Platte River Recovery Implementation Program


Michael Forsberg Photo

Final Environmental Impact Statement

Summary

U.S. Department of the Interior
Bureau of Reclamation

U.S. Department of the Interior
U.S. Fish and Wildlife Service

April 2006

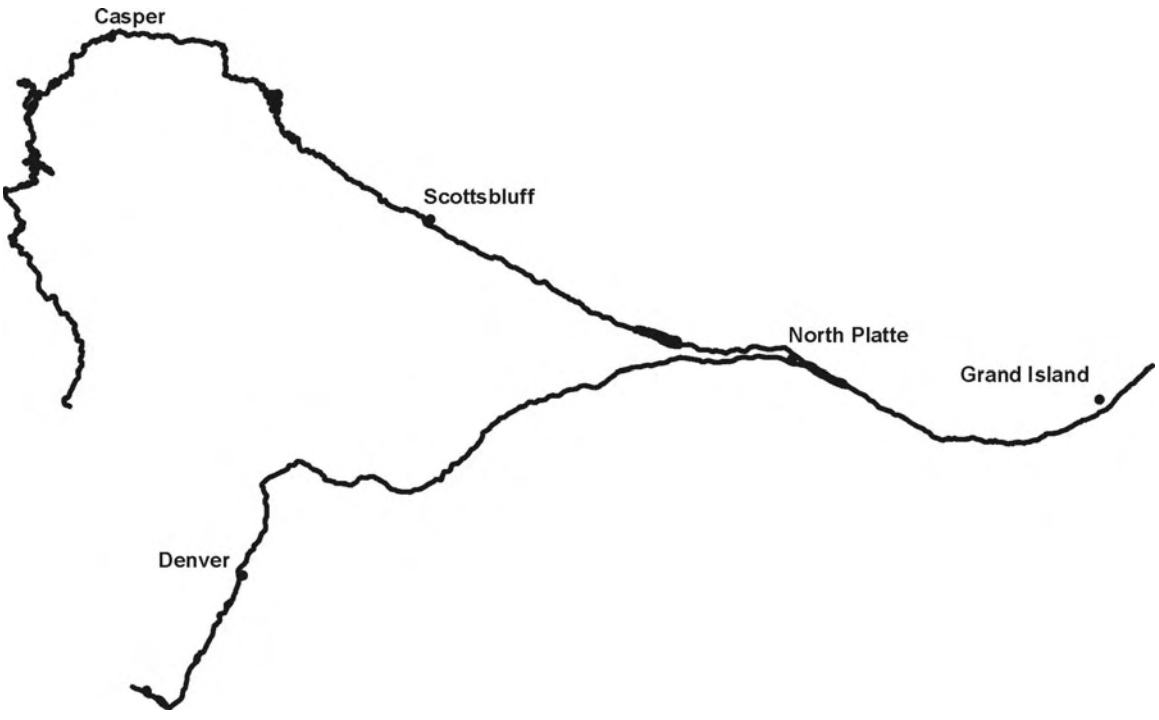
PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM

FINAL ENVIRONMENTAL IMPACT STATEMENT

SUMMARY

Assessing Alternatives for Implementing a Basinwide, Cooperative, Endangered Species Recovery Program

April 2006



United States Department of the Interior
Bureau of Reclamation
U.S. Fish and Wildlife Service

COVER SHEET
Final Environmental Impact Statement
Platte River Recovery Implementation Program

Prepared by: Bureau of Reclamation and U.S. Fish and Wildlife Service.

National Environmental Policy Act Cooperating Agencies: U.S. Natural Resources Conservation Service, U.S. Environmental Protection Agency, Western Area Power Administration, U.S. Department of Agriculture-Forest Service, U.S. Geological Survey, U.S. Army Corps of Engineers, and Carbon County, Wyoming.

Action Area:
Nebraska Counties: Adams, Arthur, Banner, Buffalo, Cheyenne, Custer, Dawson, Deuel, Garden, Gosper, Hall, Hamilton, Kearney, Keith, Kimball, Lincoln, Merrick, McPherson, Morrill, Phelps, Scotts Bluff, and Sioux.
Colorado Counties: Adams, Arapahoe, Boulder, Clear Creek, Denver, Douglas, Elbert, Gilpin, Jackson, Jefferson, Larimer, Logan, Morgan, Park, Sedgwick, Teller, Washington, and Weld.
Wyoming Counties: Albany, Carbon, Converse, Fremont, Goshen, Laramie, Natrona, and Platte.

This Final Environmental Impact Statement (FEIS) is prepared to address requirements of the National Environmental Policy Act (NEPA). This FEIS also serves as the Biological Assessment for the Endangered Species Act (ESA) Section 7 consultation.

In 1997, the States of Nebraska, Wyoming, and Colorado and the U.S. Department of the Interior (Interior) signed a *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats Along the Central Platte River, Nebraska (Cooperative Agreement*). In this document, the signatories agreed to pursue a Basinwide, cooperative approach to improve and maintain habitat for four threatened and endangered species—the whooping crane, interior least tern, piping plover, and pallid sturgeon in the Platte River.

Interior has prepared this FEIS to analyze the impacts of the first 13 years of implementation of the proposed Recovery Implementation Program (Program) (Program's First Increment) to benefit the target species and their habitat in the Platte River Basin and to provide compliance with the ESA for certain historic and future water uses in each state. The habitat objectives of the proposed Program include: improving flows in the Central Platte River through water re-regulation and conservation/ supply projects; and protecting, restoring, and maintaining at least 10,000 acres of habitat in the Central Platte River area between Lexington and Chapman, Nebraska. This FEIS analyzes the impacts of four alternatives to implement the Program. The Governance Committee Alternative is selected as Interior's preferred alternative.

The Programmatic FEIS focuses on impacts that the Program may have on hydrology, water quality, land, target species and their habitat, other species, hydropower, recreation, economics, social, and cultural resources. Subsequent NEPA and ESA documents required for implementation of specific Program actions will be tiered off of this document.

For further information regarding this FEIS, or to obtain additional copies of this FEIS, contact Joy Knipps at the Platte River EIS Office (PL-100), PO Box 25007, Denver, Colorado 80225-0007, telephone (303) 445-2096 or facsimile (303) 445-6331.

Copies of the *Platte River Recovery Implementation Program Document* may be obtained by contacting the office of the Executive Director, Governance Committee, 2003 Central Avenue, Cheyenne, Wyoming 82001, telephone (307) 634-1756 or toll-free (877) 634-1773. These documents are also available at <http://www.platteriver.org>.

ROADMAP TO THE FINAL ENVIRONMENTAL IMPACT STATEMENT

This FEIS is comprised of 3 volumes and a summary for easy reference and to provide a more thorough analytical background.

SUMMARY

The summary contains the basic information about the proposed Program and summarizes the alternatives, Present Condition, and potential impacts of each alternative.

FINAL ENVIRONMENTAL IMPACT STATEMENT, VOLUME 1

Chapter 1 introduces the purpose of and need for proposed Program and the approach to both National Environmental Policy Act (NEPA) and Endangered Species Act (ESA) analysis for the Program. The objectives and principles for the Program's First Increment, which guide the formulation of alternatives, are described. The chapter provides a sketch of the target species and the habitat they use in and along the Platte River in Nebraska, as well as the basic kinds of actions that would be taken to restore and protect habitat. Chapter 1 also describes briefly the significant changes that have been made in the EIS in response to public comments. The complete listing of public comments and responses from the EIS Team is in volume 2 of the FEIS (see below).

Chapter 2 gives a more detailed description of the target species and the key features of the Platte River habitat used by the species. This chapter also describes in detail the changes in the species habitat and trends in the species' population that provide the impetus and need for this Recovery Implementation Program.

Chapter 3 describes the action alternatives. A table summarizing the elements in each alternative, and a table summarizing the impacts of each alternative on the environment, is found at the end of chapter 3.

Chapter 4 describes the Present Condition for the affected resources, which serves as the baseline for comparing the action alternatives. The methods used for analysis are summarized in this chapter.

Chapter 5 analyzes impacts of the action alternatives for each indicator, as well as cumulative impacts. Chapter 5 also includes the biological assessments' determination of effects for the target species.

Chapter 6 describes the public involvement process and consultation and coordination efforts with other Federal, state, and local government agencies.

Chapter 7 is a list of environmental commitments that would be undertaken upon implementation of a Program.

Glossary
Bibliography
Index
Abbreviations and Acronyms
List of Preparers

FINAL ENVIRONMENTAL IMPACT STATEMENT, VOLUME 2

This volume contains documents that provide background information.

- Public Comments on the DEIS and Responses From the EIS Team
- Governance Committee Program Document Table of Contents
- The ESA Section 7 Consultation Process With and Without a Cooperative Program
- History of ESA Consultations on Platte River Target Species
- Platte River EIS Screening Report
- Lake McConaughy EA 2005 Operating Plan
- Major Water Facilities Likely to be Affected
- Service Draft Instream Flow Recommendations
- National Research Council Report on Endangered and Threatened Species for the Platte River[1]
- Fish and Wildlife Coordination Act Report: Platte River Recovery Implementation Program
- Financial Impacts to Pick-Sloan Firm Power Customers
- Volume 3 Table of Contents

FINAL ENVIRONMENTAL IMPACT STATEMENT, VOLUME 3 (ON REQUEST)

This volume is available by contacting the Platte River EIS Office <http://www.platteriver.org>. Platte River EIS Office, PL-100, PO Box 25007, Denver, Colorado 80225, USA. 303-445-2096. It contains:

A technical appendix for each resource discussed in chapters 4 and 5 to provide additional data including modeling results, methodology, and other analysis, on compact disk (CD).

Technical reports that support the data or describe methods.

[1]Reprinted with permission from the National Academies Press, Washington, D.C., Permission Number: 2248-10978.

Table of Contents

Figures

Tables

Summary

Platte River Recovery Implementation Program Final Environmental Impact Statement

INTRODUCTION AND OVERVIEW

The Platte River has undergone extensive development for irrigation, power generation, and municipal water uses. The river system today contains 15 major dams and reservoirs and provides water for about 3.5 million people. Existing facilities on the river provide hydroelectric power, irrigation water, flood control, recreation, and fish and wildlife habitat. Substantial portions of the economies of the Platte River Basin States—Wyoming, Colorado, and Nebraska—are based on water supplied by the Platte River.

Concerns have been building for years over the four threatened and endangered species that use the Platte River in Nebraska—the whooping crane, piping plover, interior least tern, and pallid sturgeon—as well as other wildlife in the Central Platte River in Nebraska. This habitat has been affected by the development of water projects throughout the Platte River Basin, and also by more local land use changes. In 1997, the States of Wyoming, Colorado, and Nebraska and the U.S. Department of the Interior (Interior) signed a *Cooperative Agreement for Platte River Research and Other Efforts Relating to Endangered Species Habitats Along the Central Platte River, Nebraska* (Cooperative Agreement)[2]. In this agreement, the signatories agreed to pursue a Basinwide, cooperative, recovery implementation program (Program) to improve and maintain habitat for the target species—whooping crane, interior least tern, piping plover, and pallid sturgeon—using the Central and Lower Platte River in Nebraska.

To ensure compliance with the Endangered Species Act (ESA) and to allow water users throughout the Platte River Basin to continue their current use of Platte River water, the Program is being developed to:

- Provide additional or modified riverflows through the Central Platte River habitat
- Protect and restore areas of suitable land habitat between Lexington and Chapman, Nebraska
- Mitigate, or offset, impacts to these species and their habitat, resulting from new water-development activities in the Basin

Interior (Reclamation and the U.S. Fish and Wildlife Service [Service]) has prepared this Final Environmental Impact Statement (FEIS) to analyze and disclose the environmental consequences of the first 13 years of this Recovery Implementation Program[3] (Program's First Increment) to benefit the four threatened and endangered species (the four "target species") and their habitat in and along the Platte River in Nebraska.

[2]Available at <http://www.platteriver.org> or from the Office of the Executive Director, Governance Committee (see "Cover Sheet").

[3]A Recovery Implementation Program is a set of actions to address aspects of the Service's recovery plan for a threatened or endangered species. A Recovery Implementation Program aims to help recover the species, while not necessarily addressing all threats to a species throughout its range.

The FEIS assesses the effects of this Program when implemented in conjunction with ongoing operation of certain existing and future water-related activities in the Platte River Basin. The Program, when implemented, is intended to provide compliance with the ESA for certain existing water projects and water uses in the Platte River Basin upstream of the confluence of the Loup River, upstream of Columbus, Nebraska, as well as for certain future water uses during the First Increment of 13 years, as they affect the target species and their habitat in the Central and/or Lower Platte River.

It is important to note that this summary does not provide all details of the alternatives or the analysis. Footnotes and source citations are not included in this summary. For details of the FEIS analysis[4], see the *Platte River Recovery Implementation Program Final EIS* (FEIS), available from the Platte River EIS Office and at <http://www.platteriver.org>. For a detailed description of the Governance Committee's proposal, see the *Platte River Recovery Implementation Program Document*, available at the Web site or from the office of the Executive Director, Governance Committee (see "Cover Sheet"). This summary contains:

- Program purposes
- Proposed Federal action
- Summary tables of alternatives and impacts
- Background: the setting, Governance Committee process to develop the proposed program, and the public participation process.
- History of habitat use and habitat trends for target species
- The FEIS alternatives: Program objectives and formulation of each alternative
- Environmental consequences: summaries of the impact of the alternatives on each resource

[4]Details include explanations of the affected environment, resource indicators, analysis, and results. This summary does not include citations.

PROGRAM PURPOSES AND PROPOSED ACTION

The purpose of the action is to implement the Program's First Increment to offset some of the impacts to the target species and their habitat located in the Central and Lower Platte River corridor caused by historic, current, and future water-related activities, through the implementation of land and water management actions which result in target species habitat restoration, creation, and/or enhancement.

The Program will:

- Assist in the conservation and recovery of the target species in the Basin and thereby provide ESA regulatory compliance for effects to the target species river habitats from existing and certain new water-related activities that deplete water from the Platte River upstream of the Loup River confluence

- Provide a means to ensure that future water uses in the Basin do not undermine these habitat and species benefits and thereby are in compliance with the ESA

- Help prevent the need to list more species under the ESA

SPECIFIC FEDERAL PURPOSES

Program purposes for the state, Federal, and private participants are similar. However, there are specific requirements which the Program must meet to address the responsibility of Federal agencies under the ESA:

(1) **Serve as the ESA Reasonable and Prudent Alternative for Previously-Completed Consultations:** Where the actions of Federal agencies have previously been the subject of ESA consultation and have received a jeopardy opinion from the Service under Section 7(a)(2) of the ESA, the Program is to serve as the Reasonable and Prudent Alternative for those actions for the target species in the Central and Lower Platte River.

(2) **Provide ESA Offsetting Measures:** Where the ongoing operations of Federal water projects in the Basin have not yet completed ESA consultation, the Program is to provide sufficient benefits to the target species in and along the Platte River in Nebraska such that any impacts of those project's operations will be sufficiently offset to avoid the likelihood of jeopardizing the continued existence of the target species or adversely modifying or destroying designated critical habitat.

In accomplishing these first two requirements, the Program will also provide for a much more streamlined and efficient process for completing hundreds of existing or pending consultations on water-related activities in the Platte River Basin.

(3) **Focus on Federal Project Impacts:** In serving as the ESA Reasonable and Prudent Alternative, or in providing offsetting measures for project impacts to the target species, the Program must offset impacts on the target species' habitats that have been adversely affected by the Federal actions, in kind and in place, especially where designated critical habitat is involved.

(4) **Meet Obligations for Species Conservation:** The Program is to assist each Federal agency in meeting its obligations under Section 7(a)(1) of the ESA to help conserve the target species and other listed species.

(5) **Address Cumulative Impacts:** To ensure the effectiveness of the Program in meeting these Federal objectives, the Program must address cumulative impacts on species habitat due to existing and future private water depletions. The Program must further ensure that contributions of water to the Program by individual water projects are not diverted or subverted by the actions of others in the Basin.

CREATING AN EFFECTIVE RECOVERY IMPLEMENTATION PROGRAM

Interior believes that a Basinwide, cooperative effort to improve and maintain habitat for the target species is essential to meeting these purposes and needs, for the following reasons:

(1) **Effectiveness for the Species**: The coordinated approach will be more effective than a project-by-project approach. A Program key purpose is to provide improved riverflows at the Central Platte Habitat Area to offset depletions caused by upstream reservoirs and irrigation projects (in some cases hundreds of miles away). Water moved from those projects to the Central Platte Habitat Area often must cross state lines and always must pass many diversion points. Without the cooperation and assistance of the states and other water users, much of the water being moved to the Central Platte Habitat Area could be diverted or stored by other projects. Similarly, improvement of land habitat for the species will be more effective if all participants can pool resources and acquire and manage land in a coordinated fashion. Without a cooperative approach, many projects and many agencies will literally compete for both water and land to improve habitat. This will lead to a less effective and substantially more costly effort.

(2) **Managing Cumulative Effects:** A cooperative Program is able to address effects on the habitat in a more comprehensive fashion than would individual project compliance with the ESA. Under the Cooperative Agreement, the states and the Federal Government have each committed to undertaking a Depletion Management Plan. These plans will address the cumulative effect of Federal and non-Federal actions on species target flows, protecting those flows from future depletions–even depletions from actions not subject to Section 7 consultation. This effort by the states would not occur under individual project compliance with the ESA.

(3) **Coordination of Program Operations:** Effectively improving flows for the target species requires coordinating operations of many water facilities throughout the Basin. A cooperative approach, that brings together all of the major system operators, can employ Program resources much more efficiently and effectively.

(4) **Monitoring and Adaptive Management:** A coordinated Program also enables comprehensive monitoring of habitat restoration efforts. This, in turn, allows for scientific evaluation of actions, and improvement of those actions through an adaptive management approach. The commitment of all parties to an adaptive management approach means that the Program's effectiveness can be increased as more knowledge and experience is gained. This coordinated effort would not occur under individual consultations.

(5) **Equitable Distribution of Effort:** A collaborative effort among all major water users in the Basin allows for a more equitable distribution of effort than might occur under individual project consultation. Individual consultations tend not to focus on issues of equity and fair share, but rather focus only on offsetting the effects of the project currently in consultation.

Whether or not a Basinwide, cooperative Program is implemented, Federal agencies and the projects they operate, fund, or authorize (which include many state and private water projects) must comply with the ESA. The alternative to a Basinwide approach to ESA compliance would be for each water project to undergo separate ESA review and develop separate measures to offset loss of habitat for the target species without relying upon the Program. This process is very costly for all parties and usually takes many years to accomplish.

PROPOSED FEDERAL ACTION

To address the Program needs and purposes, Interior, working with the states and other partners, has proposed a Basinwide, cooperative Recovery Implementation Program to meet its obligations under the ESA. Four alternatives for such an approach are described and evaluated in this FEIS.

- Governance Committee Alternative
- Full Water Leasing Alternative
- Wet Meadow Alternative
- Water Emphasis Alternative

The FEIS evaluates the benefits and impacts of these four action alternatives over the 13-year Program's First Increment. Based upon the DEIS and associated public review process, and the analysis in this FEIS, Interior has selected the Governance Committee Alternative as its preferred alternative.

SUMMARY TABLES OF ALTERNATIVES AND IMPACTS

Table S-1 shows the elements contained in each alternative. More detailed descriptions of alternatives are found in the section, "Alternatives."

Table S-1.—Summary of Elements

Alternative Element	Present Condition	Governance Committee Alternative	Full Water Leasing Alternative	Wet Meadow Alternative	Water Emphasis Alternative
Program Water Supply		Pathfinder Modification Project EA Lake McConaughy EA Tamarack Project, Phase I Water Action Plan: 13 Conservation and Water Supply Activities	Lake McConaughy Re-regulatory Account Water Leasing (approximately 120 kaf in each state)	Pathfinder Modification Project EA Pathfinder Wyoming Account Glendo Reservoir Storage Lake McConaughy EA Tamarack Project, Phase I Glendo 100 kaf New Program Water Right	Pathfinder Modification Project EA Pathfinder Wyoming Account Glendo Reservoir Storage Lake McConaughy Environmental Account Tamarack Project, Phase I Glendo 100 kaf New Program Water Right Three elements of Water Action Plan Conservation/Supply Activities: - Central Platte Power Regulation - Groundwater Management in the Central Platte Groundwater Mound - Tamarack Project, Phase III Riverside Drains Water Leasing (approximately 60 kaf in each state)
Capacity to Create Short-Duration Near-Bankfull Flows at the Habitat	---	Program develops capacity to move 5,000 cfs of Program water to Overton, Nebraska.			
Land Plan Focus	Land conditions in 1998	9,200 acres of habitat complexes. Emphasis on restoration of degraded habitat above Kearney. 800 acres of non-complex habitat. Substantial focus on widening river channel and offsetting		Same land plan as for Governance Committee, plus 7,000 additional acres of wet meadows.	Same basic focus as Governance Committee Alternative, but land plan reduced to 6,674 acres of complex lands, 800 acres of non-complex lands.

Table S-2 shows the impacts of each alternative on many of the key indicators for each resource area.

Table S-2.—Summary of Impacts for Each Alternative

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Water				
North Platte Basin				
Annual reservoir storage[5]	Average 3 percent less	Average 4 percent more	Average 9 percent less	Average 6 percent less
Average riverflows in North Platte River above Lake McConaughy 1. Winter 2. Summer	 1. No change 2. +4 percent	 1. No change 2. +7 percent	 1. No change 2. +7 percent	 1. No change 2. +8 percent
Flood control	Magnitude of largest floods reduced	No change	Magnitude of largest floods reduced	
Irrigation delivery shortages - number of years[6] 1. North Platte Project 2. Kendrick Project 3. Glendo Unit 4. Non-project Lands	 1. 1 more year 2. 4 more years 3. 1 more year 4. 1 more year	 1. no change 2. 1 year less 3. 6 more years 4. No change	 1. 5 more years 2. 5 more years 3. 5 more years 4. 1 more year	 1. 2 more years 2. 4 more years 3. 5 more years 4. No change
South Platte Basin				
Total average annual flows in the lower South Platte River, near the Colorado-Nebraska State line[7]	24 kaf increase	73 kaf increase	28 kaf increase	50 kaf increase
Irrigation water deliveries	No change	43,900 acre-feet fewer deliveries in average year	No change	31,150 acre-feet fewer deliveries in average year
Central Platte Basin				
Lake McConaughy average annual storage	Lower by 9 percent	Higher by 1 percent	Lower by 8 percent	Lower by 5 percent
Number of spills over 48 years[8]	About 52 percent fewer spills	Nearly 17 percent fewer spills	About 48 percent fewer spills	About 41 percent fewer spills
Change in average volume of spills	- 76 kaf	- 4 kaf	-87 kaf	-67 kaf

[5]Consists of total average storage changes in September for Seminoe, Kortes, Pathfinder, Alcova, Grey Reef, Glendo, and Guernsey Reservoirs.

[6]Out of the 48-year period of record used for the hydrologic analysis.

[7]Includes increases in average flow that are forecast to occur during the Program's First Increment with or without implementation of these alternatives, as a result of projected water development and changes in water use in the South Platte River Basin.

[8]Spills include spillway flows and releases to prevent violating the FERC limits on maximum reservoir elevation.

