandates, while other groups do the same. This is a critical first step but it is not the end of the process.

The process of collaborative conservation practice requires that all parties involved bring their issues of content into a public participation setting. While those involved would argue that the problems surrounding the Platte involve hydrology, agriculture, or something else, rarely do they realize that the solution to the problems lay in the effective communication of the participants.

LOOKING AT THE PLATTE WITH A CULTURAL LENS

One critical mistake that is often made when planning projects that will impact large numbers of people is that those people are homogenous. Culture and practice vary regionally and to understand the social and economic institutions of the Central Platte Valley is paramount. A prudent example of this is the role of kinship in the valley. There are several large extended families that live in the region and lots of marriage ties that have influence over large groups of peoples and communities. If an individual becomes frustrated or dissatisfied with the process,
he/she maybe able to spread that dissents over a large area geographically, socially and politically. The people of the Central Platte Valley are similar to most people in one critical facet though, autonomy. Few would argue that most people do not like to be told what to do, and will bristle at that authority. This is the case in the Big Bend Region. A good majority of the persons involved in the decision making process are not from the area, nor are they representative of the people. The work that is being done in the Central Platte Valley is being done more by a community of interest, rather than a community of place or location. In order for long-term sustainability and conservation to work on the Platte, this has to change.

The politics of the Central Platte Valley are not new nor are they unique. The conditions of the problems associated to the river are specific, but the process of compromise and collaboration are not. There is a critical element missing in the work that is being done on the Platte and that is fully understanding the social frameworks that influence the economic, political, and environmental decisions. What is needed is a more proactive approach. Using a Participatory Action Research, or PAR model we can begin to achieve this. The basics of PAR are simple. The first step is to understand the culture and history of the problem and the location in which it takes place. Look at all factors as they relate to each other. The broader a perspective the more stable the model becomes.

The second step is to understand the potential language barriers. In the case of the Platte, this may sound like a foolish notion but it is not. Although the majority of people involved speak English, there is a barrier in terminology and understanding. Competing definitions of terms commonly used in the process of planning for the future of the Central Platte Valley can lead to miscommunication and conflict. For example terms like ‘protection’ and ‘conservation’ are commonly used, but they are defined by each user and not by the all. A critical stage in successful planning for long-term sustainability is to make sure all participants understand what the others are saying. By developing a lexicon of shared meanings, missteps can be avoided and meaningful dialogue can flourish.

The next step in the process is to understand the differences between proximate and ultimate causation in a social science context. An example from the Platte comes from a focus group of farmers/landowners along the river. In that meeting, the group discussed the nuisance created by deer depredation. Their feeling was that wildlife management was not effective enough and the results of that mismanagement were broken fences, crop losses and/or hay and silage contamination. This is a proximate cause and it is given validity by the participants. If one were to look at ultimate causations of those problems, a different scenario arises. Fencing across game trails may result in broken fence but have nothing to do with the population of the animals. It takes only one deer to break a fence. Crop losses can be attributed to proximity to the river. Animals don’t read land leases nor do they care whose crops they are eating. Crop fields close to the river tend to be on sandier soils and thus poorer performers yield wise. Given those factors, animal depredation becomes a greater concern because it threatens farm fitness. Forage/silage contamination can also be explained by looking at location of such goods. Farmers/ranchers tend to place forage/silage away from their houses because of the smell and they usually place them on ground that is not productive from an agriculture standpoint. This means that they may stack bales on the edge of a field between the field and the river or along a windbreak. These areas are not used for cropping so it makes sense from a farm standpoint to use these areas for storage.
These areas also happen to be places where deer hang out. So which is right, the proximate or ultimate explanations? They both are. By understanding problems in the language of those who define them, one is given an insight into the mental landscape in which people live. By gaining that understanding, one can work to develop solutions that will fit within that landscape or find ways to educate and enable the group to work towards solutions.

Once an understanding of these conditions is met, a model can be built that will actively involve all parties. The goal is not to promote a winner take all strategy but rather to look at conditions that need to be met ultimately and finding ways to create meaning for all involved so that they will want to achieve the conditions. For example, in the case of the Central Platte Valley, one of the criteria for meeting the ESA requirements is the establishment of large open tracts of native grasslands. This makes sense from a bio-diversity standpoint, but it has little meaning to someone who owns land and is trying to make a living on it. However when examining the needs of the landowner, large open tracts of grass does make sense in terms of cattle or hay production, or to keep new house construction to a minimum. The physical landscape remains the same, but both participants are able to take meaning away from it because it fits into their symbolic landscape.

Once a model is developed that will begin to address the needs of all participants, the next step is to experiment with solutions. Working together to test ideas adds to the scientific base for planning as well as promotes dialogue between participants. It should be understood by all, though, that once a model is developed, it cannot be rigid. The model must be flexible to adapt to situations as they present themselves. It must be constantly monitored to see if it is achieving the results that the group is hoping, and if it is not the group must be prepared to change and adapt the model.

CONCLUSIONS

In conclusion, grassroots involvement is the most critical part of this process. For a project of any kind to be successful in the long term, there has to be autonomy and ownership of the project by the people who live there. This principle has been demonstrated time and again in development projects around the world. If the people who must live with the results of a project do not have equal levels of participation and ownership in a project it is almost certainly doomed to fail.

There are many lessons yet to be learned from the experience of the Central Platte Valley. All sides are not in agreement, and no one is ready to concede. Adversarial situations of this scale are unproductive and costly. Without an understanding of the social factors that influence economic and ecological decision-making, participants are creating tensions where they need not be and there are opportunities that are being missed. Collaborative conservation and public participation are risky strategies because they do not project success or easily defined goals. Those who need to know how something will end before they begin will find these processes to be uncomfortable at best. In layman’s terms, its sticky and it doesn’t make sense until you are involved. By welcoming any and all into this process you run the risk of slow beginnings but you stand a better chance of having fewer false starts and increased positive dialogue no matter what the results of the project. By making a process open to all, the sense of alienation becomes the
responsibility of the individual. If their needs are not being addressed it is because they are not there to address them.