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Average annual diversions for irrigation and power generation: Keystone Diversion 1. Winter 2. Summer	 1. + 4 percent 2. + 2 percent	 1. +21 percent 2. -9 percent	 1. +6 percent 2. + 6 percent	 1. +19 percent 2. – 5 percent
Average annual diversions for irrigation and power generation: Korty Diversion 1. Winter 2. Summer	 1. + 12 percent 2. +26 percent	 1. +13 percent 2. -3 percent	 1. +11 percent 2. +20 percent	 1. +8 percent 2. +20 percent
Average annual diversions for irrigation and power generation: Tri-County Diversion 1. Winter 2. Summer	 1. +3 percent 2. +4 percent	 1. +11 percent 2. no change	 1. +4 percent 2. +5 percent	 1. +8 percent 2. +3 percent
Average annual improvement toward target flows at Grand Island	150 kaf	137 kaf	116 kaf	184 kaf
River Geomorphology				
Flow (at Overton)				
Increase in mean annual flow	3%	13%	4%	9%
Increase in 1.5-year peak flow	57%	35%	52%	55%
Increase in average annual sandbar height potential	60%	30%	50%	53%
Sediment (Jeffrey Island to Chapman)				
Maximum sediment transport (present condition 620,000)	660,000 tons/year	745,000 tons/year	665,000 tons/year	690,000 tons/year
Net deposition and erosion with 150,000 tons of sand augmentation (present condition -220,000)	-42,000 tons/year	-135,000 tons/year	-58,000 tons/year	-71,000 tons/year
Mechanical actions at managed sites				
Increase in area of restoration	387 acres			282 acres
Increase in length of braided river	53,100 feet	53,100 feet	53,100 feet	39,600 feet
Increase in open view width	104%	103%	103%	66%
Plan Form (Jeffrey Island to Chapman)				
Average increase in width-to-depth ratio (weighted by length of 4 reaches)	10%	9%	6%	1%
Average increase in open view width (weighted by length of 4 reaches)	21%	25%	20%	19%
Water Quality				
Central Platte River at Grand Island, Nebraska				
Daily probability of river temp. exceeding 90°C (average for June, July, and August)	Slight improvement at 0.325	Slight improvement at 0.328	Slight improvement at 0.330	Improvement at 0.322
Concentration of copper in river bed sediments	Slight increase or decrease, depending on sand augmentation location			

Summary of Impacts of Each Alternative Compared to the Present Condition					
Resources, Significant Indicators, and Geographic Areas		**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Central Platte River Vegetation Communities and Species Habitats					
Land Cover Type Area					
Agriculture		-0.4 percent		-1 percent	-0.2 percent
Lowland grasslands		+10 percent		+19 percent	+7 percent
Woodlands		-7 percent		-11 percent	-6 percent
Shrublands		-12 percent		-14 percent	-8 percent
Herbaceous riparian		-7 percent		-10 percent	-6 percent
Bare sand		-1 percent			
Emergents		No change			
Sand and gravel pits		-2 percent			
Wetlands Area					
Acres of wetlands		Approximately 4,000 additional acres		Approximately 8,000 additional acres	Approximately 3,000 additional acres
Whooping Crane					
*Channel Roost Habitat**					
Channel area with widths > 500 feet		+20 percent	+19 percent	+20 percent	+15 percent
Channel aquatic characteristics		All increase/improve (+15 - +25 percent)			
Distribution of managed areas		5 GIS/bridge segments			3 GIS/bridge segments
Riverine Habitat Sustainability		Benefits of each action alternative similarly depend on the location, timing, and scale of the mechanical channel improvements/sedimentation augmentation described. See “River Geomorphology.”			
Out-of-Channel Feeding and Loafing Habitat					
Changes in acres of grassland		+10 percent		+19 percent	+7 percent
Spring flows for wet meadow maintenance		Reduced in high flows years; modest improvement in moderate flow years	Modest improvements in moderate flow years	Reduced in high flow years; modest improvement in moderate flow years.	
Grain food resources		Restored channel segments could alleviate inter-species competition for waste grain, bur the behavioral response of the competing migratory species (likelihood and timing of population redistribution) remains uncertain.			
Security and Protection					
Percent change in Bank length protected for whooping cranes, piping plovers, and interior least tern	Hershey – Chapman	+14 percent	+14 percent	+24 percent	+9 percent
	Lexington - Chapman	+8 percent	+8 percent	+13 percent	+5 percent
Out-of-channel lands protected (feeding and loafing habitat and habitat buffers)		+9,400 acres	+9,400 acres	+16,500 acres	+6,700 acres

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Piping Plovers and Interior Least Terns				
Piping Plovers				
Flow potential to build sandbars	Some increase from Present Conditions (see change in 1.5-year flood event in River Geomorphology above)			
Fledging days (all transects)	+2.3 days	+2.1 days	+2.1 days	+2.6 days
Non-channel nest sites	Likely increase for all alternatives			
River resources	Negative effect North Platte to Lexington – Likely some improvement Lexington to Chapman - Likely unchanged Chapman to Missouri River			
Interior Least Terns				
Flow potential to build sandbars	Some increase from Present Conditions (see change in 1.5-year flood event in River Geomorphology above)			
Fledging days (all transects)	+1.8 days	+2 days	+1.3 days	+1.9 days
Non-channel nest sites	Likely increase for all alternatives			
River resources	Negative effect North Platte to Lexington – Likely some improvement Lexington to Chapman - Likely unchanged Chapman to Missouri River			
Pallid Sturgeon				
Spawning flows, habitat forming flows, food base flows, summer flows	No significant differences from Present Condition			
Other Federally Listed Species				
Wyoming				
Bald eagle, Black-footed ferret, Canada lynx, Colorado butterfly plant, Preble's meadow jumping mouse, Wyoming toad, Ute ladies-tresses orchid	No significant impact			
Colorado				
Bald eagle, Black-footed ferret, Canada lynx, Colorado butterfly plant, North Park phacelia, Preble's Meadow Jumping Mouse, Ute ladies'-tresses orchid	No significant impact			
Nebraska				
American burying beetle	May have beneficial impact			
Bald eagle	Minor adverse effect			
Black-footed ferret and Eskimo curlew	No significant impact			
Western prairie fringed orchid	Reduced peak flows diminish wet meadow irrigation at known sites Less adverse impact from Full Water Leasing Alternative.			
State Listed and Species of Special Concern				
Wyoming				
Wood frog, Western boreal toad, White-faced ibis, American bittern, Snowy egret, Black-crowned night heron, Yellow-billed cuckoo, Lewis' woodpecker, Caspian tern, Forster's tern, Black tern, Common loon, Vagrant shrew	No significant impact			

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Colorado				
Boreal toad, Northern cricket frog, Northern leopard frog, Plains leopard frog, Wood frog, American white pelican, Burrowing owl, Ferruginous hawk, Greater sage grouse, Greater sandhill crane, Long-billed curlew, Mountain plover, Plains sharp-tailed grouse, Western snowy plover, Western yellow-billed cuckoo, Black-tailed prairie dog, Northern river otter, Swift fox, Common garter snake, Yellow mud turtle	No significant impact			
Common shiner, Brassy minnow, Iowa darter, Lake chub, Plains minnow, Stonecat, Suckermouth minnow	Beneficial impact			
Nebraska				
River otter	Beneficial			
Finescale dace, Northern redbellied dace, Lake sturgeon, Saltwort, Massasauga rattlesnake, Sturgeon chub, Platte River caddisfly	No significant impact			
Sandhill Cranes				
Roosting suitability Site scale (proper depth) Bridge scale (width) System scale (hydrology)	General increase at managed sites, variable at non-managed sites General increase in unobstructed view at managed sites Likely reduction in roosting depth abundance in Sutherland to North Platte reach			
Food abundance Invertebrates (acres) Invertebrates (flows) Corn (acres)	Potential increase at managed sites Potential increase in accessibility Some reduction likely			
North Platte Fisheries				
Reservoir volume: months below flag levels out of 48 years:				
Seminoe Reservoir (less than ~200 kaf)	17 additional months	20 fewer months	28 additional months	19 additional months
Seminoe Reservoir (less than ~50 kaf)	7 additional months	No change	10 additional months	7 additional months
Pathfinder Reservoir (less than ~200 kaf)	17 additional months	19 fewer months	40 additional months	23 additional months
Pathfinder Reservoir (less than ~50 kaf)	8 additional months	No change	11 additional months	9 additional months
Glendo Reservoir (less than 63 kaf)	No instances of storage less than 63 kaf			
Average Annual Fish Standing Crop				
Seminoe Reservoir	-1 percent	+3 percent	-5 percent	-3 percent
Pathfinder Reservoir	-3 percent	+4 percent	-6 percent	-4 percent
Alcova and Glendo Reservoir	Changes less than +/- 3 percent			

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Lake McConaughy and Lake Ogallala Sport Fishery Analysis				
Lake McConaughy Littoral Habitat Average annual availability	- 2 to 3 percent	No change	-2 to 3 percent	-2 percent
Lake McConaughy Open Water Habitat average annual availability	-10 to 11 percent	+/- 1 percent	-9 to 10 percent	-6 to 8 percent
Percent of years conducive to Walleye reproduction. [Present condition is 75 percent].	40 percent	70 percent	48 percent	50 percent
Percent of years conducive to White Bass reproduction. [Present condition is 13 percent].	12 percent	16 percent	12 percent	12 percent
Percent of years conducive to Smallmouth Bass reproduction. [Present condition is 82 percent].	36 percent	No change	38 percent	50 percent
Percent of years conducive to Channel Catfish reproduction.	No significant change			
Percent of years conducive to Gizzard Shad reproduction. [Present condition is 88 percent].	67 percent	93 percent	74 percent	78 percent
Percent of years with August temperature levels in Lake Ogallala stressful to trout. [Present Condition is 4 percent]	19 percent	2 percent	11 percent	12 percent
Central Platte Fisheries				
Months (out of 48 years) with improved physical habitat at Overton	+30 months	+20 months	+28 months	+32 months
Months (out of 48 years) with improved physical habitat at Grand Island	+36 months	+20 months	+28 months	+30 months
Hydropower				
North Platte				
Percent change in electrical generation	+1 percent	No change	+1 percent	+2 percent
Percent change dependable capacity	Summer: -6 percent Winter: 0 percent	Summer: -8 percent Winter: +4 percent	Summer: -4 percent Winter: -1 percent	Summer: -7 percent Winter: -1 percent
Central Platte				
Percent change electrical generation	+4 percent	+6 percent	+6 percent	+6 percent
Percent change dependable capacity	Summer: -4 percent Winter: -3 percent	Summer: -5 percent Winter: +13 percent	Summer: -1 percent Winter: -9 percent	Summer: -4 percent Winter: +17 percent
Recreation in the Platte River Basin				
Change in Recreation Visits				
Wyoming - North Platte Reservoirs[9] average annual visitation	-1.2 percent visits	-0.9 percent visits	-1.2 percent visits	-1.1 percent visits

[9]For Seminoe, Glendo, and Guernsey Reservoirs.

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Average annual impact on fishing visitation for North Platte Reservoirs (over 48 years)	Minimal impact			
Probability of fishery loss in Seminoe Reservoir under severe drought [Present Condition is 0]	.24	0	.57	.24
Probability of fishery loss in Pathfinder Reservoir under severe drought [Present Condition is 0]	.57	0	.68	.68
Average annual change in angler visitation for Pathfinder and Seminoe Reservoirs (total) if severe drought and fishery elimination occurs.	-14,946 visitors	Not applicable	-14,946 visitors	-14,946 visitors
Colorado - South Platte Reservoirs[10]	Not affected	Not available[11]	Not affected	Not available[37]
Colorado - Tamarack Ranch State Wildlife Area	Slight increase			
Nebraska - Lake McConaughy average annual visitation	-6 percent visits	-2.8 percent visits	-6.3 percent visits	-4.5 percent visits
Agricultural Economic Impacts				
Average Annual Change in Farmed Acres, without Dryland Farming Substitution (by Economic Region)				
Central Platte Habitat Area	-10,700 acres	-38,300 acres	0 acres	-18,800 acres
Lake McConaughy Area	0 acres	-16,100 acres	0 acres	-10,900 acres
Scotts Bluff Area	0 acres	-21,800 acres	-300 acres	-4,900 acres
Eastern Wyoming	-1,000 acres	0 acres		
North Platte Headwaters	-4,900 acres	-5,100 acres	-1,500 acres	-4,300 acres
Eastern Colorado	0 acres	-4,100 acres	0 acres	-2,100 acres
Average Annual Change in Agricultural Revenue ($1,000s), without Dryland Farming Substitution (by Economic Region)				
Central Platte Habitat Area	-$4,421	-$15,476	0	-$7,642
Lake McConaughy Area	0	-$5,138	0	-$3,488
Scotts Bluff Area	8	-$5,509	-$17	-$1,198
Eastern Wyoming	-$115			0
North Platte Headwaters	-$560	-$583	-$174	-$496
Eastern Colorado	0	-$1,853	0	-$1,123
Primary Program Costs				
Cost of Program elements which have environmental impacts and for which Program expenditures are required. This is not a total Program budget.[12]	**$110,387,000**	**$355,080,000**	**$68,565,000**	**$184,120,000**

[10]Includes Boyd, Empire, Jackson, North Sterling, Julesburg, Prewitt, and Riverside Reservoirs.

[11]Small changes in surface area; impact not assessed due to lack of recreation data.

[12]For example does not include administrative and staffing costs, or the cost of research and monitoring.

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
Regional Economics[13]				
Average Annual Changes in Regional Sales without Dryland Cropping Substitution ($1,000s)				
Central Platte Habitat Area	-$693	-$11,647	+$3,833	+$3,835
Lake McConaughy Area	+$243	-$1,906	+$152	-$1,555
Scotts Bluff Area	+$8	-$1,545	-$25	-$304
Eastern Wyoming	-$180	-$75	-$217	-$185
North Platte Headwaters	-$584	+$33	-$922	-$906
Eastern Colorado	0	-$762	0	-$638
Average Annual Changes in Regional Income without Dryland CroppingSubstitution ($1,000s)				
Central Platte Habitat Area	-$48	-$2,097	+$897	-$740
Lake McConaughy Area	-$57	-$168	-$30	-$244
Scotts Bluff Area	+$3	-$262	+$6	-$41
Eastern Wyoming	-$56	-$26	-$76	-$65
North Platte Headwaters	-$228	+$36	-$323	-$304
Eastern Colorado	0	-$126	0	-$127
Social Environment				
Central Platte Habitat Area				
Human health issues, population, and demographics	No Program impacts			
Out-of-bank flooding below Lake McConaughy a. Years with flows > 10,000 cfs b. Change in maximum floodflows (cfs)	a. 2 fewer years[14] b. -3,600 cfs	a. 1 fewer years b. -200 cfs	a. 3 fewer years b. -5,800 cfs	a. 1 fewer years b. -4,500 cfs
Maximum effect of Program water releases on Central Platte Habitat Area groundwater levels (feet)	Program alternatives would raise groundwater levels within 1,000 feet of the river about 3 inches for periods of 3 to 30 days, during years when surface and groundwater levels are normal or low.			
Land use changes in the Central Platte Habitat Area	Agricultural lands reduced by 1 percent or less. Lowland grasslands increased by 7 to 19 percent. River channel woodlands reduced by 6 to 11 percent.			
Cultural Resources				
North Platte Basin				
National Register of Historic Places				
Pathfinder Dam	No impact	Not applicable	No impact	No impact
Potential Disturbance to Archaeological Sites				
Seminoe Reservoir	May be subject to new exposure or erosion during extended drought.	No impact	May be subject to new exposure or erosion during extended drought.	

[13]All economic impacts represent less than or equal to one tenth of one percent of the regional economic activity.

[14]Out of the 48-year period of record used in the hydrologic analysis.

Summary of Impacts of Each Alternative Compared to the Present Condition				
Resources, Significant Indicators, and Geographic Areas	**Governance Committee Alternative**	**Full Water Leasing Alternative**	**Wet Meadow Alternative**	**Water Emphasis Alternative**
South Platte Basin				
Tamarack Project, Phases I and III	Construction of recharge ponds, pipelines, pumps, and canals would cause ground disturbance	Not applicable	Construction of recharge ponds, pipelines, pumps, and canals would cause ground disturbance	
Central Platte Basin				
Lake McConaughy	May be subject to new exposure or erosion during extended drought.	No impact	May be subject to new exposure or erosion during extended drought.	
Central Platte Offstream Regulatory Storage Reservoir	Construction would cause extensive ground disturbance	Not applicable		
Land acquisition and management in the Central Platte Habitat Area	May include physical modifications or ground disturbance.			
Groundwater management in the Central Platte groundwater mound	Construction of new wells, well pads, and pipelines expected to disturb localized areas	Not applicable	Construction of new wells, well pads, and pipelines expected to disturb localized areas	
Riverside drains	No impact	Not applicable		Laying underground piping may affect resources

BACKGROUND

THE TARGET SPECIES

Target Species: (Clockwise from upper left) whooping crane, interior least tern, pallid sturgeon, piping plover (whooping crane Photograph - Michael Forsberg)

- **Whooping Crane.** The whooping crane, found only in North America, is this continent's tallest bird. The rarest crane, it is one of the rarest bird species in the world. Historically, its range extended from the Arctic coast to central Mexico and from the Rocky Mountain region in Utah eastward to the Atlantic coast. The only self-sustaining and wild population of whooping cranes nests in and around Wood Buffalo National Park in the southern Northwest Territories and northern Alberta. This population of 215 birds winters along the coast of Texas near Corpus Christi on the Aransas National Wildlife Refuge and nearby areas. The migration route passes through Alberta; Saskatchewan; Montana; North and South Dakota; Nebraska, Kansas, Oklahoma, and Texas. The species was listed as endangered in 1967. The population numbered 43 critical habitat determination in 1978, and there were 215 cranes in March 2005.

- **Pallid Sturgeon.** The pallid sturgeon at 30 to 60 inches (76 to 152 centimeters) is one of the largest fishes found in the Missouri-Mississippi River drainage, with specimens weighing up to 85 pounds (39 kilograms). It is usually white to light brown on the back and white underneath. It has a flattened, shovel-shaped snout. This species is a bottom dweller, usually found in areas of strong current and firm sand bottom in the main channel of large, turbid rivers such as the Missouri River. Pallid sturgeons are slow-growing, late-maturing fish. Spawning occurs from April through August. The diet of the pallid sturgeon is made up of small fish and aquatic invertebrates. The species was listed as endangered in 1990.

- **Interior Least Tern.** The interior least tern is the smallest tern species in North America. The interior least tern population was listed as endangered in June of 1985, when census data indicated that there were approximately 5,000 birds. Interior least terns nest along major river systems in the interior of the United States (U.S.), including the Missouri, Mississippi, Platte, Ohio, Red, and Rio Grande Rivers. Interior least tern colonies are located in wide, open, sparsely vegetated river channels on sandbars, where nests consist of a scrape in the loose, sandy substrate.

- **Piping Plover.** The piping plover is a small shorebird related to the more common killdeer. There are three populations of piping plover: the Atlantic coast, Great Lakes, and Northern Great Plains populations. The Northern Great Plains represents the largest of the three populations, supporting 2,953 birds in 2001. This population encompasses the alkali lakes and wetlands of Prairie Canada and North Dakota, reservoir shorelines along the Missouri River and Lake McConaughy, and riverine sandbars of the Missouri and its major tributaries, including the Platte River. The Northern Great Plains piping plover was listed as threatened in January 1986.

STUDY AREA

The study area and the affected environment for this FEIS are those areas in the Platte River Basin which might be affected by Program actions. This includes the main stem, tributaries, and associated water projects of the North Platte River, in Wyoming, Colorado, and Nebraska; South Platte River in Colorado downstream of Greeley, Colorado and in Nebraska; and the Platte River in Nebraska. See the map of the Basin (figure S-1).

BASINS

When discussing river operations in this FEIS, the subbasins are defined to encompass river reaches which are operated as functional units:

- **Platte River Basin: R**efers to the sum of all the subbasins.

- **North Platte River Basin:** Refers to the river from its headwaters in northern Colorado through Wyoming, and through Nebraska to Lake McConaughy.

- **South Platte River Basin:** Refers to the river from its headwaters in Colorado to its junction with the North Platte River in Nebraska.

- **Central Platte River Basin:** Refers to the river from Lake McConaughy to Chapman, Nebraska (this includes part of the North Platte River).

- **Lower Platte River Basin:** Refers to the Platte River from Chapman, Nebraska to its confluence with the Missouri River near Omaha, Nebraska.

HABITAT AREAS

While elements of the action alternatives are located throughout the Platte River Basin, the intent of all elements is to improve habitat conditions in two habitat areas along the Platte River in Nebraska:

- **Central Platte Habitat Area** (Lexington, Nebraska, to Chapman, Nebraska) for the whooping crane, piping plover, and interior least tern

- **Lower Platte Habitat Area** (from the mouth of the Elkhorn River to the Platte's confluence with the Missouri River) for the pallid sturgeon.

COOPERATIVE AGREEMENT

The three states (Wyoming, Colorado, and Nebraska) and the Federal government developed a Cooperative Agreement, signed in July 1997.

This agreement established a Governance Committee to develop a proposal for a recovery implementation program. The Governance Committee represents the three states, water users, environmental groups, and Federal agencies. Several subcommittees to the Governance Committee were also formed. These subcommittees have diverse representation from the three states, local landowners, water users, environmental organizations, and Federal agencies.

The Cooperative Agreement also established important parameters for the Program, including acquiring land only from willing sellers/lessors, an incremental approach, adaptive management, and paying taxes on program lands.

PUBLIC INVOLVEMENT

Public involvement is a process for including interested and affected individuals, organizations, agencies, and governmental entities in an agency's decision process. In the process of preparing this FEIS, Interior has encouraged both formal and informal input.

Governance Committee and Subcommittee Public Meetings[15]

Governance Committee and subcommittee meetings were all open to the public and meeting schedules, including agendas, were posted on the PRESP Web site <http://www.platteriver.org>.

From September 1997 to fall 2005, more than 65 Governance Committee meetings were held in the three states, in Cheyenne, Wyoming; in Denver, Lakewood, and Sterling, Colorado; and in Gering, Kearney, Lincoln, North Platte, and Ogallala, Nebraska.

Water Management Subcommittee

The Water Management Subcommittee coordinated each state's development of a means to track new water depletions or accretions to ensure mitigation of impacts from new water diversions and proper crediting for water conservation. The Water Management Subcommittee also developed policies and procedures for managing Program water. From October 1997 to present, nearly 60 meetings of the Water Management Subcommittee were held in the three states.

Water Action Plan Subcommittee

The Water Action Plan Subcommittee, conducted a Basinwide study of potential water conservation and supply projects and also developed a draft Water Action Plan for review and approval by the Governance Committee. From July 1999 to fall 2005, approximately 15 meetings of the Water Action Plan Subcommittee were held in the three states.

Land Subcommittee

The Land Subcommittee developed guidelines for land habitat management, leasing, and acquisition; developed the Good Neighbor Policy; and directed a study of the potential impact of the *Land Action Plan* on local economies. The subcommittee works closely with local communities and landowners to determine the most appropriate ways to cooperatively achieve the habitat goals.

From October 1997 to fall 2005, more than 35 Land Subcommittee meetings were held, mostly in Central Platte communities in Nebraska. Notices were also mailed to the Land Committee's mailing list of local landowners and interested parties.

[13] A complete listing of the dates and locations of the Governance Committee and subcommittee meetings can be found on the PRESP Web site: <http://www.platteriver.org>.

Platte River Subbasins and Habitat Areas

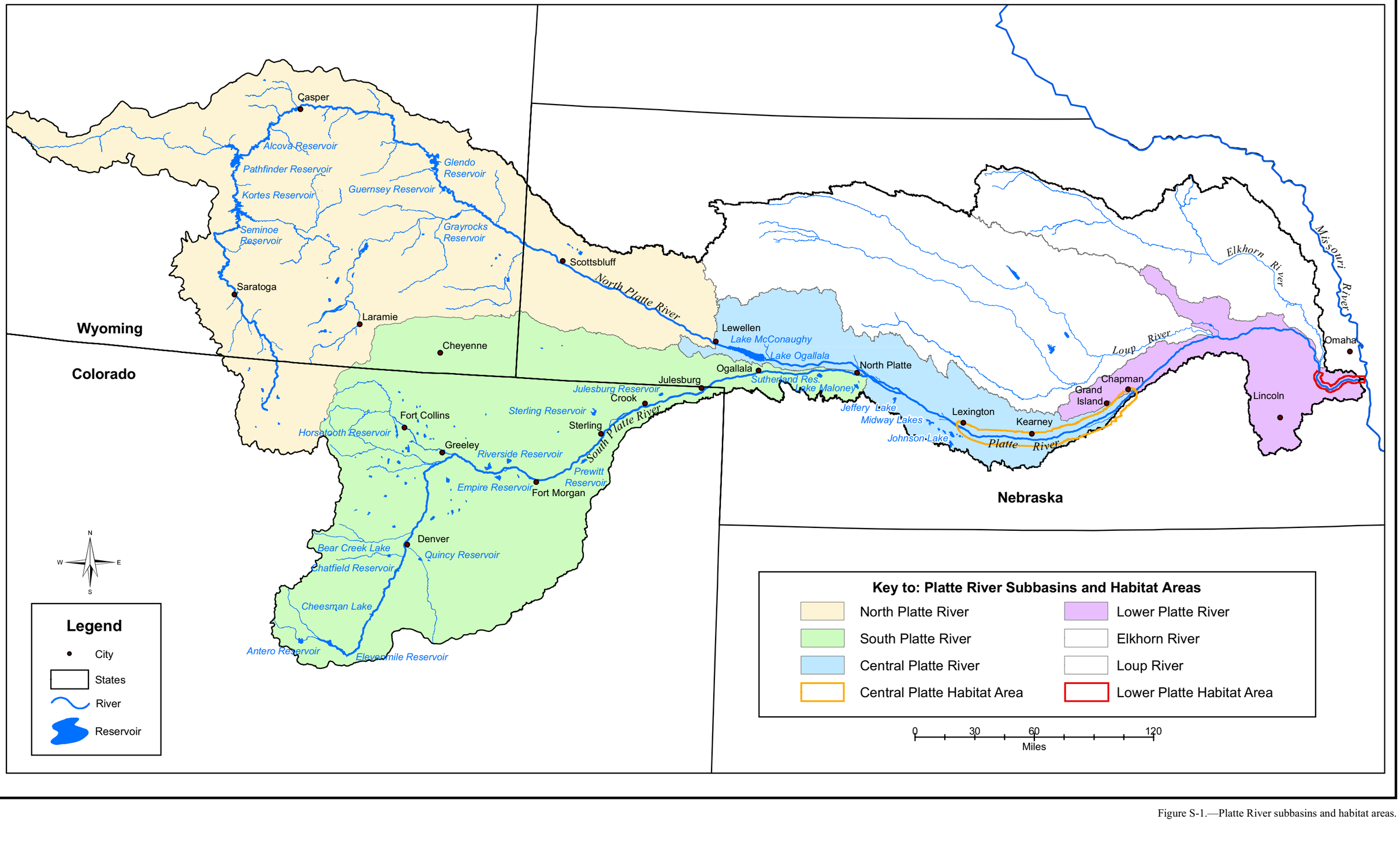


Figure S-1.—Platte River subbasins and habitat areas.

Technical Subcommittee

The Technical Subcommittee (initially known as the Monitoring and Research Subcommittee) developed the framework for habitat and species monitoring and research, as well as a peer review process for scientific studies. From November 1997 to present, more than 50 meetings of the Technical Subcommittee were held, mostly in Central Platte communities in Nebraska, but also in Colorado and Wyoming.

Scoping Process to Develop the DEIS

The DEIS scoping process was initiated in early 1998 to receive public input on the scope of the Platte River Programmatic Environmental Impact Statement (EIS), consistent with the requirements of the National Environmental Policy Act (NEPA) and its implementing regulations. The *Federal Register* Notice of Intent to prepare a programmatic EIS and schedule for the scoping meetings was published February 10, 1998. In February, March, and April of 1998, 11 scoping meetings were held in Colorado, Nebraska, and Wyoming, and approximately 500 persons attended.

Based upon the public scoping of issues, and input from agencies and other organizations, the EIS Team developed a list of important resources and issues. The EIS Team analyzed, in detail, the impacts of the alternatives on the following resources:

- Water Supply and River Flow
- River Hydraulics and Sediment Transport
- Water Quality
- Central Platte River Terrestrial Vegetation Communities and Land Use Types
- Wetlands
- Whooping Crane
- Interior Least Tern and Piping Plover
- Pallid Sturgeon
- Other Federally Listed Species, Candidate Species, and Designated Critical Habitat
- Sandhill Crane
- State Listed and Species of Special Concern
- North Platte Fisheries
- Lake McConaughy Fishery
- Hydropower
- Recreation
- Agricultural Economics
- Regional Economics
- Social Analysis
- Cultural Resources
- Indian Trust Assets
- Environmental Justice

Three resources included in the DEIS were analyzed and found to be negligibly affected or not affected by the project: State Listed and Species of Special Concern, Indian Trust Assets, and Environmental Justice.

Public Review of the DEIS

The Draft Environmental Impact Statement (DEIS) was filed with the Environmental Protection Agency on January 23, 2004, and a Federal Register notice of availability was published January 26, 2004. Persons on the EIS distribution list were mailed a hard copy and/or compact disc (CD) of the DEIS and/or the Executive Summary as requested.

Public Hearings

During July and August, 2004, approximately 339 people attended 10 public hearings in different locations of Wyoming, Colorado, and Nebraska to provide the public with an opportunity to present written or oral testimony on the DEIS.

Public Comments

The comment period concluded September 20, 2004. More than 7,000 comment submissions, written and oral were received and addressed during the finalization process of the EIS. Public comments and responses from the EIS Team are found in the main FEIS, volume 2, and on the PRESP Web site <http://www.platteriver.org>

HISTORY OF HABITAT USE AND HABITAT TRENDS FOR TARGET SPECIES

THE HISTORIC PLATTE

Before the 1880s, the Platte River in Nebraska was a broad and braided river subject to high spring floods, great loads of sediment, and occasional summer droughts. These conditions caused continuous movement of the braided river channels and sandbars, resulting in a channel that was very broad, shallow, sandy, and generally unvegetated. The general conditions of the river channel habitat in the Central Platte River are depicted in a photograph taken in October 1866 near present-day Cozad, Nebraska (figure S-2).

This photograph shows the very broad river with few islands, and with the active channel free of significant vegetation.

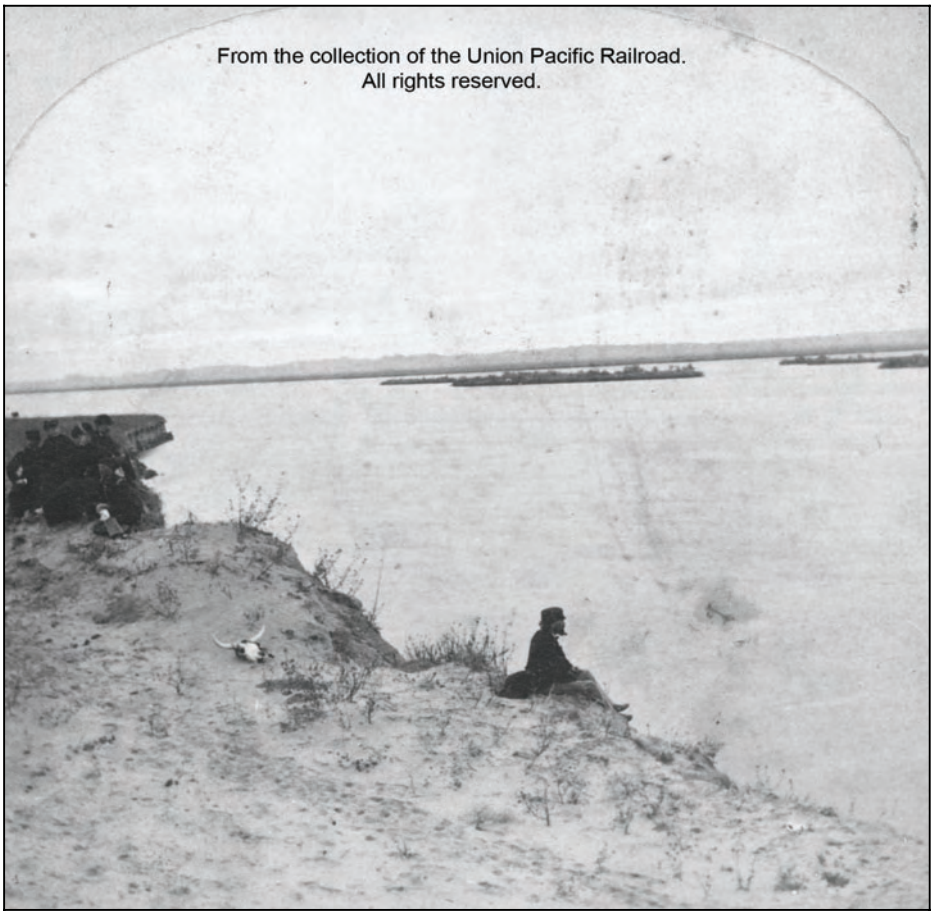


Figure S-2.—The Platte River opposite Platte City, Nebraska (near present-day Cozad, Nebraska) October 1866 (John Carbutt, photographer).

The river-related habitat historically used by the target species in the Central Platte Habitat Area contains:

- Wide, open, shallow channel areas for whooping crane roosting, and bare sandbars for nesting and foraging of the piping plover and interior least tern, free of human disturbance
- Riverflows conducive to whooping crane roosting in spring and fall
- Riverflows conducive to nesting by piping plover and interior least tern
- Riverflows which support forage fish for the interior least tern
- Lowland grasslands and wetlands for whooping crane foraging
- Agricultural grain fields near the river

However, over the past 150 years, as much as 90 percent of the species habitat in the Central Platte Habitat Area has been lost, primarily due to the effect of the many water storage and diversion projects throughout the basin, and land development along the river in the Habitat Area.

Lower Platte River habitat for the pallid sturgeon:

- Abundance of macro-bedforms in the river, such as sandbars
- A significant springtime rise in the river that provides a spawning cue, nutrient cycling, and reproductive habitat for the pallid sturgeon food base

WATER DEVELOPMENT

Water resource development in the Platte River began in the mid-1800s. Before water development, the Platte River averaged more than 2.8 million acre-feet (MAF) of flow annually at Grand. However, the pattern of flow was uneven—the Platte River ran high in the spring due to the mountain snowmelt, but diminished dramatically in the summer months when irrigation water was needed the most. Flow also varied substantially from year to year. To meet increasing agricultural water needs, water was diverted through canals to fields and also stored in reservoirs. Before 1900, nearly 4,000 canals had been constructed to divert waters from the North, South, and Central Platte Rivers. This number reached nearly 7,000 by 1930.

Transbasin diversions (diversion of water from one river basin to another) were also initiated in an effort to meet water supply needs—particularly diversions from the Colorado River Basin to the South Platte River Basin. The major transbasin diversions into the South Platte River Basin include the Colorado-Big Thompson Project, Windy Gap Project, Moffat Tunnel Collection System, and the Roberts Tunnel Collection System. In 1895, approximately 25 kaf of water were transferred into the South Platte River Basin. Between 1990 and 1999, annual diversions into the South Platte River Basin averaged more than 350 kaf per year.

Groundwater Development

Groundwater was also used to supplement surface water supplies. In 1994, it was estimated that roughly 35 percent of crop irrigation in the South Platte River Basin came from groundwater. Particularly in the South and Central Platte River Basins, the most accessible groundwater aquifers near the river are hydrologically connected to the river; thus, pumping groundwater can deplete riverflows. After groundwater pumping increased substantially in the 1960s and 1970s, the State of Colorado developed laws and regulations that integrated the management of surface water and hydrologically connected aquifers. Colorado now regulates groundwater pumping to avoid or offset any effect on the ability of senior water right holders to divert riverflows.

Use of wells for irrigation in Nebraska grew substantially during the 1950s drought and more than tripled from 1970 to 1990. By 2001, in the Platte River counties downstream from Lake McConaughy to Grand Island, more than 19,000 groundwater wells were used for irrigation. The State of Nebraska has recently implemented a set of laws and regulations that will integrate the administration of water use from surface and groundwater sources.

Development and use of groundwater in the Basin in Wyoming has been relatively modest; total use of groundwater in Wyoming is only 5 percent of surface water use.

Current Water Use

Most of the cities in the Front Range of Colorado use Platte River water for municipal supplies. Several cities along the North Platte River in Wyoming do also. Further, nearly all of the cities along the Platte River in Nebraska obtain municipal supplies from well fields next to the Platte River which are significantly supported by riverflows. However, for the states of Colorado, Nebraska, and Wyoming, total water withdrawals for irrigation and livestock are 10 to 15 times larger than for domestic, commercial, industrial, and mining uses combined.

Table S-3 summarizes Basinwide estimates of consumptive use, based primarily on per-acre estimates of agricultural consumptive use in various parts of the Basin, from the Bureau of Reclamation (Reclamation, 1992)[16], reservoir evaporation estimates from Reclamation (1992), and municipal and industrial consumptive use, based on per-capita estimates for the South Platte River Basin, from the State of Colorado (1998).

Based on the assumption that only 50 percent of the consumptive use in the Basin above the Loup River confluence becomes a depletion to flow in the Central Platte River, the estimated depletions to Central Platte River flows in an average year are at least 1.14 MAF, or about 1,575 cfs of year-round flow. This can be compared to a current average annual flow of 1.4 MAF in the Platte River at Grand Island from 1970 to 1998.

[16] For full references and sources, see the bibliography in the FEIS.

Table S-3.—Estimated Consumptive Use of Water in the Platte River Basin After Accounting for Offsetting Imports

Type of Use	(kaf)
Surface water irrigation consumptive use	1,640
Lake, reservoir, pond, canal evaporation	829
Municipal and industrial consumptive use	270
Total consumptive use	2,739
Minus transbasin imports	-450
Net Consumptive Use	**2, 289**

CHANGES IN RIVERFLOWS

Annual Volumes

The bankfull flow and the average annual flow in a river strongly influence the width of the river channel. The average annual flow of the Platte River near Overton, Nebraska, was 2.65 MAF per year during the period between 1895 and 1909, and 84 percent of this flow came from the North Platte River. During the period 1910 to 1935, the mean annual flow decreased to 2.29 MAF per year. With additional reservoir construction and drought, the mean annual flow decreased to 0.83 MAF per year during the period 1936 to 1969. During the period 1970 to 1998, the mean annual flow of the Platte River near Overton, Nebraska, increased to 1.4 MAF per year.

Peak Flows

Peak flows are the highest annual flows in the river, usually associated with spring runoff or intense rainfall events. Peak flows have a significant effect on the amount of vegetation that can become established in the river channel which, in turn, affects the extent of open views for the three bird species.

Annual peak flows of the Platte River near Grand Island, Nebraska, exceeded 17,000 cfs in 2 out of 3 years during the period 1895 to 1909. During the period 1970 to 1999, annual peak flows exceeded 6,000 cfs in 2 out of 3 years, or about one-third the peak flow of the earlier period (Randle and Samad, 2003). Peak flows began dropping in 1909 following completion of the first large reservoir on the North Platte River behind Pathfinder Dam. After 1940, after several reservoirs were completed, the peak flow on the North Platte River at North Platte, Nebraska, was seldom more than 5,000 cfs.

Timing of Flows

The pattern of flows during the year can affect the ability of the interior least tern and piping plover species to nest in the spring without subsequent inundation of nests in the summer. The natural annual pattern of flows in the Central Platte River was driven primarily by the spring snowmelt. Seasonal flows were moderate from October through February, with high flows in the spring and early summer and with flows declining through the rest of the summer.

Figure S-3 illustrates some of the changes in seasonal flow patterns. This figure shows the day of the year on which the annual peak flow occurred at Overton, Nebraska, for the period 1895 to 1998. Prior to construction of large dams (before 1910), the annual peaks clustered in late May and June. As more dams were constructed, the annual peaks occurred over a broader period until, most recently, flows in nearly every month of the year have the potential to be the annual peak.

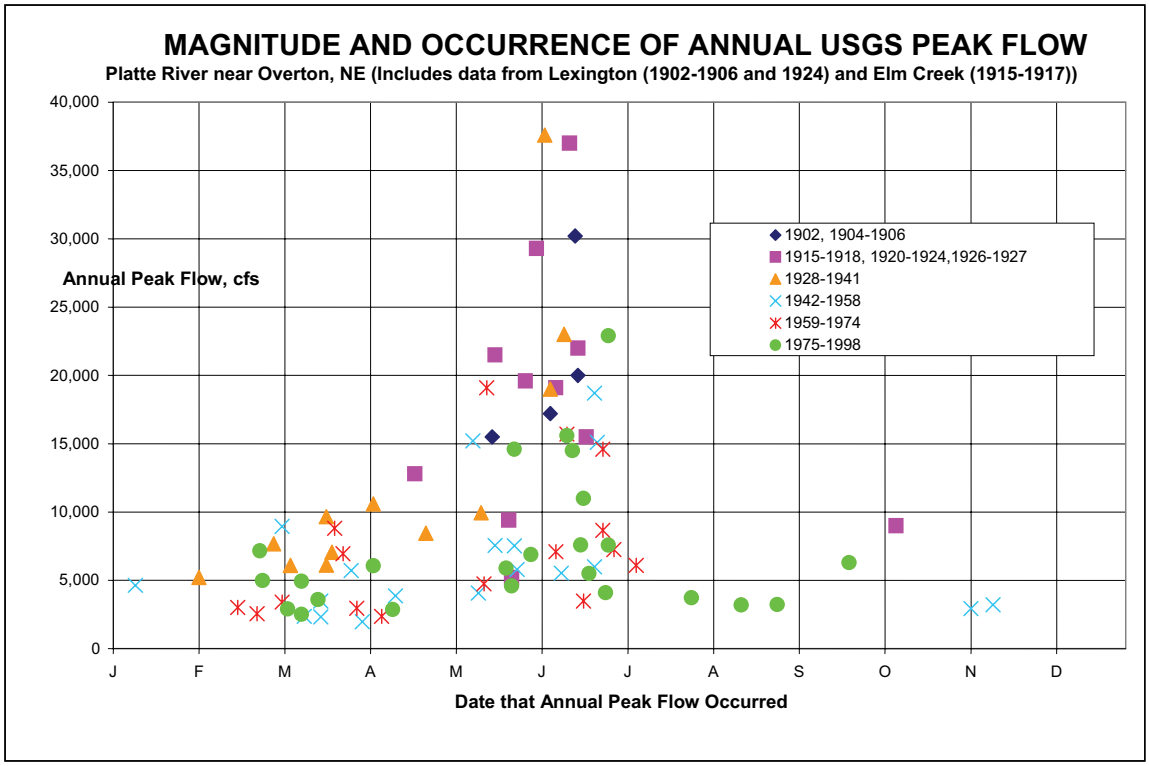


Figure S-3.—Changes in seasonal flow patterns.

CHANGES TO THE CENTRAL PLATTE RIVER CHANNEL

Based on 1900 USGS maps and 1938 aerial photographs, the river maintained a predominantly braided form until 1938, although the width of the river declined significantly. Braided plan form (as a single channel at high flows and multiple channels at low flows) provides desirable riverine habitat for whooping crane, interior least tern, and piping plover, including wide areas of water with unobstructed sight distances and bare sandbars needed for roosting, nesting, and security from predators. Reductions in flow volumes, peak flows, and sediment supply have shifted the river's form away from a wide, braided channel to anastomosed (multiple narrow and deep channels separated by vegetated islands). This can be seen from the 1938 and 1998 aerial photographs shown in figure S-4.

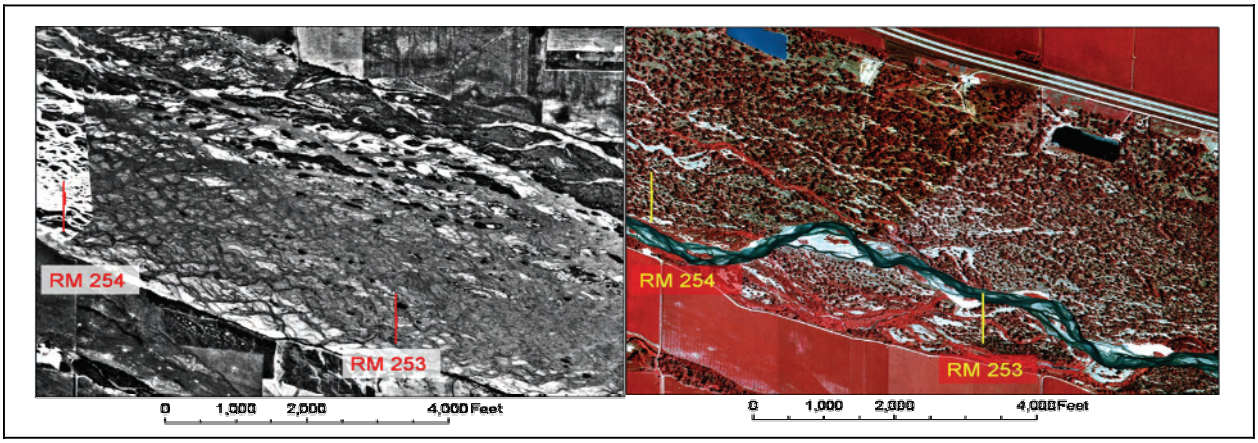


Figure S-4.—1938 and 1998 comparison of Platte River. The 1938 river (on the left) is still a wide and shallow braided channel. By 1998 (on right), the channel has evolved to a single narrow meander plan form. Red or yellow line depicts the same length in approximately the same location.

Changes in Channel Width

Channel widths along the river, have reduced by as much as 80 to 90 percent of the former 1860s channel in the upstream reaches, with lesser amounts of decrease in the reaches near Grand Island. The large decrease in channel width (displayed in figure S-5) occurred in the twentieth century. The rates of channel narrowing tended to be fastest for the upstream reaches with slower rates of narrowing in the downstream reaches. The greatest reductions in channel width occurred from 1900 to 1960 with smaller reductions, or even channel widening from 1960 to 2000.

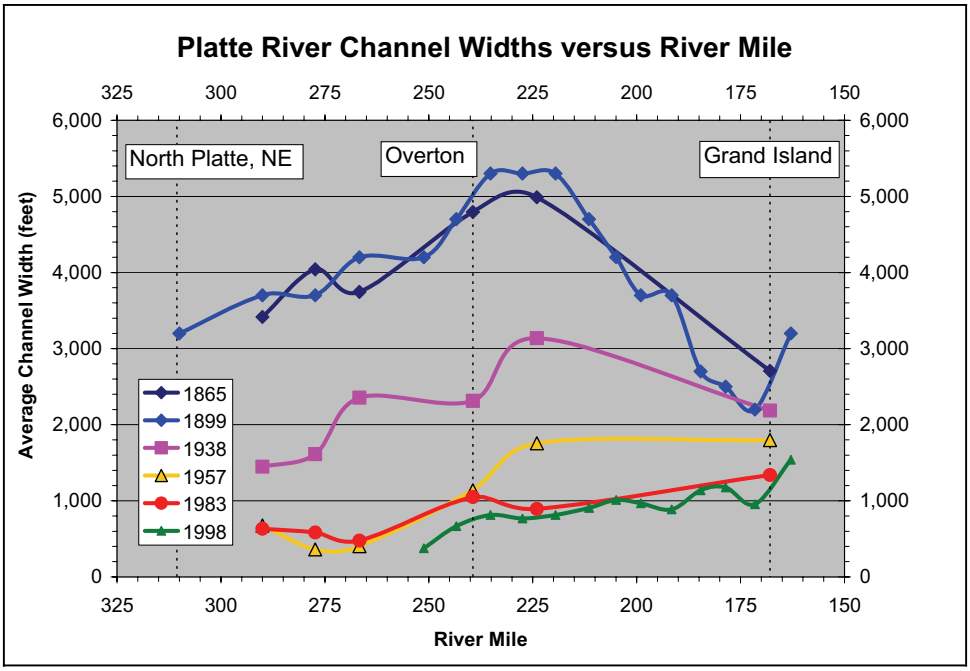


Figure S-5.—Changes in active channel width in the Central Platte River. The width is measured between the borders of vegetation along each bank of the Central Platte River. Distance along the Platte River is denoted as river mileage beginning at Plattsmouth, Nebraska (river mile 0), and increasing in the upstream direction.