APPENDIX

The author is currently working as a field representative for The Nature Conservancy (TNC) in the Central Platte Valley. In that position he is working toward developing community based conservation practice that promotes the healthiest balance of social, economic and environmental goals. Some of TNC’s projects in the Central Platte Valley include the development of grazing systems that balance bio-diversity goals with ranching and grazing needs, the development of entrepreneurial ventures that will create economic growth using conservation practice and the promotion of long term land and water protection through collaborative planning efforts with strong grassroots participation.

BIBLIOGRAPHY


Planting Guidelines

Cool season, irrigated pastures can be seeded either in the spring or fall. Spring seeding should be done as early as possible in the spring to allow for maximum growth the first year. Spring seeded pastures should generally not be grazed during the first growing season. After all growth is stopped in the fall, the residue can be grazed. Fall seeded pastures are ideally seeded in late August. These fall seeded pastures can usually be grazed the next season beginning in late April or early June.

Disadvantages of spring seeding is a higher weed competition and the loss of the entire growing season the first year. A disadvantage of fall seeding is the ability to have a crop harvested early enough and still have the ground ready for planting at the right time.

Seed placement is important for proper germination. It must be in contact with the soil, but not planted too deeply. The ideal depth is 1/8” to 1/4”. After planting, if you are not able to see seeds on top of the soil, you may be planting too deep. A firm seedbed also helps insure a good stand.

Irrigation methods

Most types of irrigation can be used on grass, although sprinkling types are preferred to flood irrigation. Solid set systems are generally the most efficient, but may be less cost effective when compared to Center Pivots. Generally, frequent and small applications result in the best use of the water. We normally recommend application rates of 2/3 to 3/4”. This compares to over one inch applications on most row crops. This is most important for those grass species that have the shallower root systems, such as perennial ryegrass. Water is usually applied in a paddock following the grazing period, but producers have successfully applied the water at any time and sometimes right over the livestock as they graze. Be careful to avoid pugging or tearing up the sod by leaving the soil too wet when the stock are on the paddock.

Apply the irrigation water as slowly as possible to reduce any runoff or standing water. Some research in Australia indicate applying water at the rate of one inch per six hours is optimum. There is also evidence to that the irrigation "season" may be quite a bit longer than the traditional row-crop season. Early applications may have the most profound affect on the entire season growth of any other time. Late applications may influence the ability to resist winter injury (especially for the shallow rooted grasses.)

Fences and Water

The newer fencing materials and watering equipment are available for irrigated pastures. Interior fences use galvanized high-tensile wire, aluminum wire, poly wire or tape, or even plain smooth wire. Barbed wire is generally not used. Posts vary from plastic step-in posts to fiberglass posts.
to common steel fence posts. Posts are placed up to 100 feet apart depending on the terrain and type of wire used. Generally, a single wire for cross fences is all that is used for cattle. Sheep and goats will need more than one wire.

Allowing center pivot wheels to "cross" fences is done about as many ways as there are graziers doing it. These designs vary from intricate gates to just letting the wheel run over the fence.

Watering systems can use plastic or PVC-type pipe on top of the ground or buried. Movable water tanks allow water to be placed in each paddock, but lanes to a central watering place is also used. We recommend to have a separate water supply for the livestock and the irrigation system. It is difficult to design a water system that can pump water to the stock independent of whether it is irrigating the grass or not.

Management

Management-intensive Grazing a viable option for grazing. Irrigated pastures will provide more opportunities for profit if the management of the system is intensive. There are times that a set-stock or slow rotation is indicated. But the majority of the time, high stock density with frequent moves will better utilize the forage produced under an irrigation system.

Highest quality forage is essential in an irrigated pasture. Frequent moves of daily or even twice daily, will result in this high quality feed. This practice gives us the highest utilization of the forage produced. Forage consumption up to 90% of the grazable forage produced during the season is within reach. This compares to 30-35% on season long grazing on native or non-irrigated pastures. Appropriate rest between grazings allows the forage to recover before being grazed again. This rest period may be between 20 and 30 days.

A SUGGESTED MIXTURE FOR IRRIGATED PASTURES IN SOUTH CENTRAL NEBRASKA

Grass/legume Lbs./acre cost/lb. Cost/acre pls/sq.ft growth form

Orchard Grass, Baridana 2 1.85 3.70 27 bunchgrass

Garrisons Creeping Foxtail 1.5 5.10 7.65 26 sod-forming

Meadow Brome, Paddock 5 2.95 14.75 10 bunchgrass

Smooth Brome, Lincoln 1 1.50 1.50 3 sod-forming

Intermediate Wheatgrass, Oahe 3 1.40 4.20 6 sod-forming

Alfalfa, Amerigraze 401+Z 2 3.50 7.00 9 legume

White clover, Alice 1 3.50 3.50 18 legume
Birdsfoot Trefoil, *Norcen* 2 2.00 4.00 19 legume

Total 18 43.17 46.30 118

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**ABSTRACT**

From 1992 to 1999 the Central Nebraska Public Power and Irrigation District conducted 82 surveys for Bald Eagles (*Haliaeetus leucocephalus*) along 120 km of the Central Supply Canal, at seven District reservoirs, and approximately 15 km of the Platte River in Nebraska. A total of 10,458 bald eagle observations were recorded for an average of 127 (10 - 429) per survey. Adults made up 72.2% of all eagles sighted between Overton and North Platte. The highest concentrations were from Lake McConaughy, Johnson Lake, and the tailrace below Central's J-1 and J-2 Hydroelectric Power Plants. Bald Eagles utilizing waterways owned and operated by Central accounted for 13% and 41% respectively of eagles counted in Nebraska and the North Platte, South Platte, and Platte River Valleys in Nebraska.