Degradation

Today, sediment transport into the Central Platte Habitat Area is reduced, due to the one-half reduction in flow. Canal flow discharged at the Johnson-2 Return, just upstream of Overton, Nebraska, brings almost no sediment into the river, yet it has the capacity to transport a sediment load similar to flows in the north channel of Jeffrey Island. As a result, a sediment imbalance is created in the Central Platte River and erosion of the bed and banks of the channel begin directly at the discharge of the Johnson-2 Return. Today, the river transports 410,000 more tons of sediment at Overton, Nebraska, than were supplied by upstream flows from Cozad, Nebraska. This creates erosion and degradation of the river bed in the upper part of the Central Platte Habitat Area.

Repeat surveys of the Central Platte River by Reclamation, between 1985 and 2005, show a continuing trend of riverbed degradation beginning at the clear water return flows of the Johnson-2 Return channel, and continuing downstream beyond Elm Creek, as shown in figure S-6. Over a recent period of 13 to 18 years, degradation ranges from approximately 6 feet near the Johnson-2 Return Channel to 1 foot nearly 18 miles downstream.

In degrading reaches, the rate of bed erosion can eventually slow if the slope of the riverbed flattens, or if the armoring process builds a protective surface of course grains on the riverbed. Armoring occurs when the smaller particles of the riverbed are removed by flows, leaving larger particles behind to protect the surface from further erosion. The process of armoring is undesirable in the Platte River because a coarser bed grain size does not support as wide a channel geometry as a finer grain size.

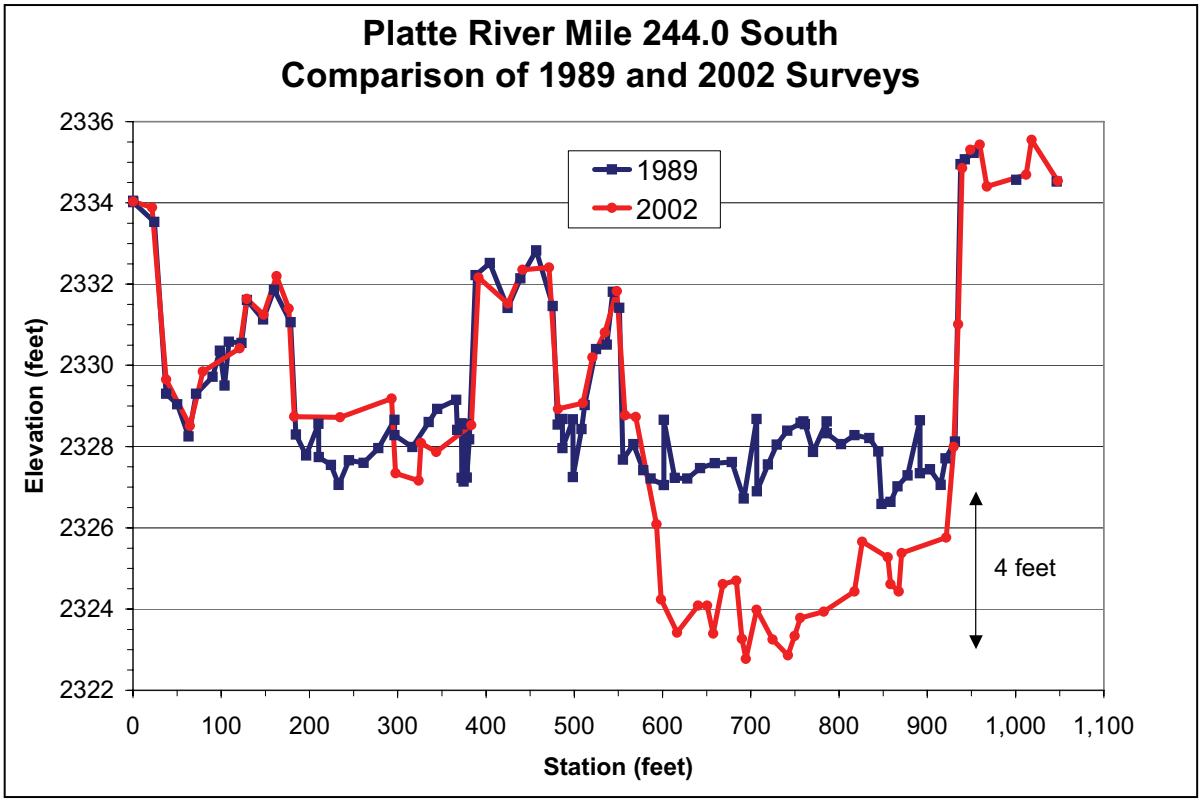


Figure S-6.—Comparison of 1989 and 2002 Platte River channel cross section surveys at river mile 244.0 in the south channel of Jeffrey Island.

Expansion of Vegetation into the River Flood Plain

Permanent vegetation and woodland began to expand into the Central Platte River in the early 1900s. Johnson (1994)[17] concludes that by 1938 (the date of first aerial photographs), only 53 percent of the historic channel area remained unvegetated from Brady to Wood River on average. The EIS Team reached a similar conclusion. Of the historic river channel area (high bank to high bank), roughly half of this area had become vegetated by 1938. From Lexington to Grand Island, Nebraska, about 27,000 acres of unvegetated channel remained. Johnson (1994) found that from 1938 to 1986, on average an additional 50 percent of open channel area was lost in the Central Platte River between Overton and Shelton. The EIS Team's analysis similarly indicates that from 1938 to 1998 the unvegetated portion of the channel between Lexington and Grand Island had been reduced to roughly 9,500 acres, an additional 65 percent loss.

Perhaps more importantly, the areas of open channel with significant unobstructed view declined even more precipitously. Areas with open view greater than 750 feet in width declined by more than 90 percent; areas greater than 1,000 feet declined by more than 97 percent.

[17] Johnson, W. Carter. 1994. Woodland expansion in the Platte River, Nebraska: patterns and causes. In *Ecological Monographs* 64(1):45-84.

When investigating the causes of woodland expansion into the historic Platte River channel, Johnson (1994) concluded that "*low June flows in the developed river, caused by upstream storage and diversion of water for agriculture, have allowed extensive plant recruitment and a buildup of tree populations in the formerly active channels of the Plate River and its two major tributaries*." The variables Johnson found most strongly correlated with loss of open channel habitat were the reduced volume and peak of June flows.

REDUCTION IN WET MEADOWS

According to several sources, wetlands and wetland meadows have been significantly reduced in the last 100 years. Farmers leveled and drained wetlands because spring water levels did not dissipate in time for planting. The reduction of river stage, especially springtime pulse flows, caused by cumulative water storage and diversion has facilitated land leveling, groundwater drainage, and conversion of wet meadows to row crop agriculture and other land uses. Declines in riverflows and a downcutting of the river channel have further lowered surface and groundwater levels in the river and in surrounding lands. Other impacts include fragmentation by roads, and suburban sprawl and industrial development (i.e., sand and gravel mining). It is estimated that native grassland and wet meadow acreage in the Central Platte River has declined 73 percent since the beginning of development.

CHANGES IN PALLID STURGEON HABITAT IN THE LOWER PLATTE RIVER

Water development above the Loup River confluence has reduced flow in the Lower Platte River during the February through July timeframe by approximately 23 percent overall, and during July through September by approximately 14 percent overall.

TARGET SPECIES – POPULATION TRENDS

The whooping crane, piping plover, interior least tern, and pallid sturgeon that use the Platte River habitat also use other habitats during their life history. Therefore, it is not easy to establish the extent to which loss of Platte River habitat has contributed to decline of each species.

Whooping Crane

Estimated whooping crane populations in 1860 to 1870 were between 500 to 1,300. Hunting and a loss of habitat caused a decrease in population numbers in the late 1880s. In 1941, the migratory population numbered 16 individuals, including 6 to 8 breeding birds. As of March 2000, 188 whooping cranes were recorded in the wild flock that migrates through the Great Plains and across the affected area of the Platte River Basin. In March 2002, the population had dropped to 173 birds, but it rebounded to 215 birds by February, 2005.

The National Research Council (2005) concluded that the current conditions of the Central Platte Habitat Area adversely affect the likelihood of survival of the crane, but to an unknown degree. The Council also concluded that the Platte River habitat is important to the continued existence and the recovery of the cranes.

Piping Plover

The International Piping Plover Census within the U.S. Great Plains and Prairie Canada population reported 3,468 birds in 1991; 3,284 in 1996; and 2,953 in 2001. Great Plains nesting sites (including the Platte Basin), which have been monitored a minimum of 10 years, have shown a decline in piping plover population. Statewide in Nebraska, interior least terns and piping plovers are undergoing a significant population decline.

During the 2001 international census, 213 piping plovers were counted along the North Platte, South Platte, Platte, Loup, North Loup, and Elkhorn Rivers in Nebraska. Another 87 piping plovers were counted along the Niobrara River, resulting in a total of 300 birds counted in Nebraska. This represents a decrease of 18 and 25 percent from the 1996 and 1991 census totals, respectively.

The National Research Council states:

> *"The [National Research Council Committee on Endangered and Threatened Species in the Platte River Basin] committee concluded that current central Platte River habitat conditions adversely affect the likelihood of survival of the piping plover, and, on the basis of available understanding, those conditions have adversely affected the recovery of the piping plover."*
>
> (National Research Council, 2005, Page 9)[18]

Interior Least Tern

During the period from 1988 to 1997, throughout their range, interior least tern populations ranged from almost 5,400 to 9,000 adult birds. In the Central Basin region, populations ranged from a low of 119 (1995) to a high of 197 (1991) adult birds. Population analysis indicates population trends are generally positive in most of the interior least tern's range. However, population trends are generally negative for the Platte River.

As noted by the National Research Council in their review:

> *"The central Platte subpopulation of least terns declined from 1991 to 2001. The number of terns using the Platte River is about two-thirds of the number needed to reach the interior least tern recovery goal for the Platte. The interior tern is nesting in substantial numbers on the adjacent lower Platte River but numbers continue to decline on the central Platte, reflecting declining habitat conditions there. The decline in the tern population on the central Platte River has been coincidental with the loss of numerous bare sandbars and beaches along the river. Control of flows and diversion of water from the channel are the causes of these geomorphic changes. . . .*

[18]National Research Council. 2005. Endangered and Threatened Species of the Platte River. Committee on Endangered and Threatened Species in the Platte River Basin, National Research Council, National Academy of Sciences. The National Academies Press, Washington, DC. 299 pp.

> *"The committee concluded that current habitat conditions on the central Platte River adversely affect the likelihood of survival of the interior least tern – in much the same fashion as they affect the likelihood of survival of the piping plover – and that on the basis of available information, current habitat conditions in the central Platte River adversely affect the likelihood of recovery of the piping plover."*
>
> (National Research Council, 2005, Page 10)

Pallid Sturgeon

Of 42 occurrences of pallid sturgeon reported in the lower Missouri River Basin in Nebraska from 1980 through 2001, 20 are from the Platte River, Elkhorn River, or the Missouri River near the Platte River confluence. Thus, 48 percent of the observations in Nebraska are from an area representing about 10 percent of the range.

The National Research Council found that that, currently, the Lower Platte River does not adversely affect the survival of the pallid sturgeon because this part of the river still provides:

> *"[S]everal of the habitat characteristics apparently preferred by the species: a braided channel of shifting sandbars and islands; a sandy substrate; relatively warm, turbid waters; and a flow regime that is similar to conditions found in the Upper Missouri River and its tributaries before the installation of large dams on the Missouri."*
>
> (National Research Council, 2005, Page 10)

The National Research Council concluded that:

> *"The population of pallid sturgeon is so low in numbers, and habitat such as the lower Platte River that replicates the original undisturbed habitat of the species is so rare that the lower Platte River is pivotal in the management and recovery of the species."*
>
> (National Research Council, 2005, Page 11)

ALTERNATIVES

Each of the action alternatives is a Basinwide, cooperative Recovery Implementation Program (Program) for the target species. Each of the action alternatives addresses the purpose of and need for the first 13-year First Increment of the proposed endangered species Program.

PROGRAM'S FIRST INCREMENT OBJECTIVES

The Cooperative Agreement established the general, long-term goal of improving and maintaining the target species-associated habitats to provide ESA compliance for certain existing and new water-related activities in the Basin that are covered by the Program. Objectives established for the Program's First Increment are:

- **Land Habitat Restoration:** Protect and/or restore 10,000 acres of habitat in the Central Platte River area.

- **Program Target River Flows:** Provide water capable of improving the occurrence of Service flow targets by 130 to 150 kaf on an average annual basis through changes in the timing, magnitude, frequency, and duration of flows.

- **Pallid Sturgeon Habitat:** Test the assumption that managing flow in the Central Platte River also improves habitat for the pallid sturgeon in the Lower Platte River.

Every action alternative addresses the same general habitat objectives for land habitat restoration, target riverflows, and steps to provide habitat benefits for pallid sturgeon. The alternatives differ in the emphasis they place on each objective, but each alternative aims to provide significant improvements in habitat for the target species.

These characteristics will serve as the initial definition and focus for creating or restoring habitat complexes and non-complex lands during the Program's First Increment, but they may be changed as new information is developed as part of an adaptive management process.

Two types of land and riverine habitat are planned for restoration and protection: habitat complexes and non-complex habitat.

HABITAT COMPLEXES

Each of the alternatives would create habitat complexes along the Central Platte River to meet the needs of the whooping cranes, interior least terns, and piping plovers. Habitat complexes include wide and long areas of unobstructed channel with shallow depths that provide adequate roost security for whooping cranes and with unvegetated sandbars that provide nesting habitat for terns and plovers. Habitat complexes also include wet meadow areas near the river for crane foraging, loafing, and courtship. Complexes also may include lands that, while not channel roost area or wet meadows, provide an important "buffer" from human disturbance (e.g., roads, dwellings). Characteristics for the components of habitat complexes are summarized from the Governance Committee's Land Plan[19] in table S-4.

Table S-4.—Summary of the Habitat Complex Guidelines

Riverine Habitat	Characteristics
Location	Platte River between Lexington and Chapman, Nebraska.
Channel area	Approximately 2 miles long, 1,150 feet wide, and includes both sides of the river.
Water depth	A range of depths with approximately 40 percent of the channel area less than 0.7-foot deep during whooping crane migration periods.
Wetted width	90 to 100 percent of channel area inundated during migration periods.
Water velocity	During migration seasons, velocity should be less than 4 miles per hour in shallow areas.
Sandbars/channel morphology	Nonpermanent sandbars and low, nonpermanent islands, high enough to provide dry sand during the interior least /plover nesting season and free of vegetation that inhibits use by interior least , plover, or crane.
Proximity to wet meadow	Within 2 miles, but contiguous is preferred.
Distance from disturbance	For whooping cranes: In general, not less than 0.5 mile distant or appropriately screened from potential disturbances. For interior least terns/piping plovers: In general, not less than 0.25 mile distant or appropriately protected from human disturbances.
Unobstructed view	Adequate visibility upstream, downstream, and across the channel.
Flight hazards	Overhead lines should be avoided, if possible.
Security	Sufficient control while target species are present to avoid human disturbance.

[19]This is contained in the Governance Committee's Program Document, which is available on request from <http://www.platteriver.org>.

Wet Meadow Habitat	Characteristics
Location	Within 2 miles of the above-described channel area.
Size	Approximately 640 contiguous acres or more.
Distance from disturbance	In general, not less than 0.5 mile distant or appropriately screened from potential disturbance.
Vegetation composition	Native prairie grasses and herbaceous vegetation, lacking or mostly lacking sizable trees and shrubs, occurring in a mosaic of wetland (hydrophytic) and upland (nonhydrophytic) plants.
Hydrology	Swales subirrigated by groundwater seasonally near the soil surface and by precipitation and surface water, with the root zone saturated for at least 5 to 12.5 percent of the growing season. Except following precipitation events, higher areas may remain dry.
Topography and soils	The topography is generally level or low undulating surface, dissected by swales and depressions. Mosaic of wetland soils with low salinity in swales and nonwetland soils occurring in uplands.
Food sources	Capable of supporting aquatic, semiaquatic, and terrestrial fauna and flora characteristic of wet meadows; especially aquatic invertebrates, beetles, insect larvae, and amphibians.
Buffer	**Characteristics**
Security	That portion of a complex used to isolate channel areas and wet meadows from potential disturbances. In general, the buffer is up to 0.5 mile wide.
Source: Governance Committee Program Document: Attachment 4: Land Plan, Table 1	

NON-COMPLEX HABITAT

Each alternative would also create non-complex habitat—land that, while not approximating the characteristics summarized in table S-4, may provide demonstrable benefits to the target species.

These habitats include the ponds and surrounding sand and gravel areas that result from gravel mining along the Central Platte River (sandpits) that are, or could be, managed as nesting areas for interior least terns and piping plovers, and wet meadows or wetlands that, while not meeting the targeted criteria for a habitat complex, may provide foraging or roosting habitat for cranes. Characteristics of non-complex habitat are summarized in table S-5.

Table S-5.—Summary of Non-complex Habitat Guidelines

Sandpit Habitat for Interior Least Terns and Piping Plovers	Characteristics
Location	Within 2 miles of a river channel, between Lexington and Chapman.
Size	Approximately 3 acres or greater of nesting substrate that may be extended to include a management zone surrounding the nesting area.
Topography and soils	Open expanse of bare or sparsely vegetated (<25 percent) dry, sandy, or sand and gravel substrate.
Security	Sufficient control to avoid human disturbance to interior least terns and piping plovers.
Nonriparian Habitat for Whooping Cranes	**Characteristics**
Location	Off-channel but within 3.5 miles of the centerline of the channel area, between Lexington and Chapman.
Type of habitat	Wetland or wet meadow areas.
Wetlands	Depressional wetlands with semipermanent, permanent, or seasonal shallow body(ies) of water that are typically wet during whooping crane migration.
Wet meadows	A generally level or low and undulating surface, dissected by swales and depressions. The area consists of a mosaic of wetland and upland soils and plants.
Distance from disturbance	In general, not less than 0.25 mile distant or appropriately screened from potential disturbance.
Unobstructed view	Good visibility in all directions.
Security	Sufficient control to avoid human disturbance to target species.
Source: Governance Committee Program Document: Attachment 4: Land Plan, Table 2	

LAND RESTORATION AND MANAGEMENT

Some of the lands acquired or managed by the Program may already approximate the habitat characteristics described in tables S-4 and S-5. In these cases, little restoration will be required, and management will focus on protecting and maintaining those habitat qualities, through efforts such as controlling disturbance factors, controlling weeds and other invasive plants, promoting desirable plant communities, and other measures. All methods of restoration will be tested, monitored, and applied more widely if effective.

Measures for restoring river channel habitat may include:

- Vegetation clearing and discing on banks and islands to improve sight distance across and along the river and to create roosting and nesting opportunities
- Island leveling—lowering elevation of vegetated islands and river banks to improve sight distance and create sandbars
- Moving river sand from islands or banks back into the active river channel to offset ongoing erosion of the channel and support formation of new sandbars
- Creating higher flows within the existing river banks to help create sandbars

- Blocking or diverting higher flows from narrow river subchannels into the main channel
- Other actions to create and maintain sandbars in the river channel
- Measures for restoring habitat complex lands outside the river channel may include:
- Removing trees and shrubs to help restore wet meadows
- Restoring swales and sloughs (and other measures such as blocking existing agricultural drains) to improve hydrologic conditions in wet meadows
- Haying, grazing, and prescribed burning to promote desirable plant communities
- Converting cropland to grassland for wet meadows
- Seeding with native plant species to improve food availability
- Restricting land use activities during migration periods to reduce disturbance of the target bird species
- Taking other actions to reduce disturbance, such as screening roads and relocating structures and access points
- Augmenting water supplies for wet meadows from existing drains or wells
- Making improvements in river stage to improve subirrigation of wet meadows adjacent to the river

Measures for improving and maintaining non-complex habitat may include:

- Controlling vegetation to maintain open sandy areas for interior least tern and piping plover nesting
- Controlling predators to reduce predation of nests
- Reducing human disturbance
- Maintaining existing hydrology in wetlands

Restoration activities would be scheduled and managed to avoid impacts to nesting and roosting target bird species.

RIVER FLOW RESTORATION AND MANAGEMENT

A significant objective of the Program is to improve target species habitat by improving the timing and magnitude of riverflows in the Central Platte Habitat Area. The primary objective is to increase occurrence of the Service's flow recommendations for species flows and annual pulse flows. Another management objective from the Adaptive Management Plan is to increase the occurrence of short-duration near-bankfull flows in the Central Platte Habitat Area. Both objectives are discussed below.

Species Flows

Species flows were established as recommended "wet year," "dry year," and "normal year" minimum flows for various periods of the year (for example, from February 1 through March 22) for the purpose of sustaining the species and their habitat. The species flows are summarized in table S-6.

Table S-6.—Species Flows at Grand Island (cfs)

Period	Wet year*	Normal year*	Dry year*
January 1 – January 31	1,000	1,000	600
February 1 – March 22	1,800	1,800	1,200
March 23 – May 10	2,400	2,400	1,700
May 11 – September 15	1,200	1,200	800
September 16 – September 30	1,000	1,000	600
October 1 – November 15	2,400	1,800	1,300
November 16 – December 31	1,000	1,000	600

*"Wet years" are defined as the wettest 33 percent," dry years" as the driest 25 percent, and "normal years" as all other years.

Annual Pulse Flows

The Service recommends that pulse flows occur annually during natural periods for high runoff: February to mid-March and May through June. These "annual pulse flows" would be in the range of 2,000 to 3,600 cfs for 7 to 30 days, and the 10-year running average of the 30-consecutive-day flow would be 3,400 cfs in May through June. Table S-7 shows the specific frequency and magnitude of flow targets for annual pulse flows.

Table S-7.—Annual Pulse Flow Targets at Grand Island (cfs)

Exceedance Probability (Recurrence Interval)	Recommended Flow in cfs	Notes
75 percent (3 of 4 years)	3,100 to 3,600 (February – March)	30-day duration for February – March
	3,000 (May – June)	7- to 30-day duration for May – June
	3,400 (May – June)	10-year running mean of 30-consecutive-day exceedance
100 percent (all years)	2,000 to 2,500 (February – March)	30-day duration for February – March

Together, the species flows and annual pulse flows described above constitute "Program target flows". These will be used by the Program as the initial benchmarks for measuring Program flow improvements.

Short-Duration Near-Bankfull Flows

To recover and maintain desirable channel habitat conditions for the target avian species, various pulse flow recommendations based on different concepts have been proposed. Flows of approximately 1-to 3 days' duration, with magnitudes approaching but not exceeding bankfull channel capacity through the Central Platte Habitat Area, are currently proposed on an annual or near-annual basis along with other

measures (e.g., clearing and leveling adjacent vegetated areas) to test the ability of the Program to scour vegetation encroaching on Program channel areas and to mobilize sand and build ephemeral sandbars to benefit the nesting target species. Current bankfull capacity in the Central Platte Habitat Area is greater than or equal to 10,000 cfs. Desired short-duration near-bankfull flows would be in the range of 6,000 to 9,000 cfs.

COMMON PROGRAM PRINCIPLES FOR THE ACTION ALTERNATIVES

In achieving the Program habitat objectives, each action alternative incorporates the following elements or adheres to the following principles that Interior considers to be fundamental to implementing a cooperative, Basinwide approach to habitat restoration.[20]

(1) **Willing buyer, willing seller/lessor:** No condemnation of land or water rights will occur. The Program will acquire interests (purchase, lease, easement, or other arrangements) in water and land only from willing sellers and lessors (Governance Committee Program Document).

(2) **Incremental approach:** Any Program will be implemented in increments, with only the Program's First Increment under review at this time (Governance Committee Program Document).

(3) **Adaptive Management:** The effectiveness of the Program will be improved, based upon learning from the initial steps. The FEIS discusses Program aspects that address scientific uncertainty. The initial effects of the Program on the species' habitat and the species' response to changes in the habitat will be monitored and evaluated. Program goals, hypotheses, or methods will be adjusted, as appropriate, based on results of monitoring and research and experience gained in implementing the Program.[21] The Governance Committee developed an Adaptive Management Plan to guide this process and recognizes the importance of implementing the Adaptive Management Plan. The Adaptive Management Plan also contains initial objectives and plans for the first stages of Program management of some key land and water elements (Governance Committee Program Document: Attachment 3: Adaptive Management Plan); however, the Governance Committee did not intend the Adaptive Management Plan to determine ESA compliance or to automatically or implicitly establish Program requirements. The Adaptive Management Plan is expected to change and adjust during the Program's First Increment as new information is learned.

(4) **Integrated Monitoring and Research Plan (IMRP):** As part of the Adaptive Management Plan, a systematic program of monitoring and research will be used to track and evaluate target

[20]Several key aspects of the Governance Committee Alternative have been incorporated into all action alternatives, such as the Depletion Management Plans, institutional arrangements, and cost sharing. While the parties to the Cooperative Agreement have not agreed that these actions would be taken should an alternative other than the Governance Committee Alternative be adopted, these elements are included in all action alternatives to facilitate comparison of impacts.

[21]The Program's adaptive management process allows for the Governance Committee to make changes to many aspects of the Program's activities to adjust to new information, peer review, or experience during the First Increment of the Program. Any changes must still address the Program's objectives for the Program's First Increment. Changes to fundamental aspects of the Program's First Increment, such as to the Program flow targets, to regulatory certainty afforded by the Program, to the Program principles of willing seller and payment of taxes, or to signatories' funding obligations, must be agreed to unanimously by the states and Interior.

species status and habitat use and the effects of the activities implemented in the Program's First Increment on the associated habitats and the response of the target species to those effects.

(5) **Water Protection, Tracking, and Accounting:** Each state would take whatever steps are necessary to account for or provide legal and institutional protections within that state for Program water to and through the Central Platte Habitat Area. Each state will use its own method of regulating, tracking, and accounting for Program-provided water.

(6) **New Depletions Management:** Each state and the Federal Government would develop means to track and offset effects of new and expanded (post-July 1, 1997) water-related activities that would cause depletions to species and annual pulse flow targets at the Central Platte Habitat Area.

(7) **Water Management:** Program water would be managed to improve habitat conditions for the target species. The Service has recommended priorities to guide use of water from the Lake McConaughy Environmental Account and other Program water elements. The Service's EA Manager would coordinate management of this water to improve riverflows with the Program's Executive Director and the other water managers participating in the Program, through the Reservoir Coordinating Committee (RCC) and the Environmental Account Committee (EAC).

(8) **Land Management:** Each action alternative includes acquisition of interest in lands in varying amounts, and management of those lands to approximate the habitat characteristics described in tables S-4 and S-5. Two specific tracts of land already owned by Program participating entities have been designated for inclusion in the Governance Committee Alternative, and they are assumed to be part of the other action alternatives as well.

- **Cottonwood Ranch Habitat**: Nebraska Public Power District has acquired a 2,650-acre portion of the Cottonwood Ranch near Elm Creek, Nebraska, that would be managed as part of the Program.

- **Wyoming Water Development Commission Property**: The State of Wyoming owns 470 acres along the Platte River, near Kearney, Nebraska, that would be managed as part of the Program.

(9) **Pallid Sturgeon:** Each action alternative includes a process to negate or offset any Program-caused adverse impacts to the pallid sturgeon in the Program's First Increment.

(10) **Institutional Framework:** The action alternatives all require organizational structures to provide oversight and coordinate implementation of a Program. The Governance Committee Program Document proposes that a new Governance Committee would be established to guide implementation of the Program, having the same representation as the Cooperative Agreement Governance Committee.

(11) **Cost Sharing:** A cost-sharing framework will be used to fund the Program, with Wyoming, Colorado, and Nebraska providing no less than 50 percent of the contributions necessary to carry out the Program (or others on behalf of their state) and the Federal Government providing the remaining contributions. For this analysis, it is assumed that any action alternative is fully funded and fully implemented.

(12) **Good Neighbor Policy:** The Program shall be carried out in such a way that the Program will be viewed as a "good neighbor" by the residents of central Nebraska and others who might be

affected by Program activities. All land management would be in accordance with a "Good Neighbor Policy" and related policies (Governance Committee Program Document: Attachment 4: Land Plan), which, among other things, stipulate that:

- The Program will pay taxes or their equivalent on Program lands, to avoid reducing tax revenues to local entities or the shifting of tax burdens to other.

- The Program will comply with applicable local, state, and Federal laws and, to the extent permitted by such laws, will be responsible for its actions to the same extent as a private individual under similar circumstances.

- The Program will emphasize the prevention, as opposed to the correction, of actions that cause adverse effects on adjacent landowners or others.

- The Program will have local representatives readily accessible so that the nature and cause of any problem can be quickly determined and needed corrective actions can be taken in a timely manner.

- The Program will require its contractors to carry appropriate insurance to cover documented damage claims resulting from their actions.

SUMMARY OF ALTERNATIVES

The action alternatives are:

- **Governance Committee Alternative:** This alternative has two components, each consisting of a variety of specific actions:

  - The land habitat component protects, restores, and maintains at least 10,000 acres of habitat in the Central Platte Habitat Area.

  - The water component improves the occurrence of species and annual pulse flow targets by an average of 130 to 150 kaf annually.

  This alternative is fully described in the Governance Committee Program Document.

- **Full Water Leasing Alternative:** Water leasing is emphasized in addressing the Program's water goals. This alternative, which provides nearly all of the Program water through water leasing, replaces the "Water Leasing Alternative" analyzed in the DEIS, which incorporated a smaller amount of leased water. Provides 10,000 acres of central Platte River habitat land under Program management and improves achievement of species and annual pulse flow targets by 137 kaf on an average annual basis.

- **Wet Meadow Alternative**: This alternative focuses on restoring wet meadow areas near the river. This alternative explores the benefits to the species from substantial increases in non-riverine habitat, but with reduced quantities of water to achieve target flows. Provides 17,053 acres of central Platte River habitat land under Program management and improves achievement of species and annual pulse flow targets by 116 kaf on an average annual basis.

- **Water Emphasis Alternative:** This alternative focuses on acquiring water for the Program. There is less emphasis on land habitat management. This alternative explores the benefits to the

target species of substantial increases in Program water supplies, particularly in reservoir storage, but reduced management of non-riverine habitat. Provides 7,475 acres of central Platte River habitat land under Program management and improves achievement of species and annual pulse flow targets by 185 kaf on an average annual basis.

Present Condition: the Baseline for Comparing Alternatives (No Action Alternative)

The Present Condition that exists in the Basin is used as the quantitative NEPA baseline for comparing alternatives. This baseline is used because these are the conditions that currently exist for the target species and upon which have been based the jeopardy opinions issued by the Service. Also, given the historic complexity and contentiousness of past Section 7 consultations related to these species, and the length of time required to develop and implement reasonable and prudent alternatives or offsetting measures as required under the ESA, does not seem likely that significant restoration activities will be implemented unless a Basinwide, cooperative Program is undertaken.

Governance Committee Alternative[22]

Water Elements

Table S-8 lists the water projects included in the Governance Committee Alternative and shows their overall expected water yields, in terms of improvements in meeting species and annual pulse target flows.

[22] [22]The Governance Committee Alternative, as described in the Governance Committee Program Document, has been summarized for purposes of this FEIS. Any discrepancies between the representations made in this FEIS and the Governance Committee Program Document are unintentional and the Governance Committee Program Document will prevail during the implementation of the Program. The Governance Committee Program Document is available on request from <http://www.platteriver.org>.

Table S-8.—Water Elements for the Governance Committee Alternative and Average Annual Improvement Toward Species and Annual Target Flows

Program Water Features and Elements	Projected Improvement Toward Target Flows (kaf per year)
State Projects	
Total for these elements: Lake McConaughy EA Pathfinder Modification Project EA Tamarack Project, Phase I	80
Water Action Plan Conservation/Supply Activities	
Total for these elements: Wyoming 1. Pathfinder Wyoming Account 2. Glendo Reservoir Storage 3. Water Leasing 4. La Prele Reservoir Leasing Colorado 1. Tamarack Project, Phase III Nebraska 1. Offstream Reservoir in the Central Platte 2. Water Leasing 3. Water Management Incentives 4. Groundwater Management in the Central Platte Groundwater Mound Area 5. Dry Creek/Fort Kearney Cutoffs 6. Dawson and Gothenburg Canal Groundwater Recharge 7. Central Platte Power Interference 8. Net Controllable Conserved Water	70*
Total	150
*This is the reconnaissance-level estimate of improvement toward target flows produced by the Water Action Plan. These estimates would be confirmed or further refined through feasibility-level studies as the Program is implemented.	

Three State Projects

Wyoming, Colorado, and Nebraska each provide an initial Program water project to the Governance Committee Alternative as a foundation for the Program Water Plan. Together, these three state projects increase achievement of target flows by roughly 80 kaf on an average annual basis. Details of the operation of the three state projects are in the Governance Committee Program Document: Attachment 5, Water Plan.

- **Wyoming—Pathfinder Modification Project Environmental Account.** The Pathfinder Modification Project would restore the capacity of the existing Pathfinder Reservoir by approximately 54 kaf to recapture storage space lost to sediment. This space would be used to store water under the existing 1904 storage right for Pathfinder Reservoir. About 34 kaf of the recovered 54-kaf volume would be accounted for in a Pathfinder EA and operated for the benefit of the endangered species and habitat in central Nebraska.

- **Colorado—Tamarack Project, Phase I.** The purpose of Colorado's proposed Tamarack Project, Phase I, is to retime the flow of water in the South Platte River that leaves the State of Colorado, to increase achievement of target flows at Grand Island, Nebraska, by 10 kaf on an average annual basis. The project involves diverting water when flows at Grand Island, Nebraska, are in excess of flow targets and when water is available under the South Platte River Compact. The water is diverted to small storage/recharge ponds, infiltrates into the underlying alluvial aquifer, and is timed to return to the river during periods of shortage to species and annual pulse flow targets. The components of the Tamarack Project, Phase I, will be developed within the 40 miles above the state line, beginning at about the Tamarack Ranch State Wildlife Area, which is owned by the Colorado Division of Wildlife near Crook, Colorado.

- **Nebraska—Lake McConaughy Environmental Account.** An Environmental Account in Lake McConaughy would hold water to be released to improve river flow conditions downstream in the Central Platte Habitat Area. The EA would receive 10 percent of the storable inflows to Lake McConaughy from October through April, up to a maximum of 100 kaf in any one year. The amount in the account also would be set at 100 kaf any time Lake McConaughy fills. Water not released from the EA in one year carries over to the next year as long as a limit of 200 kaf is not exceeded. Within certain limitations, the EA manager (a Service employee) determines when water is to be released from that account.

Water Action Plan

In addition to the three state projects, above, the Governance Committee Alternative includes a Water Action Plan that contains 13 water supply and conservation projects and activities to supply an additional average of 50 to 70 kaf per year of improvement toward meeting target flows. As summarized in table S-8, the 13 presently identified conservation and water supply projects are expected to yield 70 kaf of improvement toward target flows.[23]

- **Pathfinder Modification Project, Wyoming Account, Wyoming.** As discussed above, the Pathfinder Modification Project's restored original capacity would yield 54 kaf of storage space. A State of Wyoming Account with a firm annual water yield of 9,600 acre feet per year would be created from 20 kaf of this storage. In the event that the current demand for additional municipal water is less than 9,600 acre-feet per year, Wyoming could annually lease the unneeded portion to the Program (an estimated average of 4,800 acre-feet per year for the Program's First Increment).

- **Glendo Reservoir Storage, Wyoming.** Wyoming would annually lease the unneeded portion of its share of Glendo storage water to the Program (an estimated average of 2,650 acre-feet per year for the Program's First Increment).

[23]Details of the Water Action Plan can be found in the Governance Committee Program Document: Attachment 5: Water Plan, Section 6: Reconnaissance-Level Water Action Plan. The conservation and water supply projects in the Water Action Plan were identified through reconnaissance-level studies. The results of more detailed project development and feasibility studies carried out as part of the Water Action Plan may cause some projects to be abandoned. If so, "substitute" projects would be identified, if necessary, to meet the overall Water Plan goals. This FEIS assesses the effects of the proposed projects on the river system and on the species' habitat. The local impacts of construction of any such projects would be addressed in subsequent National Environmental Policy Act and Endangered Species Act documents prior to implementation, including analysis of effects on other listed species. The FEIS analysis arrives at estimates of water yield that, in some cases, differ somewhat from those target reductions either for individual elements or for the aggregate yield of all the Governance Committee Actions.

- **Water Leasing, Wyoming.** An incentive program would be established for willing Wyoming irrigators to make temporary leases of their water available to the Program. While numbers are not known, the goal would be to lease approximately 16,500 acre-feet of water per year. The shortage reduction at the Central Platte Habitat Area would be about 3,900 acre-feet on an average annual basis.

- **La Prele Reservoir Water Leasing, Wyoming.** Under La Prele Reservoir leasing, the Panhandle Eastern Pipeline Company, which holds right to 5 kaf of storage space in La Prele Reservoir, would lease the space to the Program. The average annual yield from this space is estimated at 1,865 acre-feet per year at the reservoir.[24]

- **Tamarack Project, Phase III, Colorado.** Colorado proposes to use groundwater recharge to provide an estimated average of 17 kaf of water per year to the Governance Committee Alternative through additional retiming from various locations downstream from the Balzac gauge.

- **Offstream Reservoir in the Central Platte, Nebraska.** An offstream storage reservoir would store excess flows from CNPPID's canal to retime releases. The project is expected to yield about 14,000 acre feet per year of improvements to target flows, of which 7 kaf are credited to the Program and the rest reserved for Nebraska to offset future depletions. This project would be cost shared between the Program and the State of Nebraska.[25]

- **Water Leasing in Nebraska.** A water leasing program similar to Wyoming's would include leasing sufficient rights to obtain Program management of approximately 8,400 acre-feet per year of water that would otherwise be consumptively used. After accounting for transit losses, this would yield an average 7-kaf-per-year improvement toward target flows at Grand Island, Nebraska.

- **Water Management Incentives in Nebraska.** Water management incentives would include paying willing farmers with storage rights in Lake McConaughy to reduce their need for irrigation deliveries by adopting water-saving measures. Only the avoided consumptive use of water would be available to the Program for management. The expected yield is an average improvement toward target flows of 7 kaf on an average annual basis.

- **Groundwater Management in the Central Platte Groundwater Mound, Nebraska.** Additional groundwater management would be implemented in the high groundwater area south of the Central Platte River ("Groundwater Mound") that has built up due to percolation of irrigation water and seepage from canals and reservoirs. Management would be implemented to avoid permanent "mining" of the groundwater table: The goal for these options is to provide an average improvement toward target flows by 6 kaf on an average annual basis, of which 1,400 acre-feet per year would be credited to the Program; the remainder is reserved by the State of Nebraska to offset future depletions to the Platte River.

[24]The Water Action Plan's objective for this element is 2,200 acre-feet per year.
[25]The Water Action Plan's objective for this element is a yield of 8 kaf per year, with 5 kaf per year going to the Program.

- **Dry Creek/Fort Kearney Cutoffs, Nebraska.** The Dry Creek/Fort Kearney Cutoffs consist of two options to create a small drainage channel that would return either existing flows in Lost Creek (Dry Creek cutoff) or releases from the Funk Lagoon (Fort Kearney cutoff). This would provide an estimated annual average of 2,200 acre-feet per year to the Central Platte Habitat Area.[26]

- **Dawson and Gothenburg Canal Groundwater Recharge, Nebraska.** The Gothenburg and Dawson canals divert water from the Central Platte River just upstream of the Central Platte Habitat Area. The recharge project would involve diverting riverflows into the canals outside of the irrigation season, when flows in the river are in excess of target flows. These waters would return to the river through groundwater flows over a period of years, with approximately 28 percent of return flows occurring within 9 years. The average diversions to the Gothenburg and Dawson canals would be approximately 14 and 19 kaf per year, respectively, providing an estimated additional average of 2,600 acre-feet per year to target flows, of which 1,600 acre-feet would be allocated to the Program.

- **Central Platte Power Interference, Nebraska.** Year-round releases are made from Lake McConaughy to generate hydropower at the Kingsley Dam hydropower plant and at the CNPPID and NPPD canal powerplants. Waters not diverted for irrigation return to the Platte River above the Central Platte Habitat Area. The Program would pay the districts to modify their schedule of water releases to shift some of the riverflows from periods of excess to periods of flow shortage, thus improving the overall attainment of target flows by an average of 1,400 acre-feet per year.

- **Net Controllable Conserved Water, Nebraska.** CNPPID has undertaken various conservation measures to reduce its total diversions from the Platte River, based on an agreement with the National Wildlife Federation. For this element, 5 kaf per year of target flow shortage reduction could be made available to the Program.

Program Releases and Flows

The water management facilities on the Central Platte River are complex. Water is stored, diverted, and returned at many points, serving many functions and water users. The facilities are managed by multiple agencies. Coordination of water operations is an important part of the Governance Committee Alternative and the improvement of flows in the Central Platte Habitat Area. This is especially true given that most of the flow improvements for the Governance Committee Alternative result from a retiming of riverflows rather than a change in the annual volume of flows.

Figure S-7 illustrates one of the ways that the Governance Committee Alternative's water could be managed to improve attainment of target flows at Grand Island, on an average annual basis, compared both to the Present Condition and to the target flows for each month. The graphic highlights the releases from the EA. (Note that the flow targets shown in this figure are, in some cases, combinations of species and annual pulse flow targets.) As shown, the Governance Committee Alternative stores or diverts water from the months of January, November, and December. Program waters are released to increase flows in March, April, May, August, and September. Many other patterns of EA release are possible that would still produce roughly the same amount of improvement in meeting Service species and annual pulse flow targets, even though the consequential negative and beneficial impacts on the resources could widely differ.

[26]The Water Plan objective for this element is 4,000 acre-feet per year. Because this water enters the Platte River roughly half way through the Central Platte Habitat Area, it is credited with 2,200 acre-feet in the FEIS analysis.

Addressing the North Platte River Channel Restriction

Improving the occurrence of target flows and achieving short-duration near-bankfull flows requires moving significant amounts of water from the Program's Lake McConaughy Environmental Account downstream to the Central Platte Habitat Area. This can be done using a combination of flows from Lake McConaughy down the North Platte River and flows through the canal system. However, in the past several years, the carrying capacity of the North Platte River channel at North Platte, Nebraska, has been reduced. This reduces the Program's capacity to move water to the habitat, especially during the irrigation season when irrigation deliveries are filling most of the channel's capacity.

Figure S-7.—The Present Condition median riverflows at Grand Island, Nebraska, and flows under the Governance Committee Alternative, compared to the Service's species and annual pulse flow targets

The Governance Committee has agreed to implement measures that allow a safe conveyance capacity of at least 3,000 cfs. The Governance Committee has proposed to undertake a feasibility study by the end of year 2 of the Program's First Increment to evaluate the feasibility of delivering during the Program's First Increment:

- 5,000 cfs of Program water for 3 days to the upper end of the associated habitat (at Overton gauge) for pulse flows when other demands for conveyance of water deliveries are low (normally September 1 to May 31)

- Quantities of Program water that are likely to yield 800 cfs at the Central Platte Habitat Area during the irrigation season

The Governance Committee will implement measures expected to achieve these objectives by year 5 of the Program, unless the feasibility study and the adaptive management process find that these deliveries are infeasible or unnecessary and the Governance Committee concurs.

Short-Duration Near-Bankfull Flows

The Program has also established a management objective in the Adaptive Management Plan to create short-duration near-bankfull flows in the Central Platte Habitat Area. Using the Program's ability to deliver 5,000 cfs of Program water at Overton, the Program will seek to create annual (usually springtime) flows near bankfull in the Central Platte River of at least 6,000 cfs for a period at Grand Island sufficient to mobilize sediment and build sandbars.

- Testing will start in the first year of the Program with a flow target of up to 5,000 cfs for 3 days at Overton gauge. A plan for achieving this objective will be developed by the EAC and implemented during the first year of the Program.

- Using the EA in Lake McConaughy, as well as the flexibility in the CNPPID and NPPD canal and reservoir system, short-duration releases will be added to South Platte River flows to create short-duration near-bankfull flows in the Central Platte Habitat Area during spring or outside of the main irrigation season. These flow events will be tested in stages and adjusted accordingly based on their success at aiding the construction of braided channels, increasing sandbar heights, and restricting establishment of new vegetation in the active channel.

- The Program will also investigate the augmentation of winter pulse flows to enhance ice scour.

Management of New Depletions

The Program seeks to ensure that other water-related actions do not reduce achievement of target flows. Each state and the Federal agencies have, therefore, developed plans to mitigate or avoid any future depletions that increase shortages to the species and annual pulse flow targets.

Each plan is briefly summarized. Please note that the Depletion Management Plans are complex, and readers wanting the technical and legal details should read the more detailed description in the FEIS or the full text of the plans in Governance Committee Program Document: Attachment 5: Water Plan.

Wyoming

Wyoming's Depletions Plan will develop existing water-related baselines covered by the program, establish a method for determining if these baselines are exceeded and develop a mitigation plan for any excess depletions, and determine how to report and mitigate post July 1, 1997 water-related activities. The Wyoming Depletions Plan includes two existing water-related baselines for the North Platte Basin and one for the South Platte River Basin.

The Wyoming State Coordinator will monitor issuing water rights and state funding of water projects to determine if these proposed water uses are covered by the Program or if they are new water uses that must be mitigated. If new water uses require Federal approval, the State Coordinator will be available to assist in ESA consultations. If new water uses do not require Federal approval, then the State Coordinator will require that depletions fro the new uses be mitigated.

The Wyoming Water Development Commission is evaluating the feasibility of a Wyoming Water Bank, with the primary goal to provide sufficient replacement water to offset any depletion in excess of existing water-related baselines and for future domestic wells and stock ponds. As it is unlikely that the Wyoming Water Bank would have sufficient water to assist with mitigating new water-related activities beyond domestic wells and stock ponds, proponents of new water-related activities will likely need to provide mitigation for their projects.

Colorado

The Colorado's Plan for Future Depletions is divided into Colorado South Platte River Basin and Colorado North Platte River Basin. The South Platte portion of the future depletions plan assumes that new water development will be driven from population growth rather than increases in agricultural use. The South Platte depletions plan retimes the net increase in water to avoid increasing shortages to program target flows. Colorado will track changes in population, irrigated lands, and water use every 5 years, and will change its plan if the material assumptions are unfounded. Colorado expects little new water use in the Colorado portion of the North Platte River Basin. Colorado will mitigate new depletions that occur if irrigated acreage exceeds 134,467 acres or the population in Jackson County exceeds 2,022 people. If a plan for future depletions is needed in the North Platte Basin, Colorado commits to replacing depletions from new water-related activities on a one-to-one basis after considering timing and location and shortages to Program target flows, consistent with the decree in *Nebraska v. Wyoming*, 325 U.S. 589 (1945), modified, 345 U.S. 981 (1953).

Nebraska

Nebraska's plan to prevent or mitigate for new depletions to target flows would be implemented primarily through actions taken by the Nebraska Department of Natural Resources (NDNR) and by the up to seven natural resources districts (NRDs) that have land area subject to that plan.

Depletions to target flows and to "state-protected flows" will be estimated and will be offset in quantity, time and location.

In all cases, the offset objective will be to replace the water depleted in the amounts needed and at the times and locations needed to prevent harm to the water uses and/or the target flows for which such flow protection is required. Any additional offset measures that are needed after 2008 because of the lag effect of new groundwater uses begun in that same time period will be put into place by the time the depletions from those new uses occur.