**INTRODUCTION**

From 1992 - 1999 the Central Nebraska Public Power and Irrigation District (Central) surveyed wintering bald eagles (*Haliaeetus leucocephalus*) along seven reservoirs, 120 km of Central Supply Canal, and three locations on the Platte River in central Nebraska.

Previous studies (Plettner 1993, Stalmaster and Plettner 1991, Stalmaster 1990), found these areas accounted for 30 - 48% of the bald eagles surveyed in the North, South, and Platte river valleys, 12.8 - 21% surveyed throughout Nebraska, and 1.5% surveyed in the contiguous 48 states during mid-winter bald eagle counts.

In 1992 Central began weekly ground surveys, beginning in mid-December and continuing until late February, to further monitor wintering bald eagle use of Central's canal and reservoir system. From 1992 to 1994 the surveys consisted of observations made at Lake McConaughy and seven locations along Central's Supply Canal and one area along the Platte River. In 1994 the survey was expanded to include three additional sites along the Supply Canal and two additional sites along the Platte River. The results of these surveys are presented here.

**METHODS**

From 1992 to 1999, 82 surveys were conducted at up to 10 locations along the Central Supply Canal, three locations on the Platte River, and at Lake McConaughy. The surveys were carried out on a weekly basis beginning the first week in December and ending in February or early March of each year. Surveys began at 0800h CST and were concluded by 1400h CST. From 1992 to early 1994 nine locations were surveyed. Five additional locations were added in 1994 - 1995. For each survey the observer drove to designated observation points and a count of the eagles visible from that point was made. Eagles observed along the supply canal were identified as adult, juvenile, or unknown age. The age of the birds at Lake McConaughy was not recorded.
RESULTS

A total of 10,458 bald eagle observations were recorded during 82 surveys with 4,676 coming from Lake McConaughy and 5,782 from locations along the Central Supply Canal, associated lakes, and three areas along the Platte River. 71.2% of all observations were of adult birds with 28.8% being either juvenile or unknown age birds.

The areas with the highest number of observations were below the Kingsley Hydroelectric Plant at Lake McConaughy, Johnson Lake, and the tailrace below the J-2 Power Plant.

DISCUSSION

During 1988 and 1989 Stalmaster (1990) conducted both ground and aerial surveys of the lakes and canals owned and operated by Central and those owned and operated by the Nebraska Public Power District (NPPD). The results from the ground surveys compared with the results of the Midwinter Bald Eagle Surveys conducted during those years by the Nebraska Game and Parks Commission indicated 30% of all bald eagles on the Platte River System and 12.8% of the bald eagles in the State of Nebraska were associated with the lakes and canals of the Central and NPPD systems.

Despite changes in protocol and the fact that our study does not include areas owned and operated by NPPD, we arrived at similar results. The results from our ground surveys compared to the results of the Nebraska Game and Parks Commission' Midwinter Bald Eagle Survey (Dinan, 1998) show that 41% of the Platte River bald eagles and 13% of the Nebraska Population are located at these sites.

The number of eagles observed along the canal and the three associated river locations reach peak numbers in early January and remain somewhat stable through February. This would indicate the values observed for this area of Nebraska during the Mid-winter Eagle Survey are an accurate measure of bald eagle use.

The number of bald eagles observed at Lake McConaughy increases significantly from early January, when the Nebraska Mid-winter Eagle Survey is conducted, through February. Over the seven-year period of this study we documented a 382% increase in February use of Central’s project as compared to that recorded during the statewide January surveys. This increase undoubtedly reflects both the concentration of eagles from surrounding areas made unsuitable by increasing ice cover and the beginning of the spring migration.

A number of variables effect how many eagles may be seen at a sight on any given day. One such variable is the number of fish passing through the power plant. When Lake McConaughy freezes over, which generally occurs in mid-January, alewife (Alosa pseudoharengus), and other fish seek deeper and warmer water. This results in a large number being drawn into the Kingsley hydroelectric plant that has its intake on the bottom of Lake McConaughy. The fish pass through the plant into Lake Ogallala. The sudden and extreme pressure change which occurs upon emergence from the plant incapacitates the fish (Laux, 1995) making them readily accessible to gulls, ducks, and bald eagles in the ice free water of Lake Ogallala.
A strong correlation ($r = 0.755$) exists between the number of fish removed on a daily basis from strainers within the Kingsley Hydroelectric Plant's cooling system, an indication of the number of fish being drawn through the turbines of the power plant, and the number of eagles congregating in the trees and on the ice of Lake Ogallala near the outlet from the plant.

**CONCLUSIONS**

Data collected since 1987 highlights the importance of the water resources owned and operated by the Central Nebraska Public Power and Irrigation District to the wintering ecology of bald eagles in Nebraska. During the past twelve years these areas have contained 13% and 41% of the wintering population of bald eagles found within Nebraska and in the Platte River Valley respectively as measured in January. During February the area below Kingsley Dam has contained the highest number of bald eagles in the state with a high of 368 bald eagles counted in 1994 from a single location below Lake McConaughy.

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Upper Platte River Fish Diversity and Abundance Sampling 1997 and 1998

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Abstract

From 1990 to 1996 the Central Nebraska Public Power and Irrigation District and the Nebraska Public Power and Irrigation District measured various aquatic habitat types and conducted fish diversity and abundance sampling at up to 13 locations in the Central Platte River (defined as Lexington to Chapman). During 1997 and 1998 Central expanded this sampling to the Upper Platte River (Confluence of the North and South Platte Rivers to Lexington). I present here the results of the Upper Platte River sampling.

A total of 11,254 fish from 38 species in 12 families were collected and identified with the vast majority coming from the minnow family (84% in 1997 and 78% in 1998). Sand shinners (N. stramineus), fathead minnows (P. pronelas) and red shinners (C. lutrensis) were the most common species collected. There was little difference in the relative abundance of the various habitat types between the Central Platte Sites and those on the Upper Platte. The width of the channel on the Upper Platte is less than that on the Central Platte resulting in less open channel and more relative bank habitat, however that difference did not result in significant differences in fish species richness and or abundance. Using the Whittaker's Coefficient of Community there was an 85% similarity between data gathered on the Central Platte and that from the Upper Platte. Species richness, species composition, and individual abundance measured on the upper Platte River fell within variation measured during the central Platte River.