Federal

A new Federal depletion is one that occurs after July 1, 1997 which is partially or solely a Federal agency responsibility to address. Generally speaking, this would include depletions from new water-related activities implemented by Federal agencies that provide that provide a primarily "national benefit." Each state has agreed to work with Interior and cooperating Federal agencies in the process of securing up to 350 acre-feet of water annually, if needed, to offset new Federal depletions within the state in a manner consistent with the respective state's Depletion Management Plan.

The Federal Depletion Management Plan is not intended to cover large new Federal depletions (e.g., Federal depletions measured in thousands of acre-feet per year) that could be associated with new or enlarged reservoirs, large well fields, large surface water diversions, or other large-scale activities. Those will be covered through measures developed under separate ESA Section 7 consultation.

A Federal agency electing to participate in the Program will have several options for addressing the new Federal depletions for which the agency is responsible:

- Replace the new Federal depletion by permanently retiring an equivalent Federal depletive activity
- Provide annual funding to the appropriate parties to ensure that offsetting measures will be implemented consistent with the applicable state Depletion Management Plan, as necessary to fully offset the Federal depletion
- Replace the new depletion through other means

Land Elements

The Governance Committee's land objective for the Program's First Increment is protecting, restoring where appropriate, and maintaining at least 10,000 acres of habitat for the target species in the Central Platte Habitat Area, located between Lexington and Chapman, Nebraska.[27]

The 10,000 acres of land has been divided into two categories:

- 9,200 acres of lands for habitat complexes with potential to achieve habitat characteristics similar to table S-4 (habitat complex guidelines).
- 800 acres of non-complex lands, such as sandpits and small palustrine wetlands, with the aim of approximating features described in table S-5 (non-complex habitat guidelines).

Initial Focus for Habitat Complexes

In addition to the Program land objectives described above, the Adaptive Management Plan describes more specific initial management objectives that will be the initial focus for restoration and protection of habitat complexes.

[27]The 10,000 acres includes two parcels that have already been put forward for inclusion in a Program: the 470-acre State of Wyoming property near Kearney, Nebraska, and the 2,650-acre NPPD Cottonwood Ranch property near Elm Creek, Nebraska.

Location

While the long-term objective is to have one habitat complex in each of ten bridge segments in the Central Platte Habitat Area, the Adaptive Management Plan indicates that the Program's First Increment emphasis will be on the river above Minden, Nebraska, with a target of 6,400 acres of Program habitat complexes in this reach, and the remaining 2,800 acres downstream to Chapman.

Restoration

The Adaptive Management Plan also describes a First Increment focus on restoration of habitat, as opposed to protection of existing habitat, with roughly 50 percent of Program lands undergoing significant restoration or enhancement (change in cover type or land category) during the Program's First Increment.

Wet Meadows

The management objective from the Adaptive Management Plan is to increase wet meadow acreage by 10 percent over the 1998 baseline conditions for the Central Platte Habitat Area.

Open Channel Habitat

The management objective from the Adaptive Management Plan is to increase the acreage of channel area greater than 750 feet wide by 30 percent over the 1998 baseline conditions for the Central Platte Habitat Area. Methods to be tested for achieving this result include:

- Mechanically clear vegetation from islands and banks in the channel as needed to aid the widening process
- Mechanically lower islands to a level that will be inundated by anticipated annual peak flows
- Scour channel vegetation, maintain channel width and form, and build higher sandbars through short-duration near-bankfull within banks, and use other flow management methods
- Consolidate higher flows into the widened channel and away from subchannels to maximize stream power and help induce braided channel characteristics

Offsetting Channel Erosion

The management objective from the Adaptive Management Plan is to assist in attaining sediment balance in the river reach above Kearney through actions on Program lands. Methods for achieving these objectives that will be tested through the Adaptive Management process include:

- Starting in year 1 of the Program, move river sand on approximately 20 acres of river islands and banks on Program or cooperator lands above Overton, into the channel where the riverflow can move sand. Cleared areas will ultimately be lowered to the elevation that can be overtopped by a flow of 1,000 cfs. Movement of the island or bank sand into the active channel should occur at a rate that allows the material to be moved by the river but does not raise average bed elevation so much that flow begins to spill into subchannels.
- Begin investigating alternative methods such as channel plan form changes, tributary delivery improvements, or flow routing changes.

- Develop a master plan for sustaining sediment balance in the Central Platte Habitat Area:

Illustrative Scenario for Program Lands under the Governance Committee Alternative

Acquiring interests in lands for the Program is based entirely upon willing sellers. Therefore, it is not possible to determine, prior to Program implementation, exactly which lands will become part of the Program.[28] However, based upon meeting the objectives described above, an illustrative scenario for land acquisition and management has been analyzed. While the ultimate plan implemented for the Program will differ in specific location and management of each land parcel, the overall scale of actions, the types of actions, and hence their overall effect on key habitat characteristics should be similar to those produced by this scenario.

Table S-9 shows the acres of land managed under this scenario for various reaches of the river.

Table S-9.—Illustrative Distribution of Land Plan Acreage by River Segment, Governance Committee Alternative*

River Reach	Acreage
Lexington to Johnson-2 Return	24
Johnson-2 Return to Overton	195
Overton to Elm Creek	3,110
Elm Creek to Odessa	57
Odessa to Kearney	1,760
Kearney to Minden	1,551
Minden to Gibbon	75
Gibbon to Shelton	1,094
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	42
Phillips to Chapman	1,685
Total	10,000

*Includes all Program interests in lands, whether fee title, leases, or easements.

To accomplish the habitat restoration objectives, actions are proposed on Program lands to remove islands in the channel that are covered with woody vegetation and which sit well above the typical high water line. The goal is to create additional areas of wide channel with views unobstructed by high islands and vegetation. Actions to increase areas of wide channel are especially important in those areas of the

[28]Except for the Cottonwood Ranch and the Wyoming Water Development Commission Property, which have already been committed to the Program by their managing entities.

Central Platte Habitat Area where a single, wide channel has been replaced with several narrow subchannels. In these areas, actions are taken on Program lands to widen the primary channel.

To increase and maintain the wetted width of the primary channel, and to increase the ability of high flows (including short duration flows near bankfull) to remove annual vegetation and to mobilize and build higher sandbars, additional actions are proposed to direct higher riverflows into the primary channel by blocking or diverting those flows from subchannels.

The illustrative land plans evaluated for the alternatives involve varying amounts of island clearing and leveling, and restriction of flows into subchannels. In most cases, island clearing and leveling results in removing a high, wooded island which is surrounded by open channel. Restriction of flow into subchannels may take several forms. Where subchannels are short and narrow, it may be most useful to block the upper end of the channel with a sand dam, converting the short and narrow channel into a slough or backwater. Where the subchannel is lengthier or wider, the best approach may be to place a sand dam and pipe culvert across the upper end. The dam and culvert could be sized to allow average flows to continue through the subchannel, while diverting the highest flows into the primary channel. Other approaches are possible, all with the objective of diverting the highest flows into the primary channel. Some of these actions are illustrated in figure S-8.

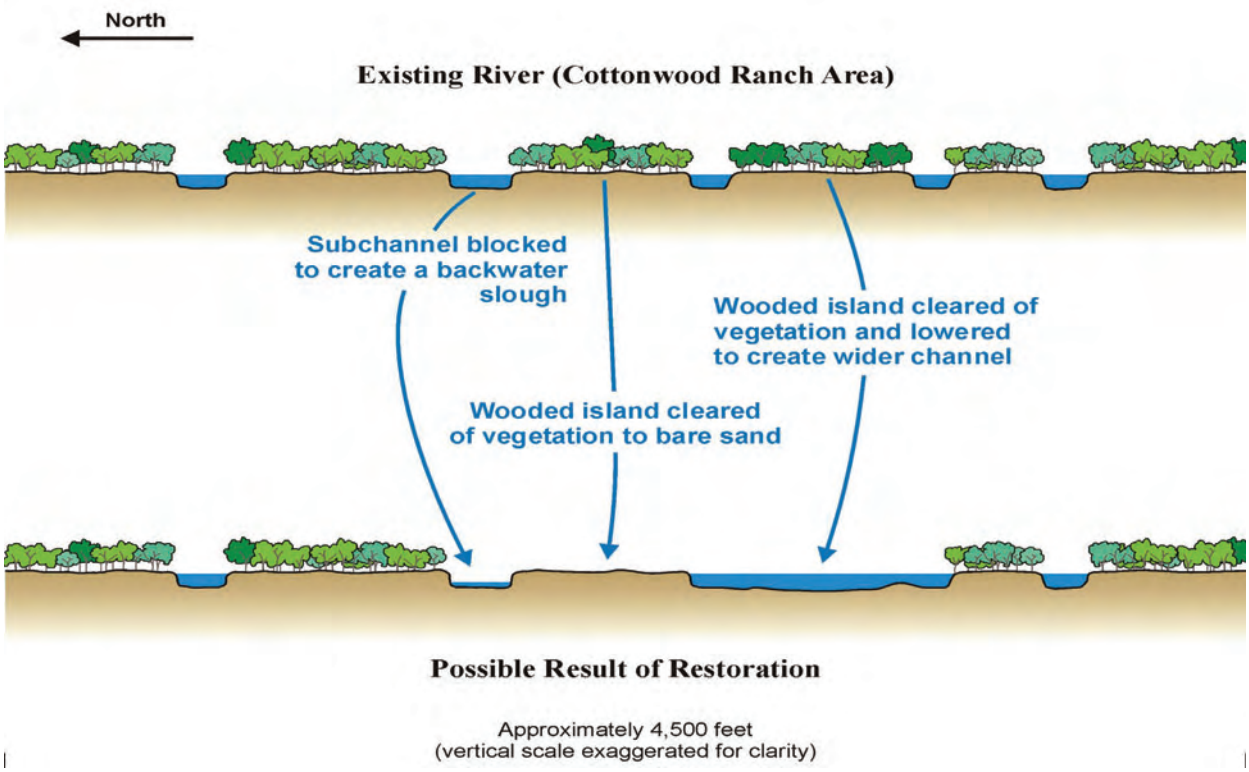


Figure S-8.—Cross-section of the river on Cottonwood Ranch, illustrating the types of channel restoration activities described in this scenario.

As with all channel restoration work, detailed restoration plans will be developed once a Program is under implementation and specific lands are offered for sale or lease by landowners. At that time, specific permitting under the Clean Water Act will also be necessary through the U.S. Army Corps of Engineers (Corps). Every effort will be made to avoid any adverse consequences or impacts to downstream land owners, as stipulated in the Program's Good Neighbor Policy.

Table S-10 shows how this land management scenario modifies various land cover types as restoration is undertaken. For example, in this scenario, lands are acquired in areas where the river flood plain is filled with wooded islands. To more closely achieve the habitat characteristics of open channel described in table S-4 (habitat complex guidelines), the Governance Committee Alternative could convert roughly 300-400 acres of vegetated islands in the river channel to wetted channel by removing vegetation and lowering the islands to an elevation that can be overtopped by flows within the riverbanks.

Table S-10.—Summary of Estimated Land Cover Changes for All Land Parcels Managed in the Governance Committee Alternative

Restoration Activities	Change in Cover Type	Acres	Subtotal
To lowland grassland	Wooded to lowland grassland	2,235	**4,277**
	Herbaceous to lowland grassland	271	
	Agriculture to lowland grassland	1,161	
	Shrubs to lowland grassland	513	
	Upland grassland to lowland grassland	94	
	Emergents to lowland grassland	3	
To wetted channel	Wooded to wetted channel	152	**355**
	Shrubs to wetted channel	163	
	Herbaceous to wetted channel	19	
	Bare sand to wetted channel	19	
	Lowland grassland to wetted channel	2	
	Emergents to wetted channel	0	
To bare sand	Wooded to bare sand	0	**0**
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	
Restored lands		4,632	4,632
Unmodified lands		4,568	4,568
Total non-complex habitat		800	800
Totals		**10,000**	**10,000**

Under the Adaptive Management Plan, this process would be accomplished in phases over several years. Initial efforts would be small in scale, with monitoring of progress and effectiveness, as described in detail in the Adaptive Management Plan.

Full Water Leasing Alternative

Water Elements

Table S-11 presents the water elements for the Full Water Leasing Alternative.

Table S-11.—Average Annual Program Water Contribution to Species' Target Flows Under the Full Water Leasing Alternative

Program Water Features and Elements	Projected Improvement Toward Target Flows (kaf per year)
Wyoming Water leasing (approximately 60 to 70 kaf per year leased) Colorado Water leasing (approximately 100 kaf per year leased) Nebraska Water leasing (approximately 60 to 70 kaf per year leased) Lake McConaughy RA 200 kaf	
Total	**137**

Lake McConaughy Re-Regulation Account

Under the Re-Regulation Account, 200 kaf of space in Lake McConaughy would be allocated for storing and releasing Program water, similar to the EA proposed for the Governance Committee Alternative. The primary difference is that the RA would not acquire 10 percent of the storable inflows to Lake McConaughy, but would only capture and/or regulate Program water acquired through leasing of consumptive use on the North Platte River and Platte Rivers in Wyoming and Nebraska. Water not released from the RA in one year would carry over to the next year as long as the limit of 200 kaf is not exceeded.

Water Leasing

Each state would lease water for Program purposes by voluntary participation, from existing reservoir storage or direct diverters in that state. The state would provide to the Program only the consumptive use associated with the existing use. The remainder acquired would be managed under direction of the state to maintain the current pattern of return flows. Typically, this means that the Program would manage approximately one-half of the water leased.

The location of the leased water would depend on patterns of participation and state policies. For this FEIS analysis, the amount of water assumed to be leased was divided among reservoirs or projects as follows to illustrate a range of possible effects. In actual implementation, Program water leasing would likely be more widely distributed. Table S-12 shows the distribution of water leasing under the Full Water Leasing Alternative.

Table S-12.—Illustrative Distribution of Water Leased to the Program Under the Full Water Leasing Alternative

	Acre-Feet
Wyoming (North Platte River Reservoirs)*	
North Platte Project	124,100
Kendrick Project	18,800
Glendo Unit	3,465
Colorado	
Jackson Reservoir	8,000
Empire Reservoir	4,000
Riverside Reservoir	8,000
Prewitt Reservoir	10,000
North Sterling Reservoir	30,000
Julesburg Reservoir	10,000
South Platte River Direct Diverters	28,125
Nebraska (Lake McConaughy and below)	
Lake McConaughy	120,000
*A significant amount of the water in these Wyoming reservoirs serves agricultural lands in the panhandle of Nebraska.	

Wyoming: The Program leases 32 percent of the water that each Reclamation district receives from Reclamation reservoirs in the North Platte River Basin. (Such an approach would likely require the creating accounts in the North Platte Project reservoirs (Pathfinder and Guernsey) for each irrigation district that receives water from the North Platte Project.)

Colorado: The Program leases water both from reservoir storage and direct flow diverters on the South Platte River, as shown in table S-12. These leases are targeted and managed to provide increased flows in May and June to the state line. It is assumed that any such leasing would occur in the lower South Platte River Basin, below Greeley, where competition for water with municipalities is reduced.

Nebraska: The Program leases 13.8 percent of the water diverted by each irrigation district that has a surface water diversion below North Platte, Nebraska and which receives water from storage in Lake McConaughy and Sutherland Reservoir.

After accounting for conversion of stored water to consumptive use and for transit losses, this element would yield approximately 137 kaf per year of target flow improvement at the habitat.

Program Releases and Flows

The water accrued to the Pathfinder Environmental Account and the leased waters in the North Platte River Basin typically would be held in one or more of the North Platte River reservoirs and moved down to the Lake McConaughy Environmental Account during September. The leased waters in the South Platte River Basin would likely be released or bypassed in May and June to augment spring flows and sediment transport to the Central Platte Habitat Area.

For this alternative, the capacity to move water to the habitat and to create short-duration near-bankfull flows would be the same as that for the Governance Committee Alternative.

Lake McConaughy 200 kaf Re-Regulation Account Management

Management of the Re-Regulation Account would be similar to the Lake McConaughy Environmental Account in the Governance Committee Alternative.

Land Elements

The Land Plan for this alternative is the same as for the Governance Committee Alternative.

Wet Meadow Alternative

Water Elements

Table S-13 lists the water elements for the Wet Meadow Alternative. This alternative uses the three state projects, plus a 100 kaf new water right for the Program in Glendo Reservoir.

Table S-13.—Average Annual Program Water Contribution to Species' Target Flows Under the Wet Meadow Alternative

Program Water Features and Elements	Projected Improvement Toward Target Flows (kaf per year)
State Projects	
Total for these elements: Lake McConaughy EA Pathfinder Modification Project EA Tamarack Project, Phase I	80
Additional Water Elements	
Total for these elements: Wyoming Program water right for 100 kaf Glendo storage Glendo Reservoir Storage Pathfinder Wyoming Account	36
Total	**116**

Lake McConaughy Environmental Account

See Governance Committee Alternative.

Pathfinder Modification Project Environmental Account

See Governance Committee Alternative.

Pathfinder Wyoming Account

See Governance Committee Alternative.

Glendo Reservoir Storage

See Governance Committee Alternative.

Tamarack Project, Phase I

See Governance Committee Alternative.

New Program 100-kaf Water Right in Glendo Reservoir

This proposal is to reduce the re-regulation space in Glendo Reservoir by 100 kaf and file in Wyoming for a new (junior) water right on that space. Currently, over 300 kaf of the space in Glendo Reservoir is dedicated to the restorage of water that is released in the winter from Pathfinder Reservoir to generate power and maintain Gray Reef Reservoir minimum outflow requirements. Water accruing in priority to

the 100 kaf space would be managed for the target species. This produces approximately 38 kaf of reduction in target flow shortages at Grand Island.

A new Wyoming water right would be required to allow this storage to be used for environmental purposes. Additional Federal authorization may also be required. The re-regulation space in Glendo is currently used to:

- Replace water that passed the Wyoming–Nebraska State line in excess of the amount ordered by canals with storage contracts below the Wyoming–Nebraska State line
- Replace evaporation from the storage ownership accounts of Pathfinder Reservoir, Guernsey Reservoir, Seminoe Reservoir, Alcova Reservoir, and Glendo Reservoir
- Supplement the natural flow that is available for apportionment between Wyoming and Nebraska

Program Releases and Flows

The water accrued to the Pathfinder EA and the Program storage right in Glendo Reservoir would be moved down to the Lake McConaughy EA during September. For this alternative, the capacity to move water to the habitat and to create short-duration near-bankfull flows would be the same as that for the Governance Committee Alternative.

Management of the Lake McConaughy Environmental Account would be roughly the same as for the Governance Committee Alternative. However, the significantly reduced amount of Program water would mean that achievement of flow targets and vegetation-scouring flows would be impaired.

Land Elements

Land elements are discussed below and summarized in table S-14, which shows the acres of land managed under this alternative for each river reach. This alternative includes the same land management plan as contained in the Governance Committee Alternative, but adds roughly 7,000 acres of additional wet meadow acquisition and/or restoration. Primary actions include removal of woody and herbaceous vegetation and grading some areas to restore swales and sloughs. Further, actions to restore sediment balance in the river are aimed at reducing the downcutting of the river channel and in fact may raise the elevation of the channel bottom in degraded areas. This may result in raising the groundwater level near the river sufficiently to help restore former wet meadows that have been dried up as the river channel degraded and groundwater levels declined.

Table S-14.—Illustrative Distribution of Program Lands, Managed by River Reach, for the Wet Meadow Alternative

River Reach	Acreage
Lexington to Johnson-2 Return	24
Johnson-2 Return to Overton	195
Overton to Elm Creek	3,110
Elm Creek to Odessa	2,596
Odessa to Kearney	2,578
Kearney to Minden	2,766
Minden to Gibbon	75
Gibbon to Shelton	2,014
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	1,603
Phillips to Chapman	1,685
Total	**17,053**

The management of lands for this alternative is similar to the methods and focus for the Governance Committee Alternative. Table S-15 shows the approximate changes in land cover types associated with this land management strategy.

Table S-15.—Summary Table of Estimated Land Cover

Restoration Activities	Change in Cover Type	Acres	Subtotal
To lowland grassland	Wooded to lowland grassland	3,864	**8,212**
	Herbaceous to lowland grassland	414	
	Agriculture to lowland grassland	3,188	
	Shrubs to lowland grassland	636	
	Upland grassland to lowland grassland	107	
	Emergents to lowland grassland	3	
To wetted channel	Wooded to wetted channel	152	**355**
	Shrubs to wetted channel	163	
	Herbaceous to wetted channel	19	
	Bare sand to wetted channel	19	
	Lowland grassland to wetted channel	2	
	Emergents to wetted channel	0	
To bare sand	Wooded to bare sand	7	**7**
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	
Restored lands		8,574	8,574
Unmodified lands		7,679	7,679
Total non-complex habitat		800	800
Totals		17,053	17,053

Water Emphasis Alternative

Water Elements

Table S-16 shows the water elements for the Water Emphasis Alternative. This alternative improves achievement of target flows by 185 kaf.

Table S-16.—Average Annual Program Water (kaf Per Year) Contribution to Species' Target Flows Under the Water Emphasis Alternative

Program Water Features and Elements	Projected Improvement Toward Target Flows (kaf per year)
State Projects	
Total for these elements: Lake McConaughy EA Pathfinder Modification Project EA Tamarack Project, Phase I	80
Additional Water Elements	
Total for these elements: Wyoming 1. Glendo 100 kaf storage right 2. Water leasing (60 to 70 kaf leased per year) 3. Glendo Reservoir Storage 4. Pathfinder Wyoming Account Colorado 1. Tamarack Project, Phase III 2. Water leasing (60 to 70 kaf leased per year) Nebraska 1. Central Platte hydropower re-regulation 2. Water leasing (60 to 70 kaf leased per year) 3. Groundwater management in the Central Platte groundwater mound 4. Riverside drains	104
Total	**184**

Lake McConaughy Environmental Account

See Governance Committee Alternative.

Pathfinder Modification Project Environmental Account

See Governance Committee Alternative.

Pathfinder Wyoming Account

See Governance Committee Alternative.

Glendo Reservoir Storage

See Governance Committee Alternative.

Tamarack Project, Phase I

See Governance Committee Alternative.

Tamarack Project, Phase III

See Governance Committee Alternative.

New Program 100-kaf Water Right in Glendo Reservoir

See Wet Meadow Alternative.

Central Platte Hydropower Re-Regulation

Currently, there are periods when releases from Lake McConaughy, in combination with South Platte River flows and/or downstream river gains, result in flows between Overton and Grand Island which exceeds species and annual pulse flows recommendations. In this option, releases for power generation are reduced during periods in which target flows are being exceeded, and the water is instead released during periods of flow shortages. The Program would pay the utilities for any losses in the value of the power generation that result.

For this element, the release of approximately 5,100 acre-feet per year of water would be rescheduled, shifting some releases from the September-April period to the May-August period.

Riverside Drains

This element involves installing agricultural drains in the Central Platte River region under some farmed fields that experience chronically high groundwater and loss of productivity. These drains would lower the groundwater table a few feet and drain these waters to the Platte River. Lands that are actively cultivated and have a typical spring water table less than 5 feet below the surface could be considered for drains on a voluntary participation basis. The drains would reduce direct evaporation and evapotranspiration by vegetation, provide supplemental water for instream flows, and benefit farmland.

If 100 miles of drains were constructed, the flow from the drains would be about 40 kaf per year, of which about 10 kaf per year would be salvaged water (i.e., water that would not otherwise reach the river because it is currently lost through evaporation or evapotranspiration).

Basinwide Water Leasing

The Program would lease water from willing lessors sufficient to allow release of enough water to improve achievement of target flows by roughly 68 kaf on an average annual basis.

Each state would lease water for Program purposes by voluntary participation, most likely from existing reservoir storage in that state. The state would provide to the Program only the consumptive use associated with the storage. The remainder acquired would be managed under direction of the state to maintain the current pattern of return flows. Typically, this means that the Program would manage approximately one-half of the water leased.

The location of the leased water would depend on patterns of participation by water users and state policies. For this analysis, the amount of water assumed to be leased was divided among reservoirs or projects as follows to illustrate a range of possible effects. In actual implementation, Program water leasing would likely be more widely distributed. Table S-17 shows water leasing under the Water Emphasis Alternative.