INTRODUCTION

From 1990 through 1996 the Central Nebraska Public Power and Irrigation District in conjunction with the Nebraska Public Power District conducted sampling at up to 13 sites on the Platte River between Lexington and Chapman, Nebraska.

The purpose of the sampling was to determine species diversity and abundance, population size (defined as an index of the number of fish per mile) and the use of specific habitats within the river. The study was conducted in response to expressed concerns on the impact of low flows on the fish community and the subsequent effect that would have on least terns (Sterna antillarum) which feed on minnow species and juvenile fish.

In 1996 Mike Gutzmer and I did some preliminary sampling in the upper Platte River (defined as North Platte to Lexington, Nebraska) to assess the need for further sampling in this reach of the river (Gutz and Peyton, 1997). Based upon the sampling in the lower Platte and the results of the 1996 sampling in the upper Platte comprehensive sampling using the methodology developed from 1990 - 96 in the central Platte was conducted at three locations in the upper Platte. The results of that sampling are presented here.
METHODS

Sampling was conducted at three sites between North Platte and Lexington (Brady, Gothenburg, and Lexington) in summer (early June) and fall (early October) during 1997 and 1998. Fish sampling methodology was based upon Chadwick & Associates (1992 and 1993) and consisted of ten replicate main channel samples using four seines. Three of the seines were used to delineate an area of 112.5 square meters and the fourth seine was then drawn through the area collecting all fish within the delineated area.

Five 16m lengths, 1m wide, of bank habitat, defined as bank with overhanging vegetation, were sampled by electrofishing. Five in-channel snags were sampled via electrofishing as were five backwaters with downstream connections to the channel and five isolated backwaters that were no longer connected to the flowing channel.

Sample sites were 200 meters long and stretched across all channels of the river. At these sites the total area of the five designated habitat types (open channel, bank, snag, backwater, and isolated backwaters) were measured.

The number of fish collected within each known area was then expanded to represent the total area of each habitat type per site, per acre of that habitat type, and per mile of river.

RESULTS

A total of 11,254 fish representing 38 species in 12 families were collected and identified. A mean of 7,100 fish were collected at each site during each sampling effort which resulted in a calculated mean of 61,000 fish per mile of river.

The majority of the fish collected (84% in 1997 and 78% in 1998) were from the minnow family (Cyprinidae) with sand shiners (N. stramineus), red shiners (C. lutrensis), and fathead minnows (P. promelas) the most common.

Habitat at the three sites in the upper Platte consisted of 95% open channels, 2% bank, 1% in-channel snags, 1% backwaters, and 1% isolated backwaters.

DISCUSSION

One purpose of the study aside from developing baseline information on the abundance, distribution, diversity and habitat use of fishes in the upper reach of the Platte River was to compare those fishery aspects with that of the central reach of the Platte River.

Whittakiers' Coefficient of Community (Whittaker, 1975) was used to compare species diversity with that of the central Platte. After two years of collection in the upper reach there was an 85% similarity in species diversity with collections made over seven years of sampling on the central Platte.
Species richness, abundance, and the resulting population estimate at any given site in the upper Platte during any given season over both years, while resulting in a lower mean than occurred in the central Platte, still fell within variation measured at sites in the central Platte.

This study, in conjunction with sampling from 1990 - 1996 in the central reach of the river, would seem to indicate that despite fairly significant differences in timing and magnitude of river flows that there is a strong degree of consistency in the fishery community between the upper and the central reaches of the Platte River in Nebraska.

References


Mapping Sandhill Crane Roost Sites Along the Central Platte River Using Aerial Infrared Videography

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Aerial infrared videography was collected over the Central Platte River for five nights during the Spring 2000 migration season in order to create digital maps delineating the spatial and temporal patterns of sandhill crane roost sites. Previous efforts to image sandhill cranes along the Platte River using infrared detectors have produced mixed results. In the past, infrared technology was only available from military sources. However, recent advances in the quality of commercially available infrared detectors have led to increased commercial use of these systems, notably for wildlife biology applications. Similar advances in digital video technology permit collection of large quantities of imagery. Individual digital video images from the flights were georeferenced to digital orthophotos within a geographical information system to generate maps of crane roost sites. The maps created by the U.S. Geological Survey were used to investigate the influence of riverine management activities, such as vegetation clearing and streamflow modification, upon the quantity, quality, and distribution of roosting habitat. Imagery from higher altitude flights was used to compute roost site areas, while imagery from lower altitude flights was used to calculate crane densities, in as much as individual cranes could be counted. The U.S. Geological Survey plans to continue to monitor the distribution of sandhill crane roost sites by building upon the techniques developed from the Spring 2000 experiment.
Is Stability of the Platte River Myth or Reality?

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The Big Bend reach of the Platte River is the subject of scrutiny and change. Thirty-five years of research on the reach by the authors produced a data base, gathered from air photos and field investigation, covering nearly 60 years. Periodic analysis of the data through the 1980s repeatedly showed a pattern of stability throughout with discernable differences in patterns within different segments of the Big Bend. This linear analysis also identified probable causal agents for both long-term change and stability. A just-completed three year upgrading of the data base, using original sources and modern computer technology, with added data through the mid-1990s, indicates that certain of the segments are beginning to destabilize in a pattern previously unobserved. This paper examines the indicators of that destabilization and the likely causes.
Soil Vegetation Correlations Along Hydrologic Gradients in the Platte River Wet Meadows

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The importance of soil characteristics in wetland delineation has been well documented. In fact an exact definition has been adopted to determine whether a soil series meets the requirements to be classified as a wetland soil. Even with this definition, little work has been done to determine what role these soils play in determining the plant community composition in a wetland ecosystem. These plant communities are also a key component in the delineation of wetland sites, and much work has been done on their physiological and morphological characteristics. Even with this extensive amount of information about wetland soils, and wetland plant communities, there is still a gap in this information when it comes to relating specific plant communities to specific soil characteristics. This study proposes to provide some insight into these soil-plant relationships. The Platte River in central Nebraska is of the utmost importance not only to the people of the surrounding communities, but also to the wildlife species, that it sustains. The wet meadows located along the Platte River channels are an intricate part of many of these wildlife species habitats. These wet meadows that will be the subject of this study of ecosystem interactions.

These wet meadows vary greatly in their hydrology, and land management practices. To represent this diversity the wet meadows were classified into three management practices (grazed, hayed, or rested). Four replicate sites were selected for each land management practices. Each site was sampled along a hydrology gradient, which consisted of a ridge-swale complex. Each complex was sampled along transects which were established at approximately 15cm increment increase in elevations. Soil samples were taken at each transect. These soil samples were taken at 15-20cm depths. Each soil sample was analyzed for; nitrate, pH, salinity, excess lime, phosphorous, potassium, organic matter, soil texture, percent moisture, and soil percolation rates. All soil samples were taken during the summer of 2000. Hydroperiods and water levels were recorded at wells located on the ridge, and in the swale of each complex. At least one of these wells was equipped with a logger to continuously monitor water levels at each site.

The data from this field season will be analyzed not only between land use treatments but also within treatments, and more specifically between transects within a single complex. Soil-vegetation correlation’s will be determined by performing ordination analysis (CCA) comparing the plant community compositions present at a transect to the soil characteristics present. Cluster analysis of this data will also be performed to determine if distinct groups of plant species require specific soil characteristics. Other investigators determined these plant community composition values used, but these communities where sampled along the same transects as the soil samples.
From Main Channel to Riverine Landscape: Maintaining Hydrological Connectivity on the Platte River Floodplain

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Protect, maintain, and restore biodiversity and ecological processes on the Platte River floodplain is the goal of environmental management to sustain and balance ecological values with human uses. Multiple-scale and hierarchical approaches on conserving biodiversity are needed due to the complex environmental factors over landscape and watershed scale and a large variety of values associated with the biodiversity. The Platte River instream flow appropriations and the "environmental account" of water stored in Lake McConaughy provide not only the rights to regulate river flows, but also a challenge of being compatible with the Nature for maintaining biodiversity and satisfying human's needs. Platte River is a typical braided floodplain river that consists of extensive interconnected biotic communities, their habitats, and environmental gradients. The main channel is only one component of the river ecosystem that links the interactive braided channels, riverine lotic and lentic habitats, and non-aquatic habitats associated with the fluvial system. Habitat heterogeneity associated with riverine landscape contributes to biodiversity of the Platte River ecosystem. Maintaining hydrological connectivity of the main channel with its riverine habitats is the key for sustaining the biodiversity. Can the approved minimum instream flows maintain efficient hydrological connectivity within the braided channel network? How to optimally use the limited water resource and achieve our goal of biodiversity conservation? This paper intends to answer these questions by examining hydrological linkages and spatial and temporal changes of selected riverine habitats in the Middle Platte River, from Overton to Grand Island. Coupled main channel-riverine habitat monitoring data from 1996-1998 were analyzed to conduct the river discharge-riverine water level models (Q-H models). Spatial explicit models (SEM) with GIS data were used to locate the habitat patches, analyze landscape patterns, and incorporate results of the Q-H models for evaluating changes of riverine habitats with hydrological regime. Scenarios of the hydrological linkages among the main channel and four types of riverine habitats under different instream flow levels are demonstrated quantitatively. Effects of natural and human disturbance on structure and function of the riverine habitats are discussed. Focuses of research and management of the Platte River ecosystem should be moved from the mean channel and the target species' habitats upon the entire river ecosystem by integrating of riverine habitats at landscape and watershed scales.
Linking the Hydroperiod to Riparian Grassland Plant Species of the Platte River in Central Nebraska

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Although the values of riparian wetlands to wildlife, fisheries, agriculture, and nonpoint source pollution control are well established, few quantitative data are available linking the underlying hydroperiod to the riparian plant communities that support these important wetland functions. This lack of information is especially critical along the Platte River in central Nebraska where riparian grasslands support a multitude of migratory birds, and where flow re-regulation to enhance habitat for endangered species is being considered on a basin-wide scale. Our study has two objectives designed to address this lack of information. First, evaluate possible links between the hydroperiod and plant species composition along a water-level gradient in the riparian grasslands of the central Platte River; and second, identify possible links between the hydroperiod and river stage, precipitation and evapotranspiration. Additional links to the hydroperiod, including soil characteristics and macroinvertebrate communities, are also being simultaneously studied by other investigators.

Preliminary results from this two-season study will be presented. The basic procedure included sampling plant species abundance along a hydrologic gradient from the bottom of a swale to the top of an adjacent ridge (~2 m change in relative elevation). Several distinct plant communities occur along this gradient as individual plant species express their response to optimum water levels. Study sites (individual ridge and swale complexes) were selected to represent four replicates of three broad-based land management practices (grazed, hayed, or rested). Vegetation transects aligned along plant-community bands (e.g., topographic contours) were established at 15 cm increments in relative elevation from the bottom of each swale to the top of an adjacent ridge. Two hundred points, spaced 10 cm apart, were used to calculate basal cover and frequency to the nearest plant for each transect during the early summer of 1999 and 2000. Water levels were monitored at each site by a pair of wells: one at the bottom of the swale and one at the top of an adjacent ridge, with at least one well at each site equipped with a water-level recorder. Precipitation and evapotranspiration were continuously monitored onsite by four weather stations, and five individual recording rain gages. River stage was monitored by a network of recording and non-recording river-stage gages.