Table S-17.—Illustrative Distribution of Water Leased to the Program Under the Water Emphasis Alternative

	Acre-Feet
Wyoming	
North Platte Project	29,700
Kendrick Project	10,300
Glendo Unit	300
Colorado	
Jackson Reservoir	8,000
Empire Reservoir	4,000
Riverside Reservoir	8,000
Prewitt Reservoir	10,000
North Sterling Reservoir	30,000
Julesburg Reservoir	10,000
Nebraska	
Lake McConaughy	60,000

Wyoming: Water leasing from Reclamation reservoirs in Wyoming was obtained by leasing 6.9 percent of the water delivered from storage from any irrigation district that receives water from Reclamation in the North Platte River Basin. (This would likely require creating accounts in the North Platte Project reservoirs [Pathfinder and Guernsey] for each irrigation district that receives water from the North Platte Project.)

Colorado: Water leasing in Colorado was obtained by leasing from 11 percent (Empire) to 42 percent (North Sterling) of water storage from six reservoirs along the South Platte River below Greeley, as summarized in table S-17. Preference was given to leasing from the three most downstream reservoirs (Prewitt, North Sterling, and Julesburg), because water leased from these facilities would likely suffer lesser transit losses and would provide greater yields at the Central Platte Habitat Area than would water

leased from higher in the system. These leases are targeted and managed to provide increased flows in May and June to the state line.

Nebraska: Water leasing in Nebraska below Lake McConaughy was obtained by leasing 6.9 percent of the water diverted by any irrigation district that has a surface water diversion below North Platte, Nebraska and receives water from storage in Lake McConaughy and Sutherland Reservoir.

Groundwater Management in the Central Platte

A large groundwater mound has developed in the Central Basin as a result of CNPPID irrigation. This mound, which lies beneath Phelps and Kearney Counties in Nebraska, would be conjunctively used with a system of shallow wells and a groundwater recharge system.

For this alternative, in the fall, approximately 9,600 acre-feet per year of flows, which are in addition to target flows, would be diverted through the CNPPID distribution system and into a recharge system of about 125 wells. In the spring and summer, a similar amount of water would be pumped into the irrigation supply system from this groundwater storage area to substitute for waters that otherwise would be released from Lake McConaughy. The waters not released from Lake McConaughy would enter the EA to be managed for habitat flows.

Land Elements

Under the Water Emphasis Alternative, relatively more water and less land is managed under the Program. The land habitat component for this alternative is a reduced form of the land plan used for the Governance Committee and Full Water Leasing Alternatives. As shown in table S-18, the plan involves 7,475 acres of land. Management of the parcels would be similar to that for the Governance Committee Alternative, but on a smaller scale.

Table S-18.—Illustrative Distribution of Program Lands, by River Reach, for the Water Emphasis Alternative

River Reach	Acreage
Lexington to Johnson-2	24
Johnson-2 to Overton	195
Overton to Elm Creek	3,110
Elm Creek to Odessa	57
Odessa to Kearney	1,760
Kearney to Minden	95
Minden to Gibbon	75
Gibbon to Shelton	25
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	42
Phillips to Chapman	1,685
Total	**7,475**

Land management strategies and methods for this alternative are the same as for the Governance Committee Alternative, except on a smaller scale, due to the fewer total acres managed.

Table S-19 presents land management for the Water Emphasis Alternative.

Table S-19.—Summary table of Estimated Land Cover Changes for All Land Parcels Managed in the Water Emphasis Alternative

Restoration Activities		Acres	Subtotal
To lowland grassland	Wooded to lowland grassland	1,863	**2,986**
	Herbaceous to lowland grassland	225	
	Agriculture to lowland grassland	451	
	Shrubs to lowland grassland	354	
	Upland grassland to lowland grassland	93	
To wetted channel	Wooded to wetted channel	108	**260**
	Shrubs to wetted channel	113	
	Herbaceous to wetted channel	18	
	Bare sand to wetted channel	19	
	Lowland grassland to wetted channel	2	
To bare sand	Wooded to bare sand	0	**0**
	Shrubs to bare sand	0	
	Herbaceous to bare sand	0	
Restored lands		3,246	3,246
Unmodified lands		3,428	3,428
Total non-complex habitat		800	800
Totals		**7,474**	**7,474**

ENVIRONMENTAL CONSEQUENCES

This section provides brief summaries of the environmental consequences of each alternative. Table S-2 provides quantification of impacts. See the FEIS for a description of the affected environment for each resource discussed here.

OVERALL STRATEGY OF THE ALTERNATIVES

The primary focus of Program actions is to improve habitat in the Central and Lower Platte Habitat Areas for the target species. Because benefits for the pallid sturgeon in the first 13 years of implementation (Program's First Increment) will be provided through a program of research, with possible (but currently unknown) habitat improvements to follow, the discussion of Program actions will here focus on the actions which ultimately benefit the three target bird species in the Central Platte Habitat Area. Although the Program alternatives differ in their emphasis, the general actions and effects are here discussed for all alternatives taken together.

The Program aims to improve both riverflows and land habitat in the Central Platte Habitat Area to increase the availability of habitat used by the target species.

Improving Riverflows

Flows in the Central Platte Habitat Area are improved by altering Platte River flow volumes and timing; generally by increasing spring and summer flows. For example, under the Governance Committee Alternative, these changes in flow are accomplished primarily by storing Program water in an Environmental Account in Lake McConaughy in Nebraska and making releases to benefit the species. Benefits are also produced by other smaller projects that re-time the flows in the South Platte and re-time flows in the Central Platte.

Accruing water to the Environmental Account in Lake McConaughy is accomplished by:

- Reallocating a portion of Lake McConaughy inflows to the Lake McConaughy Environmental Account.
- Storing a portion of inflows to Pathfinder Reservoir in Wyoming in an Environmental Account, and then moving those Program waters down to the Lake McConaughy Environmental Account
- Accruing additional waters in the Lake McConaughy Environmental Account through water leasing.

These actions change the reservoir operations in the North Platte system of reservoirs and at Lake McConaughy. They also change operations of the Central Platte Districts' canals, lakes, and powerplants. Reservoir levels, releases through powerplants, and streamflows are altered throughout the system.

- Reservoir storage is affected. This affects irrigation supplies and deliveries, which affects irrigated acreage, crop production, agricultural revenues, and local economies.
- Power generation and economic value are affected.
- Lake and stream fisheries may be affected.

- Lake and river-based recreation may be affected.

Ultimately, flows through the Central Platte Habitat Area are changed to benefit the target bird species.

Improving Land Habitat

Apart from improvements in flows, the roosting, nesting, and foraging habitat for the target bird species are improved by improving channel habitat (channel width, availability of sandbars, etc.), by restoring wet meadows and other land features near the river in the Central Platte Habitat Area, and by reducing human disturbance. Where lands are leased or sold to the Program, some of those lands will be managed in ways that change the land use and vegetative cover, such as converting wooded meadow and agricultural lands to wet meadows, or clearing trees and other vegetation from river islands and moving river sand back into the active channel.

These actions will affect the width of the wetted river channel and the rates of channel erosion and sand deposition, as well as the extent of sandbars. The rate of encroachment of vegetation into the channel will be affected by the frequency of high flows that scour vegetation.

Ultimately, the availability of channel and wet meadow habitat for the target bird species are increased.

The alternatives also manage some areas of sandpits and palustrine wetlands to improve their value as habitat for the target bird species, primarily by removing vegetation and preventing disturbance or predation of the species using these areas.

The affected resource areas are:

- Water Resources (riverflows, lake levels, water deliveries)
- River Geomorphology
- Water Quality
- Central Platte River Terrestrial Vegetation Communities and Land Use Types
- Wetlands
- Whooping Crane
- Piping Plovers and Interior Least Terns
- Pallid Sturgeon
- Other Federally Listed Species and Designated Critical Habitat
- State-Listed Species and Species of Concern
- Sandhill Cranes
- North Platte River Basin Fisheries
- Nebraska Sport Fisheries
- Central Platte Fisheries
- Hydropower
- Recreation
- Agricultural Economics
- Regional Economics
- Social Environment
- Cultural Resources

The FEIS analysis indicated there is no potential for the alternatives to adversely affect Indian Trust Assets in the Basin, or to create environmental justice impacts. Therefore, these issues were dropped from further detailed discussion.

WATER RESOURCES

North Platte Basin

Reservoir Storage

Compared to the Present Condition, average total storage in the North Platte River reservoir system would range from no change under the Full Water Leasing Alternative to 9 percent less under the Wet Meadow Alternative. There would be essentially no change in reservoir water elevations at Alcova, Glendo, and Guernsey Reservoirs under any action alternative. All action alternatives would result in fewer years with spills from Guernsey Reservoir than under the Present Condition.

Riverflows

When compared to the Present Condition, flow in the North Platte River below Guernsey Dam would generally be less in the winter (October - March) due to a few years when the volume of spills are reduced, and more in the summer (April - September) under all action alternatives. Under the Present Condition, flows below Kortes and Gray Reef Reservoirs are maintained above 500 cubic feet per second (cfs) to preserve fisheries; however, flows would fall below 500 cfs in 1 year below Kortes and 1 to 2 years below Gray Reef under the action alternatives.

Irrigation Deliveries

Irrigation deliveries are affected in two ways:

- Leasing water to the Program by farmers or districts reduces water deliveries to those water users
- Allocating some of the storage in Pathfinder Reservoir recovered through the Pathfinder Modification Project to environmental purposes, and other Program activities, increases the frequency and magnitude of irrigation shortages.

All alternatives except for the Full Water Leasing Alternative increase the number of years where irrigation deliveries fall below either historic deliveries, or do not meet a full irrigation demand.

Effects of the Program on Water Use Above Pathfinder Reservoir

Reclamation requests that the state administer water rights on the North Platte River above Pathfinder Reservoir when the forecasted supply available to the North Platte Project is less than 1,100 kaf. The action alternatives can only affect water users above Pathfinder Reservoir in Wyoming through an increase in the frequency and duration of water right administration for Pathfinder's 1904 right.

Under the Cooperative Agreement and Modified North Platte Decree, the Program would not make a call on rights upstream of Pathfinder Reservoir to fill the 54 kaf of storage in the reservoir that is restored through the Pathfinder Modification. However, the action alternatives which include the Pathfinder Modification do place an additional demand on overall reservoir storage compared to Present Condition by allocating 5 percent of the storable inflows for Pathfinder Reservoir to the Environmental Account and the Wyoming Municipal Account. This decreases Pathfinder Project ownership over time and can,

thereby, cause an increase in the number of allocation years and the potential for additional months with water right administration on the North Platte River above Pathfinder Reservoir.

Water Right Administration Before May 1

When water right administration is underway for Pathfinder's 1904 right, upstream water users with rights senior to Pathfinder's 1904 right are limited to a diversion of 1 cfs per 70 acres and those with rights junior to Pathfinder may not divert water from the river.

All of the action alternatives, except the Full Water Leasing Alternative, increase the years with water right administration on the North Platte River by 2, from 9 to 11 years. The net increase in the number of months with water right administration is the greatest for the Wet Meadow and Water Emphasis Alternatives with an increase of 6 months for the study period compared to the Present Condition. The Governance Committee Alternative increases the number of months with water right administration by 3 months for the study period. The Full Water Leasing Alternative reduces the number of months with water right administration by 2 months for the study period.

Calls for water right administration are most likely to affect diversions from October 1 to April 30 since October is the first month that an allocation is calculated and April 30 is the assumed cutoff date for implementing a call. The average consumptive use in April is 316 acre-feet for Present Conditions. The change in consumptive use just for those years with a call for water right administration is 138 acre-feet.

The other category of change, storage of water for use after May 1, has more potential to be affected by additional calls. The difference in acres irrigated from reservoir storage above Pathfinder Reservoir between dry years with calls and dry years without calls is 179 acres. Assuming this difference is all due to the call and not from climatologically conditions, 179 acres represents a 207 acre-feet of consumptive use or and average of 13 acre-feet. The total impact of a call would therefore be no more than 345 acre-feet of consumptive use out of 106,152 acre-feet of annual consumptive use.

Water Right Administration After May 1

A request for administration for the 1904 Pathfinder Reservoir water right by Reclamation after May 1 is assumed in the FEIS to be highly unlikely. Reclamation, like all valid water right holders in Wyoming, is not prohibited from requesting a call on the river. There has not been a request for administration of the 1904 Pathfinder water right after May 1 since construction of Pathfinder Dam. With this historical perspective of nearly 100 years and the provisions that were implemented in the Modified North Platte Decree, it is viewed that such a request is highly unlikely. Therefore, the alternatives are not expected to affect the frequency of state water right administration after May 1 of the year.

South Platte Basin

Reservoir Storage

Compared to the Present Condition, storage in South Platte Basin reservoirs would not change under the Governance Committee and Wet Meadow alternatives. Under the Full Water Leasing and the Water Emphasis alternatives, the end-of-month storage contents of Basin reservoirs from which the Program leases water would, on average, be lower in May, June, July and August than under the Present Condition.

Riverflows

Flow in the South Platte River above the confluence with the Cache La Poudre River (near Greeley, Colorado) would not change under any of these action alternatives, relative to the Present Condition.

Flow in the South Platte River below the Cache La Poudre River confluence and above Fort Morgan, Colorado, may be somewhat greater in the months of May and June under the Full Water Leasing and Water Emphasis Alternatives, due to water leasing for Program purposes from off-channel reservoirs and/or direct-flow rights along this reach. Estimated average increases in flow at Fort Morgan are 82 cfs in May and 4 cfs in June under the Water Emphasis Alternative, and 124 cfs in May and 45 cfs in June under the Full Water Leasing Alternative. In other months of the year and under other action alternatives, there would be no difference.

Flow in the Lower South Platte River (beginning someplace downstream of Fort Morgan and above the Nebraska State line) generally would be less in November, December, January, February, and June due to recharge projects like the Tamarack Project, Phase I, and greater in the remaining months of the year under the Governance Committee, Wet Meadow, and Water Emphasis Alternatives. Estimated average reductions in flow at Julesburg, Colorado, for each of these 4 months range from 340 to 9,242 acre-feet, depending upon the alternative and the month. Estimated average increases in flow for the remaining months of the year range from 156 to 5,373 acre-feet per month. The same is true for the Full Water Leasing Alternative, except that flows in March will on average be less, not more, than under the Present Condition.

Irrigation Deliveries

Relative to the Present Condition, deliveries of irrigation water to users in the South Platte Basin will not change under the Governance Committee and Wet Meadow alternatives. Under the Full Water Leasing and Water Emphasis alternatives, leasing of water for Program purposes would, on average, reduces deliveries of water to lower South Platte irrigators in Colorado by about 31,150 acre-feet per year.

Central Platte Basin

Reservoir Storage

Reservoir storage in Lake McConaughy would be less than the Present Condition under all action alternatives, except for the Full Water Leasing Alternative, due to increased deliveries for environmental purposes. Average storage range from 5 percent less under the Water Emphasis Alternative to 9 percent less under the Governance Committee Alternative.

All alternatives would reduce spills—from 17 percent for the Full Water Leasing Alternative to over 50 percent for the Governance Committee Alternative.

Riverflows

Average flows in the Platte River below Lake McConaughy would decrease in May and June, due to the reduction in spills from Lake McConaughy under all action alternatives, except the Full Water Leasing Alternative compared to the Present Condition. For all action alternatives, except the Full Water Leasing Alternative, flow in the reach below the Tri-County Diversion Dam to the Johnson-2 Return would be less in June due to reductions in spills and flow in May would be higher due to the release of EA water. For all action alternatives, except the Full Water Leasing Alternative, flows between Overton and Grand Island would decrease in January and December due to operational changes. For all action alternatives, except the Full Water Leasing Alternative, flows would also decrease in June due to a reduction in spills and flow would increase in the remaining months. For the Full Water Leasing Alternative, flows decrease at all points downstream of Lake McConaughy for July and August due to reduced irrigation deliveries.

Peak flows (flows greater than 10,000 cfs) in the Central Platte Habitat Area are reduced by all action alternatives except for the Full Water Leasing Alternative. The alternatives increase the achievement of target flows at Grand Island, Nebraska, by a range of 116 kaf up to 184 kaf on an average annual basis.

Irrigation Deliveries

Western Canal, which is located on the South Platte River near the Colorado-Nebraska State line, is the only district in the Central Platte River Basin that experiences shortages to irrigation deliveries under the Present Condition and the action alternatives. Shortages to Western Canal are reduced for the action alternatives compared to the Present Condition due to flow accretions in Colorado.

RIVER GEOMORPHOLOGY

The volume and occurrence of riverflows, availability, and rate of sediment transport carried by the river, and stability of the river banks influence the plan form, cross section, and profile of a river. Changes in river form can decrease or increase habitat for the target species. A braided plan form provides the habitat characteristics preferred by roosting whooping cranes and nesting and rearing interior least terns and piping plovers.

All of the alternatives integrate measures which improve the quality of the central Platte River habitat for the target species. Each alternative has three components all focused toward improving habitat for the target species:

- **Water Plan:** actions that alter flow
- **Mechanical Plan:** actions that alter topography and plan form
- **Sediment Augmentation Plan:** actions that provide sand in the river

A summary of the alternative differences follow:

- **Governance Committee Alternative:** All the alternatives improve physical habitat to some degree over Present Conditions, but from a geomorphic perspective, the Governance Committee Alternative provides the most overall benefit. Shortcomings of the Governance Committee Alternative include the smallest mean annual flow relative to all alternatives, a higher percent of

flow conveyed in the Tri-County Supply Canal rather than in the Platte River, and a medium increase in open view width. However, overall benefits of the Governance Committee Alternative include large 1.5-year peak flows for building sandbars, the most successful sediment budget with the least erosion and least deposition, a successful land plan for increasing habitat through increases in length of braided river, and increased width-to-depth ratios and wetted width of the river, most notably in the degrading reach from Jeffrey Island to Elm Creek.

- F**ull Water Leasing Alternative:** This alternative does not have as much sandbar building potential as the Governance Committee Alternative from the 1.5-year peak flows, requires the largest volume of sand to eliminate a sediment imbalance, and creates more deposition. However, this alternative does produce more improvements than the Governance Committee Alternative in width-to-depth ratio, widest water and open view width in the aggrading reach from Gibbon to Wood River.

- **Wet Meadow Alternative:** This alternative provides consistently good improvements, although it never provides the most benefits.

- **Water Emphasis Alternative:** This alternative provides the smallest benefit of the four alternatives, and is the least desirable alternative from a geomorphic perspective. This alternative is limited by its smaller mechanical action plan and by a larger sediment requirement to prevent erosion.

WATER QUALITY

The action alternatives would cause:

- Very slight decreases or increases in total dissolved solids in some of the North Platte reservoirs and stream gauge locations

- A small decrease in specific electrical conductance in the South Platte River at Julesburg, Colorado

- Reduced elevations in Lake McConaughy that will lead to somewhat warmer releases to Lake Ogallala, which may have an adverse affect on trout habitat in Lake Ogallala

- Reduced chances of exceeding 90 degrees Fahrenheit in the Central Platte River in the summer months

- Increased or decreased probability of copper toxicity in river sediments in some locations, depending on sites chosen for sand augmentation

Conjunctive use of the groundwater mound in the Central Platte River Basin under the Governance Committee, and Water Emphasis Alternatives could reduce somewhat high concentrations of selenium that currently exist in some areas of the groundwater mound.

Concentrations of copper in samples of bed, bank, and island sediments in the Central Platte River Basin above the Upper Effects Threshold for aquatic life. However, the potential adverse biological effects from these concentrations has not been studied in resident fish and birds. Movement of sand from islands back into the river channel (included in all alternatives except the Governance Committee Alternative) could somewhat increase the concentration of copper suspended in river sediments and in bed sediments,

while augmentation using bank sediments would likely decrease the copper concentration in the sediments. The probability of toxicity associated with the metals in the sediments should change little.

CENTRAL PLATTE RIVER TERRESTRIAL VEGETATION COMMUNITIES AND LAND USE TYPES

In general, the Wet Meadow Alternative has the most impact on land use and vegetation communities in the Central Platte Habitat Area. This alternative reduces woodlands by 11 percent (4,015 acres), reduces shrublands by 14 percent (799 acres), reduces herbaceous riparian wetlands by 10 percent (434 acres), and reduces emergent wetland by less than 1 percent (3 acres). This alternative also increases lowland grasslands by 10 percent (8,210 acres) and decreases bare sand by 1 percent (12 acres).

The Water Emphasis Alternative has the least impact on vegetation communities, reducing upland grasslands by 0.3 percent (93 acres), woodlands by 6 percent (2,010 acres), shrublands by 8 percent (469 acres), and herbaceous riparian by 6 percent (242 acres). The Water Emphasis Alternative also increases lowland grasslands by 7 percent (3,025 acres) and reduces bare sand in the channel by 1 percent (19 acres). All alternatives reduce existing agricultural lands by 1 percent or less (408 to 3,043 acres).

All action alternatives will provide increases in migratory and nesting habitat for the target bird species in the Central Platte Habitat Area and increased migratory habitat for waterfowl and shorebirds. The areal extent of changes in other vegetative communities under all action alternatives is relatively minor, and so alternatives are expected to have minor positive and negative effects on resident populations of animals.

WETLANDS (WET MEADOWS)

All action alternatives provide increases in wet meadow complexes and riparian communities which fall under the technical classification of wetlands. The Wet Meadow Alternative produces the greatest gain, converting 7,802 non-wetlands to lowland grasses, and 417 acres of palustrine, emergent wetlands to lowland grasses. The Governance Committee and the Full Water Leasing alternatives produce a 4,003-acre gain in lowland grasses, and covert 274 acres of palustrine, emergent wetlands to lowland grasses. The Water Emphasis Alternative produces the least change, converting 2,982 acres of non-wetlands to lowland grasses, and 265 acres of emergent, palustrine wetlands to lowland grasses

WHOOPING CRANE

Roosting Habitat

The Full Water Leasing Alternative most improves both the amount and the distribution of wide channel roosting habitat. These improvements are due to initial mechanical channel widening on Program lands, with continued channel maintenance from sand augmentation and improved channel-forming flow events. The Governance Committee and Wet Meadow alternatives also provide improvement, albeit more limited. Channel clearing activities and sand augmentation for these alternatives are identical to Full Water Leasing, but the Full Water Leasing alternative provides higher flow events and greater sand transport. The higher flows result from reservoirs being maintained at higher pool levels.

For all of the alternatives, the value of channel roost habitat created upstream of Kearney could be negatively affected by hydrocycling discharges from Johnson-2 Return Canal. The Johnson 2 Return discharges produce repetitive oscillations of river stage in the Johnson-2 Return to Kearney river reach that may disrupt crane roosting behavior and flush cranes from roosts. Cranes flushed at night are subject to risks of injury/mortality from collisions with fixed objects such as power lines and tree branches. The experience of roost disruption also may inhibit future use by individual whooping cranes.

Feeding Habitat

For all action alternatives, the acreage of grasslands would increase. The Wet Meadow Alternative would provide the largest grassland acreage.

Wet meadow creation in the upstream portion of the Central Platte Habitat Area would be experimental. To the extent the Program attempts to create meadows sand and gravel mineral soils of the former river channel, biological communities would probably generally have lower biodiversity and productivity than natural riparian meadows. The abundance and diversity of food resources of meadow created on mineral soils may have limited or very limited value.

Native wet meadows are still prevalent in downstream portions of the Habitat Area. The Full Water Leasing Alternative would provide the greatest hydrologic support for these by providing higher spring flows and river water surface elevations, particularly in important high flow years. River water surface elevations from the Governance Committee, Wet Meadow, and Water Emphasis alternatives appear to be nearly equal. They provide somewhat less support than Present Condition in high flow years, but greater support than Present Conditions in moderate and low flow years.