Direct and indirect gradient analyses will be used to evaluate potential links between the hydroperiod and plant species abundance and community structure. Plant response will be inspected for relationships to the hydroperiod during the growing season, and non-linear curves fitted to the data. Non-linear curves were chosen because their parameters can be interpreted with a biological meaning (e.g., amplitude of the peak plant response, water level at the peak, and an indication of the range of favorable water levels). Regression will be used to evaluate possible links between the hydroperiod and river stage, precipitation and evapotranspiration.
Land Management Effects on Invertebrate Diversity in Riparian Meadows of the Platte River in South-Central Nebraska.

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Arthropods comprise a critical component of managed ecosystems. Within these managed ecosystems, land-use practices may greatly affect the arthropod community. We assessed the impacts of different land-use practices on grassland arthropod communities along the Platte River in south-central Nebraska. We used pitfall traps to examine the effect of land-use practices (hayed, idle, or grazed) on arthropod diversity and abundance during two sampling periods in 1999. Pitfall traps consisted of arrays (N= 15 per site, 12 sites) of four 475 ml cups with 0.3 meters of drift fencing placed between them. Traps were opened for a 48 h period during July and September, 1999. Pitfall samples were identified to family and family-level Shannon and Simpson diversity indices were calculated. We examined a total of 16,445 specimens belonging to 91 families. Idle fields had the highest Shannon diversity (7.42) compared to hayed and grazed fields which had diversity estimates of about 7.2. Simpson Index estimates of evenness were also highest for the idle fields (7.29) compared to hayed (6.87) and grazed (6.56). The most abundant arthropods collected from the idle and grazed treatments were ants (Formicidae), while Isopods were most abundant in the hayed treatment. These differences do not appear to be explained by soil-moisture, which was highest (approximately 30%) for idle and grazed treatments and slightly lower (about 25%) for the hayed treatment. The idle treatment had more invertebrate predators. Spiders (1,116) and ground beetles (637) were more abundant compared to hayed (354 spiders, 287 carabids) or grazed (475 spiders, 416 carabids) treatments. Idling of fields can be an important management tool for enhancing arthropod diversity and abundance in native grasslands.
Alternative Methods to Maintain and Enhance Wet Meadow Habitat Along the Platte River, Nebraska

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The Platte River system is one of the most highly developed river basins in the world. At the same time, the central Platte River and its associated wet meadows are an important habitat resource for regional biodiversity, numerous migratory birds and other species. Central Platte River habitats are host to species federally listed as endangered (e.g., whooping crane, interior least tern) and threatened (e.g., piping plover, western prairie fringed orchid). Wet meadows once occurred extensively along the Platte River; however, substantial reductions have occurred during the past century. Many wet meadows have been drained, leveled and converted to cropland.

The sponsors of this Project, Central Platte Natural Resources District, Nebraska Game and Parks Commission, Nebraska Public Power District and The Central Nebraska Public Power and Irrigation District, with the aid of grants from the Nebraska Environmental Trust Fund, have joined together to study alternative methods for maintaining and enhancing Platte River wet meadows. Specifically, the Project goal is to assess the feasibility of enhancing the ecological integrity of Platte River wet meadows at three southcentral Nebraska demonstration sites using means other than streamflow. Success will be measured by gaining additional insights into developing alternative methods in enhancing and maintaining wet meadows. Information gained through this study will be useful in developing other habitats along the Platte River. The three demonstration sites being studied are the Cottonwood Ranch property near Overton, the Grand Island Wellfield site located south of the city of Grand Island and the Wyoming site located southeast of Kearney.

Project sponsors developed site enhancement plans with input from participants of a Wet Meadow Workshop. Two independent experts reviewed revised draft plans. Baseline biological and hydrologic monitoring began in 1997. Site enhancements were implemented and post-treatment biological and hydrologic monitoring efforts began in 1998 and continued through 2000. Data analysis and report preparation are underway.
Platte River Color-Infrared Orthophotographs Available Through the Internet

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Color-infrared (CIR) digital aerial orthophotographs of the Platte River in central Nebraska are now available for downloading over the Internet. These photographs were taken over the Platte River between Lexington and Chapman, Neb., in August 1998 by the Bureau of Reclamation. The CIR photographs were digitally scanned to obtain an image resolution of 1 meter per pixel. The images were then orthorectified to remove distortions caused by camera angle and topographic relief. The resultant digital images average 48 Mb in size. MrSID, image compression software from LizardTech (1), was used to reduce the average file size to about 2.2 Mb. This process greatly reduces the file size while retaining nearly all of the image detail. The compressed images can only be viewed with a MrSID viewer that is available free of charge from LizardTech’s Web page. ArcView and Adobe Photoshop users can download the MrSID program extension to view the images within their software. These CIR digital files are georeferenced, making them ideal for use in geographic information systems. The images are suited for mapping land cover, locating in-channel structures, detecting change, and a wide range of other applications. Making these images available over the Internet places a powerful resource management tool into the hands of those who need it. It is hoped that this will result in better scientific evaluations and more informed decisions concerning land and water resource management in the Platte River Valley. This work was done in cooperation with the Bureau of Reclamation and is part of the U.S. Geological Survey’s Place-Based Study of the Central Platte River. Images can be viewed and downloaded from .

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Reflections on EPA’s CBEP Project

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Between 1993 and 1999, EPA focused considerable financial and human resources on a comprehensive study of the Middle Platte River Community; that 165-mile reach of the Platte River between and North Platte and Columbus, and the accompanying 5,000 square mile watershed that drains into that river segment. A multi-agency and multi-organization "Team" guided the efforts of EPA into compiling economic, social, cultural, historical, recreational as well as environmental information about the human and natural resources of the watershed.

Over 50 "products" were generated by the project, most to capture the perceived problems of the watershed residents and of the Middle Platte River, and to propose opportunities to address those problems. To date, forty-two formal project briefings have been given to agencies, organizations, groups, and individuals to inform them of the issues and concerns of the watershed and the Community.

The objective of the study evolved into providing the agencies, organizations, and institutions responsible for Middle Platte River management, as well as the watershed residents, with information about the watershed to jointly develop a comprehensive, long-range planning process to address and resolve the concerns raised by the Community.

The presentation will provide an overview of the entire Community-based Environmental Protection (CBEP) project and will focus on specific study results of interest to the audience. Recommendations for developing a comprehensive long-range plan and implementing the plan objectives will be presented.
The Platte River Corridor Initiative

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During the past two years Prairie Plains Resource Institute has been promoting a new vision for the Platte River Corridor between Grand Island and Columbus that encompasses a balance between environmental, social, and economic needs. The key to success may be in developing a process that encourages public participation and collaboration between entities and individuals that up to now have not been working together. In other words we must know what people along the corridor need and what they want for the future. We must develop a common language regarding things like "conservation" or "development." We also must determine the most effective, responsible and acceptable roles for government agencies, NGOs, community groups, individuals, and other who are welcome to join in the process. Anything resembling a common vision will only be borne out by good leadership and imaginative projects that yield fruit. It is at root a people process requiring human interactions based on trust, mutual understanding and putting good information to use. Only in the creation of "community" can real conservation happen. This requires us to become intimately involved in the processes of local community (i.e., urban, rural and small town) development. As we attempt to change people's attitudes with enlightened conservation thinking we must work within the framework of peoples needs and values. Likewise, river corridor conservation action needs to be generated from within the region by self-determined citizens. This presentation will contain further explanation of the above comments along with a recounting of the Initiative's evolution to the present. Also, there will be a distinction made between what Prairie Plains Resource Institute's organizational goals are within the broader context of the Initiative.
Influencing the Nest Site Selection of Least Terns and Piping Plovers

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Endangered least terns and threatened piping plovers nest in Nebraska at sand and gravel mines (sand pits) where they are vulnerable to disturbance from mining activities. Conflicts occur when their nesting and protected status limits or stops mining activities, causing hardship and economic losses. We evaluated the possibility of shifting nesting away from active mining areas and toward inactive portions of sand pits. We evaluated nesting response to an attractant (gravel and driftwood spread on the bare sand), a deterrent (mylar flagging), and a control (untreated sand). We established experimental plots (0.2-1.0 ha) with attractant, deterrent, and control treatments at 12 sand pits along the lower Platte River prior to the 2000 nesting season. Least tern (P < 0.001) and piping plover (P = 0.039) nests were not distributed randomly with respect to treatment. Of 101 least tern nests initiated in experimental plots, 71% were in attractant, 1% in deterrent, and 28% in control plots. Of 19 piping plover nests, 58% were in attractant, 11% in deterrent, and 31% in control plots. Substrate and vegetation analysis revealed that colonies were located within plots that had less vegetation and more driftwood than unused plots. Nests were located at sites that contained significantly (P < 0.05) more small (5-15mm) and large (>15mm) gravel than was available on untreated sand. Hatching rates did not differ (P = 0.958) between attractant and control plots, but there was significantly (P = 0.04) more vegetation present at unsuccessful nests. To attract least terns and piping plovers, we recommend 15% cover of small gravel, 5-10% cover of large gravel, driftwood present in >10% of the area, and vegetation <3%. To deter terns and plovers we recommend 7m long streamers of 30mm wide, 0.025mm thick mylar flagging attached to 1m poles arrayed in a 7m grid. This technique gives managers a valuable tool to protect nesting birds and avoid conflicts.
Factors Influencing Soil Macroinvertebrate Communities in Riparian Grasslands of the Central Platte River Flood Plain

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Riparian grasslands along the Platte River contain a mosaic of wetland, wet meadow, and upland grassland habitats that provide critical resources for a wide variety of migratory birds. Because these grasslands are hydrologically linked to the river, management of river flows is an important component of plans to maintain, enhance, and restore these grasslands. However, management decisions for the Platte River ecosystem are hampered by the lack of information on the influence of river flows on riparian grassland communities. Moreover, information about the relationships between the biological communities and their physical environments are needed in order to develop long-term management strategies for riparian grasslands along the Platte River. This 2-yr study examines the soil macroinvertebrate component of the biological community, while a companion study examines the plant component. The objectives of this study are to describe the soil macroinvertebrate community of riparian grasslands along the Platte River and its relationship to a variety of abiotic and biotic factors and to assess the impact of 3 grassland management practices (grazing, haying, and idling) on soil macroinvertebrate abundance, biomass, and diversity. Information from this study will provide an important baseline for evaluating the success of future riparian grassland restoration projects.

The study was conducted during 1999 and 2000. Twelve study sites that represent 4 replicates of ridge-swale gradients (each replicate includes a high, middle, and low transect) and 3 management treatments were located in riparian grasslands along the Platte River in central Nebraska. Sampling was conducted every 6 weeks from mid-April-late September. We collected 5, 25X25 cm and 20 cm deep, soil blocks from each transect at each site for a total of 180 samples during each sampling period. At each sample site, we recorded the following environmental data: soil temperature, soil moisture, water table depth (from wells located on the high and low transects), litter depth, litter cover, litter mass, and root mass. Soil samples were also collected from each sample site for determination of soil texture, organic matter, total carbon, total nitrogen, pH, potassium, and phosphorus. Following collection of soil blocks, a wet-sieving technique was used to remove soil invertebrates. Macroinvertebrates were identified to family or genus level, and abundance and biomass of each taxonomic group was recorded.

We present preliminary results from the study. Twenty-three different taxa of soil macroinvertebrates inhabited riparian grasslands along the Platte River. The most common soil macroinvertebrates were earthworms (Aporrectodea spp. and Diplocardia spp.), June beetles (Scarabaeidae), ground beetles (Carabidae), click beetles (Elateridae), and sow bugs (Isopoda). Earthworms and June beetles account for most of soil macroinvertebrate biomass in riparian grasslands.

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The North and South Platte and Platte Rivers and associated habitats (e.g., sand pits) are major wintering areas for Canada geese (Branta canadensis) in Nebraska. Identification of important river segments and changes in abundance and distribution of wintering Canada geese may be used to direct management actions and mitigation factors. The objective of this study was to examine changes in abundance and distribution of Canada geese along the Platte River during 1960-2000 counts Mid-Winter Survey (MWS) counts. The MWS is conducted annually in early January and all Canada geese and other waterfowl species are counted by ocular estimation. The entire length of the North and South Platte and Platte Rivers is flown at an altitude of 100-300 feet above ground level with 1-2 observers. Counts of geese are recorded along river sections and nearby associated habitats within river systems. Observations were separated and into four main river sections: 1) North Platte River, from the Wyoming state line to the Tri-County Diversion Canal, 2) South Platte River, from the Colorado state line to the Tri-County Diversion Canal, 3) West Platte River, from the Tri-County Diversion Canal to Central City, NE, and 4) East Platte River, from Central City, NE, to Plattsmouth, NE. Each main section was further divided into several subsections for more detailed analyses. Additionally, we examined changes over four time periods (i.e., decades). Over the 41 years, the North Platte River annually has wintered more (P < 0.001) Canada geese than all other river sections. The three most important river subsections along the North Platte were the Lisco-Oshkosh (x=8,472), Lewellen-Kingsley Dam, (x=1,983) and Wyoming Line-Scottsbluff (x=1,692) sections, respectively. The Kearney-Minden (at the I-80 and Nebraska Highway 10 interchange) (x=2,061) and the Gothenburg-Lexington (x=920) subsections annually wintered more Canada geese along the West Platte River. The Hershey-Tri County Diversion Canal (x=1,344) and Columbus-North Bend (x=288) sections were the most important river subsections along the South and East Platte, respectively. There appeared to be no major change in the distribution of Canada geese along the Platte Rivers, however, all river sections experienced dramatic increases (>500%) of wintering Canada geese from the 1960s to the 1990s. Increases in wintering Canada goose numbers along the Platte Rivers are indicative of restoration efforts in Nebraska and increases in Canada goose populations in the Central Flyway. Although annual counts vary widely due to weather and habitat conditions, the North Platte and Western Platte rivers are the most important areas for wintering Canada geese in Nebraska, but increases are occurring along other areas of the Platte River. Continuation of the MWS is important to track changes in abundance and distribution of Canada geese in Nebraska. Future research should investigate ecology of wintering Canada geese along the Platte Rivers to identify important population parameters and habitat needs.
Changes in Waste Corn Availability Affect Fat Storage by Sandhill Cranes Staging in the Central Platte River Valley, Nebraska

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Preliminary measurements of sandhill cranes that died during a blizzard in March 1996 in the Central Platte River Valley (CPRV) suggested fat storage may have declined from when last measured in the 1970s. We suspected that if fat storage had declined, the loss may have resulted because of a reduction in waste corn but we lacked quantitative information to substantiate whether or not waste corn levels had changed, and if so, how much. Therefore, in 1997-99, we re-measured waste corn (kg/ha) on plots within a random sample of quarter sections in which we had measured waste corn in 1978-79. Specifically, we estimated standing crop of waste corn on cropland in the CPRV shortly after harvest during fall 1997 and 1998, in February 1998 and 1999 just prior to arrival of cranes, and in April 1998 and 1999 at crane departure and compared waste corn present in each period with the same period in 1978-79. In 1998 and 1999, we also collected sandhill cranes throughout their stay in the CPRV to measure fat content to compare with fat levels in the 1970s. In 1997, a severe storm in October early in the harvest period caused a high loss of ears leading to waste corn at post harvest 1998 being only 10% lower than at post harvest in 1979. In fall 1998 under more favorable weather conditions for corn harvest, waste corn post harvest was 49% lower than in fall 1978. By crane arrival and departure in 1999, waste corn had declined by 61% and 96% from 1979. The marked decline of waste corn in spring 1999 reflects the growing pressure on the waste corn resource over the winter and spring staging period since the 1970s caused, in part, by increasing numbers of arctic-nesting geese staging in the CPRV. The decline in amount of waste corn present from 1998 to 1999 brought about a corresponding decrease in fat storage in large-bodied cranes, i.e., *G. c. rowani* and *G. c. tabida*, whereas fat content of smaller-bodied *G. c. canadensis* remained similar to the 1970s. In 1998, when corn remained plentiful, % body fat at departure from the Platte Valley was comparable among subspecies and to the 1970s.
Yellow-billed Cuckoo Subspecies Designation Along the North Platte River and Other Locations in Nebraska, a New Endangered Taxon?

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I, along with assistants during six nesting seasons since 1992, captured, banded and recaptured over 13,000 birds with mist nets along the North Platte River near Lakes Keystone and Ogallala. I recorded measurements from 15 Yellow-billed Cuckoos (Coccyzus americanus) during that time. I also measured 37 Yellow-billed Cuckoo skins in the Nebraska State Museum at the University of Nebraska, Lincoln.

Results of the morphometrics analysis seem to indicate that the North Platte River Cuckoos are of the western subspecies (C. a. occidentalis). The western subspecies has previously been reported as close as eastern Colorado. There appears to be a mix of the eastern subspecies (C. a. americanus) and the western subspecies in the Nebraska museum skins. Morphological separation of these subspecies has been the subject of some controversy, and caution is suggested in the trinomial classification of this species. Alternatively, Yellow-billed Cuckoos may simply be a gradually clinal species without definitive subspecies.

Yellow-billed Cuckoos are proposed as a federal endangered species with noticeable declines in Midwest prairies and southern Great Plains. The western populations (subspecies) are considered severely threatened. The initial 90 day finding on the petition to list the species was published in the Federal Registry (vol 65 no. 33 pages 8104-8107) on February 17, 2000, and a status review is due in February 2001. Due to its affinity for riparian habitats, the Platte River and its tributaries would be prime candidates for a recovery effort linked to shrub and tree densities as prime habitats.