The affect of action alternatives on whooping crane waste-grain food supplies would depend in part on the social and behavioral response of other water-bird populations that use the Platte to altered river habitat conditions. An increase in distribution of wide open channel habitat could distribute bird population more evenly and alleviate crowding of large flocks in few river segments, thus easing competition for waste corn.

Habitat Sustainability

Program lands would occupy only a small portion of the Central Platte Habitat Area, but the Program Alternatives will affect the ability to maintain habitat throughout the 90-mile long Habitat Area. The Full Water Leasing Alternative would result in the greatest improvement to wide channels and reverie habitat maintenance processes. These improvements result from a combination of mechanical clearing, sand augmentation, and higher channel forming flows. The Governance Committee, Wet Meadow, and Water Emphasis alternatives also provide channel width improvement, comparable to one-another but less than those achieved by the Full Water Leasing Alternative.

All alternatives rely on mechanical intervention (i.e., sand augmentation) to offset the continuing impacts of sediment transport imbalances in the Central Platte Habitat Area that exist due to water diversions. Sand augmentation would artificially help to maintain wide channels and reduce channel degradation.

The deficit of sediment supply to the Central Platte Habitat Area will continue with operation of the Tri-County Canal under all alternatives. The water plan for each alternative requires sand augmentation to prevent increasing the imbalance that exists under Present Conditions. The conservation and recovery of whooping crane habitats would be increasing reliant on artificial/mechanical sediment augmentation measures to offset the sand imbalance.

Security

The Wet Meadow Alternative provides the greatest channel length managed for crane security, and thus the greatest protection against disturbance and intrusion for roosting cranes. The channel lengths protected by the Governance Committee and the Full Water Leasing alternatives are about equal to one another and somewhat less than the Wet Meadow Alternative. The Water Emphasis Alternative provides the least protection.

Including out-of-channel lands, the Wet Meadow Alternative provides the largest area of protected habitat—about 16,000 acres. The area: perimeter ratio is slightly greater than that of other alternatives, an indication that the land parcels would be more contiguous and consolidated. The Governance Committee and Full Water Leasing alternatives would each protect roughly 9,600 acres, and the Water Emphasis Alternative about 7,000 acres.

PIPING PLOVERS AND INTERIOR LEAST TERNS

These alternatives would likely provide benefits to plovers and terns using Lake McConaughy, likely reduce channel conditions in the North Platte to Lexington reach that currently support plovers and terns, maintain or perhaps provide some improvement in channel nesting conditions in the Lexington to Chapman reach (while increasing sandpit nesting opportunities in this reach), and maintain present conditions for birds using sandpits and channel sites in the lower river if higher median flows are not implemented.

Flow Potential to Build Sandbars

Each alternative increases the potential for building higher sandbars through an increase in the frequency of near-bankfull flows through the Central Platte Habitat Area. The Governance Committee Alternative produces the largest differences while the Full Water Leasing Alternative produces the smallest differences between water surface elevations for mean annual flows and a 1.5-year peak flow event.

Fledging Days

Fledging days for both plovers and terns would increase from Present Conditions for all transect categories under all action alternatives. If suitable sandbars are available, then these alternatives would provide an increase in the number of days free from potential inundation. Both situations (suitable sandbars and inundation free days) would be required to improve channel nesting conditions for plovers and terns.

Non-Channel Nest Sites

Median May end-of-month elevations for Lake McConaughy would be lower than Present Conditions for all alternatives. Elevations would be significantly lower than Present Conditions (3,259.5 feet) for the Governance Committee Alternative (3254.2 feet), the Wet Meadow Alternative (3255.6 feet), and the Water Emphasis Alternative (3255.8 feet), but not for the Full Water Leasing Alternative (3258.6 feet). Lower May elevations may provide increased beach nesting opportunity for piping plovers and interior least terns.

Sandpits provide nest sites throughout the study area and any additional managed acreage—near the active river channel—would benefit plovers and terns. An undetermined, but additional acreage of sandpits, would be managed for piping plover and interior least tern nesting under all the action alternatives

River Resources

Both the frequency and magnitude of spills from Lake McConaughy would be reduced from present conditions by all the proposed action alternatives). The magnitude of spills would be significantly lower than Present Conditions (169.1 kaf) for the Governance Committee Alternative (95.3 kaf), the Full Water Leasing Alternative (165.6 kaf), the Wet Meadow Alternative (82.3 kaf), and the Water Emphasis Alternative (102.2 kaf)[29].

Reduced spills from Kingsley Dam and increased annual flows at Cozad indicate the river between North Platte and Lexington may experience changes in the future—such as further channel narrowing—that may negatively affect the river's ability to provide resources to plovers and terns currently using this reach. In the Lexington to Chapman reach, mechanical restructuring of the channel and judicious use of pulse flows may offset effects from the significant reduction in frequency and magnitude of spills from Kingsley Dam.

PALLID STURGEON

The analyses indicates that the alternatives' water and sediment management activities do not provide significant benefits to the pallid sturgeon. While the alternatives vary slightly from indicator to indicator, they are not significantly different from the Present Condition in their effects on pallid sturgeon. The pallid sturgeon research plan does benefit the pallid sturgeon only in that it will provide information that can be subsequently used to secure defined benefits to the species.

OTHER FEDERALLY LISTED SPECIES AND DESIGNATED CRITICAL HABITAT

The species listed in table S-20 that may be present in the action area would not be affected (in the states indicated) by any of the alternatives under consideration. These species will not be affected because they are not known to occur in the action area or they may be present in the action area but their habitats will not be affected by either water (e.g., flows or leasing) or land activities (e.g., habitat management). Determinations of effect are identified by state where species may be present in more than one state.

[29]Note: Spill volumes are presented here as means values because reduced frequency under the action alternatives result in a "zero" (0) median value for all action alternatives except the Full Water Leasing Alternative.

Table S-20.—Federally Listed Species **Not Affected** by the Alternatives

Species	States
Black-footed ferret	Wyoming and Colorado
Canada lynx	Wyoming and Colorado
North park phacelia	Colorado
Eskimo curlew	Nebraska

Table S-21 lists species and designated critical habitat may be affected by Program activities through:

- Flow and land management activities in the North Platte, South Platte, and Central Platte rivers
- Effects to aquatic and riparian habitat associated with potential water leasing throughout the Platte River Basin.

Table S-21.—Federally Listed Species that May be Affected by **Flow and Land Management Activities**

Species	States
Bald eagle	Wyoming, Colorado, and Nebraska
Western prairie fringed orchid	Nebraska
Ute ladies'-tresses orchid	Wyoming

Table S-22 lists species that may be affected by water leasing. All alternatives, through these water leasing actions, have the potential to affect streamflows in areas occupied by one or more listed species. Given the undetermined, site-specific nature of future water leasing, the effects of these activities on listed species cannot be determined at this time. However, in all cases, the Program has the choice about where to implement such actions. In evaluating all offers of water to the Program, the Program will consider and assess the potential for adverse effects to these species and ensure, through consultation with the Service, that Program actions do not jeopardize the continued existence of listed species nor adversely modify designated critical habitat.

Table S-22.—Federally Listed Species That May Be Affected by **Water Leasing**

Species	States
American burying beetle	Nebraska
Colorado butterfly plant	Wyoming and Colorado
Colorado butterfly plant critical habitat	Wyoming
Preble's meadow jumping mouse	Wyoming and Colorado
Preble's meadow jumping mouse critical habitat	Wyoming
Ute ladies'-tresses orchid	Wyoming and Colorado
Wyoming toad	Wyoming

SUMMARY OF EFFECTS DETERMINATIONS FOR ALL LISTED SPECIES

As the FEIS serves as the Biological Assessment for ESA Section 7 compliance, different regulatory terminology, analyses, and determinations are used. The "Other Federally Listed Species and Designated Critical Habitat" provides a determination of effect for the Governance Committee Alternative only.

The effects determinations for the target species are shown in table S-23. Note that while the Governance Committee Alternative produces many benefits for the three target avain species, some negative effects on habitat result (primarily from the reduction in peak flow and the increase in clear water flows into the Central Platte Habitat Area) and hence an effects determination of "May affect, likely to adversely affect" is required by regulation. This is not a determination of the sufficiency of the alternative to meet ESA requirements for the Program.

Table S-23.—Summary of Effects Determinations for the Target Species for the Preferred Alternative (Governance Committee)*

Species	Effects Determinations
Whooping crane	May affect, likely to adversely affect
Interior least tern	May affect, likely to adversely affect
Piping plover	May affect, likely to adversely affect
Pallid sturgeon	May affect, likely to adversely affect
Whooping crane critical habitat	Likely to adversely affect
*By policy, if a Federal action will (or is likely to) result in both adverse and beneficial effects to listed species, the appropriate determination is "may affect, likely to adversely affect." This is true even where net effects may be positive.	

The ESA Section 7 effects determinations for Other Federally Listed Species are listed in table S-24.

Table S-24.—Summary of Effects Determinations for Other Listed Species for the Preferred Alternative (Governance Committee Alternative)

Common Name	State	Effects Determinations
American burying beetle	Nebraska	May affect, not likely to adversely affect
Bald eagle	Wyoming, Colorado	May affect, not likely to adversely affect
Bald eagle	Nebraska	May affect, likely to adversely affect
Colorado butterfly plant	Wyoming, Colorado	May affect, not likely to adversely affect
Preble's meadow jumping mouse	Wyoming, Colorado	May affect, not likely to adversely affect
Ute ladies'-tresses orchid	Wyoming, Colorado	May affect, not likely to adversely affect
Western prairie fringed orchid	Nebraska	May affect, likely to adversely affect
Wyoming toad	Wyoming, Colorado	May affect, not likely to adversely affect
Designated Critical Habitat		
Preble's meadow jumping mouse	Wyoming, Colorado	May affect, not likely to adversely affect
Colorado butterfly plant	Wyoming, Colorado	May affect, not likely to adversely affect

No significant adverse impacts are anticipated for any state listed species in Wyoming, Colorado, or Nebraska.

SANDHILL CRANES

In changing river flows, channel habitat, and wet meadow habitat for the target species, all of the action alternatives would affect habitat used by sandhill cranes in Nebraska.

Roosting Suitability—Site Scale

The analysis predicts a small (≤ 10 percent) reduction in roosting depth abundance in the all transects categories for all alternatives except the Wet Meadow Alternative.

The analysis also evaluated change in roosting depth abundance in channels greater than 500 feet. Roosting depth in channels greater than 500 feet are predicted to experience some small to moderate increases in roosting depth under the action alternatives when all transects are considered. The exception would occur under the Water Emphasis Alternative which may experience a small reduction in roosting depth abundance.

Roosting Suitability—Bridge Segment Scale

Unobstructed channel width would increase from Present Conditions under all alternatives, except the Full Water Leasing Alternative. Increases would generally occur in channel width categories greater than 500 feet. Increases in unobstructed channel width using a GIS approach would range up to 21.1 percent for all bridge segments.

The analysis also predicts increases in unobstructed channel width in all four reaches. Estimated minimum increases in the three reaches range from 9 to 14 percent, and estimated maximum increases range from 27 to 60 percent, depending on alternative.

Roosting Suitability—System Scale

Roosting suitability at the upper end of Lake McConaughy would be generally similar to Present Conditions for spring and summer flows under each proposed action alternative.

Spills from Kingsley Dam would be reduced for all action alternatives. Spill magnitude would be reduced for all alternatives, except the Full Water Leasing Alternative.

Food Suitability—Bridge Segment Scale

Acres of corn would be reduced somewhat on some managed sites. Acres of corn and invertebrate food would be unchanged by the action alternatives at non-managed sites. The most acres of corn (Wet Meadow Alternative) potentially restored to lowland grasses would still be less than 2.0 percent of the 1998 corn acreage within the Central Platte Habitat Area. Additional acres of irrigated corn would be lost under the action alternatives through water leasing agreements. Because of the uncertainties that surround waste corn abundance and availability for sandhill cranes, any reduction in waste corn abundance as measured by acres of corn, should be avoided.

NORTH PLATTE FISHERIES

Changes in reservoir operations and levels can affect the amount of habitat available for fisheries in the North Platte reservoir system and the intervening river reaches.

The alternatives result in more drawdowns below both reservoir volumes identified by the Wyoming Game and Fish Department (WG&F) as providing good conditions for fisheries, and also a small number of additional drawdowns below elevations identified as critical to the fishery at Seminoe and Pathfinder reservoirs.

None of the alternatives have an effect on Alcova Reservoir fisheries. Overall, impacts in Guernsey Reservoir compared to Present Condition are not considered substantial because the fishery in this reservoir is seasonal.

Under the Present Condition, the North Platte River flows downstream of Kortes Dam do not fall to less than 500 cfs. All alternatives, except for the Full Water Leasing Alternative, had 4 to 6 months in the 48-year period of record where North Platte River flows were below this level.

Downstream of Pathfinder Dam, the alternatives produced no additional periods of flow below 75 cfs relative to the Present Condition. There should not be any adverse effects to the fishery. Pathfinder Reservoir outlet temperatures for each alternative compared to Present Condition do not indicate that water temperatures would be significantly raised by any alternative. Maximum release temperatures remain below 20 °C (68 °F), a temperature at which the trout fishery should not be detrimentally affected.

For flows below Gray Reef Dam, there was little difference among alternatives with the exception of the Full Water Leasing Alternative. The Present Condition and the Full Water Leasing Alternative flows were always above 500 cfs. For each of the other three alternatives, March flows are projected to drop below 400 cfs on one occasion (1965). Dissolved oxygen depletion below Gray Reef Dam should not be a problem because oxygen is generally at or above saturation during summer months.

There should be no effect on the riverine fisheries downstream from Glendo Reservoir because no alternatives drop below the established 25 cfs minimum flow level.

The existing fishery downstream from Guernsey Reservoir to the Wyoming-Nebraska state line is marginal. There is no officially established maintenance flow in this reach. Improved habitat conditions during months of increased flows may be offset by periods of decreased flows compared to Present Conditions.

Potentially reduced irrigation deliveries with the Full Water Leasing Alternative in the Nebraska Panhandle streams could result in reduced habitat for the trout populations. Water temperature impacts are not anticipated.

Wyoming State Mitigation Proposal

Wyoming Water Development Commission has entered into an agreement to contribute up to $2 million to the Department of Game and Fish during the first Program increment to support the restoration of fisheries in the main North Platte Reservoirs and river reaches should they be significantly adversely affected by the Program.

NEBRASKA SPORT FISHERIES: LAKE MCCONAUGHY AND THE LOWER PLATTE RIVER

The Program actions to improve river flows through the Central Platte Habitat Area affect the operations and reservoir levels for Lake McConaughy in Nebraska in ways that may affect the fisheries in Lake McConaughy and Lake Ogallala. Several indicators show habitat availability and flows:

- Littoral habitat present through the summer months in Lake McConaughy is reduced slightly in all alternatives except the Full Water Leasing Alternative, which leaves amounts of littoral habitat essentially unchanged from the Present Condition.

- Walleye recruitment is expected to be reduced slightly from present conditions under the Full Water Leasing Emphasis Alternative and significantly reduced under all other alternatives.

- Spawning of Lake McConaughy white bass in the North Platte River above the reservoir is not substantially changed under any of the alternatives. The frequency of optimum conditions is increased slightly under the Full Water Leasing Alternative and decreased slightly under all other alternatives.

- All alternatives, except for the Full Water Leasing Alternative, which leaves conditions essentially unchanged from the Present Condition, reduce the frequency under which the optimum smallmouth bass spawning habitat is accessible and reduce the total amount of spawning habitat available in a given year substantially.

- All of the alternatives are expected to exhibit a slight adverse effect on channel catfish spawning conditions in the North Platte inlet to Lake McConaughy.

- All alternatives, except the Full Water Leasing Alternative which leave conditions largely unchanged, reduce occurrence of optimum reservoir elevations conducive for successful gizzard shad spawning significantly.

- All alternatives, except the Full Water Leasing Alternative which improves conditions slightly over the Present Condition, reduce the frequency of conditions conducive to over-winter survival of gizzard shad significantly.

- Under all alternatives, it is more likely that temperatures which support the Lake Ogallala trout fishery may be negatively affected.

- No significant effects are expected for catfish and shovelnose sturgeon in the Lower Platte River.

CENTRAL PLATTE FISHERIES

The Central Platte fisheries (between Lexington and Grand Island, Nebraska) provide forage for interior least terns and larger fish supply forage for bald eagles.

All alternatives resulted in similar and generally better fish habitat compared to present conditions, but the Program Water Emphasis Alternative would provide slightly more benefit for the fish community among

alternatives at Overton. The Governance Committee and Full Water Leasing alternatives would provide slightly more benefit for the fish community at Grand Island.

On the basis of daily flows, there was a small difference in the probability of exceeding the Nebraska temperature standard and the number of times that the 1,200-cfs flow target was exceeded among alternatives during the summer.

Turbidity analysis (discussed above) showed that no significant change in turbidity would occur due to any alternatives compared to Present Condition.

HYDROPOWER

Most of the alternatives increase overall power generation and economic value of power produced, due to the increased volume of waters being moved through the powerplants each year.

All of the alternatives reduce summer dependable capacity in the North Platte hydropower system, the largest effects being a reduction of 16.21 megawatts[30] (-7.5 percent) for the Full Water Leasing Alternative. The Governance Committee and Wet Meadow alternatives reduce dependable winter capacity, the Full Water Leasing Alternative increases dependable winter capacity, and the Water Emphasis Alternative decreases dependable winter capacity in the North Platte hydropower system and increases in the Central Platte hydropower system.

The alternatives also reduce summer dependable capacity in the Central Platte hydropower system, by as much as 4.8 megawatts (-5.4 percent) under the Full Water Leasing Alternative. The effects of the alternatives on winter dependable capacity are both positive and negative depending on the alternative.

The reductions in dependable capacity are a result of the generally lower reservoir levels discussed in the "Water" section, earlier in this chapter, which reduce the maximum amount of power that can be produced on a highly reliable basis.

RECREATION

Wyoming

- **Wyoming main stem reservoirs.** On a statewide basis, and under average hydrologic conditions, the impacts on general recreational use at Glendo, Guernsey, and Seminoe reservoirs in Wyoming are minor for all alternatives. The changes attributable to any one of the alternatives amount to approximately 6,000 annual recreation visits at the three reservoirs in total. These total changes are less than 3 percent of the annual total identified in the Present Condition.

- **Average condition**. The Full Water Leasing Alternative results in slight increases in anglers at Pathfinder and Seminoe reservoir fisheries and slight decreases in anglers for Glendo reservoir fishery under average conditions. The other three alternatives have minimal negative impacts (-0.9 to -5.9 percent change from the Present Condition) to angler visitation at the Wyoming

[30] A watt is the fundamental unit of electric energy. It is defined as a current of 1 ampere flowing under 1 volt of pressure. A megawatt is 1 million (1,000,000) watts. A megawatt hour is the continuous generation of 1 megawatt over a 1-hour period of time.

reservoirs.

- **Severe drought.** All alternatives except the Full Water Leasing Alternative could result in lowering reservoir levels and eliminating fisheries at Pathfinder Reservoir and possibly at Seminoe Reservoir under severe drought conditions. These fisheries recover in 2 to 7 years, depending on the species. Under this fisheries elimination scenario, the average annual impacts are minimal or moderate for trout anglers and substantial for walleye anglers.

- **Wyoming North Platte Reservoirs boat ramp access.** All of the alternatives, except the Full Water Leasing Alternative increase the number of seasons slightly (ranging from 1 to 7 seasons) that individual boat ramps at Pathfinder and Seminoe Reservoirs are not usable due to low water, at some time from May to September. The Full Water Leasing Alternative improves conditions somewhat. The impacts on the use of Glendo boat ramps is very minor.

Colorado

In Colorado, impacts to recreation visitation and associated value are not quantifiable with the currently available data. Under the Water Emphasis and Full Water Leasing Alternatives, water leasing from South Platte reservoirs is expected to reduce reservoir areas by -2.3 percent to -9 percent earlier in the summer than those same reductions would otherwise occur for delivering irrigation water.

Nebraska

- **Lake McConaughy recreation visits.** The Water Emphasis Alternative results in the least amount of change in surface area and thus, the least amount of decline in recreation visits and economic value. The Full Water Leasing Alternative results in an overall increase in average surface area, resulting in slight increases in recreation visits and economic value.

- **Lake McConaughy boat ramp access.** Some of the higher-elevation boat ramps will become functionally unusable under most conditions, while some of the lower elevation boat ramps will see relatively few effects.

- **Nebraska Panhandle.** Only the Full Water Leasing Alternative could reduce somewhat the water deliveries in this area, which would reduce the amount or duration of storage in the Inland Lakes and the seepage and runoff into the coldwater streams that cross through the irrigated areas. This is not expected to affect the local fisheries. More precise estimates of the effects of water leasing must wait until a specific water leasing plan is developed.

AGRICULTURAL ECONOMICS

In general, each of the alternatives analyzed is expected to cause a slight decrease in the amount of irrigation water consumptively used by farms within the Basin. All impacts are measured on an average annual basis. Reduced irrigation water deliveries are expected to reduce both irrigated acres and the value of agricultural commodities produced. The Wet Meadow Alternative has the least impact (a reduction of just under 4 kaf), while the Full Water Leasing Alternative has the greatest (a reduction of over 145 kaf). Corresponding decreases to irrigated acres are expected in the range of 1,500 to 85,000 acres, depending on how individual farmers respond to the change in available irrigation water.

The change in the amount of agricultural commodities produced is estimated to cause a decrease in farm revenues of from about $160,000 (under the Wet Meadows Alternative) to more than $28,000,000 (under the Full Water Leasing Alternative).

Table S-25 defines the economic impact regions.

Table S-25.—Platte River Economic Regions and County Groupings

Economic Region	Counties Included
Central Platte Habitat Area	Adams, Buffalo, Dawson, Gosper, Hall, Hamilton, Kearney, Merrick, and Phelps in Nebraska.
Lake McConaughy area	Arthur, Cheyenne, Custer, Deuel, Garden, Keith, Lincoln, and McPherson in Nebraska. Logan and Sedgwick in Colorado.
Scotts Bluff area	Banner, Kimball, Morrill, Scotts Bluff, and Sioux in Nebraska. Goshen in Wyoming.
Eastern Wyoming	Albany, Laramie, and Platte in Wyoming.
North Platte headwaters	Carbon, Converse, Fremont, and Natrona in Wyoming. Jackson in Colorado.
Eastern Colorado	Larimer, Morgan, Washington, and Weld in Colorado.

With the exception of the Wet Meadow Alternative (where the impacts are projected to occur only in the Scotts Bluff and North Platte Headwaters areas), the impacts to farm revenues will probably be spread throughout a much larger area of the Basin. However, under the three other alternatives analyzed (Governance Committee, Full Water Leasing and Water Emphasis alternatives), farm revenue impacts are expected to be greatest in the Central Platte Habitat Area. The Governance Committee Alternative reduces the farm revenue impacts in three regions (Central Platte Habitat Area, North Platte River Headwaters, and eastern Wyoming), but revenues in the Lake McConaughy, Scotts Bluff, and East Central Colorado areas are not affected. Under the Water Emphasis Alternative, the Lake McConaughy area is the second most impacted region, followed by the Scotts Bluff area, North Platte Headwaters, and the Eastern Colorado area. Under the Full Water Leasing Alternative, farm revenue impacts are greater in the Lake McConaughy area than the Scotts Bluff area, with the order of the other economic regions remaining the same. As each alternative was analyzed to determine the effects of various actions, it was determined that two of the identified impact regions (South Platte Headwaters and Denver metro area) incurred no economic impacts, regardless of alternative.

REGIONAL ECONOMICS

All of the projected economic impacts from each alternative are less than or equal to one-tenth of 1 percent of the economic activity in the associated region.

All of the alternatives bring money into the economic regions through construction investments, payments for land, or payments for water. Together, these investments and payments constitute the economic benefits of the Program alternatives.

Regional economic losses are created primarily in two ways:

- **Water leasing:** When water users or land owners lease or sell water or land to the Program, agricultural production is reduced. Individuals would likely participate in the Program only if Program payments for water or land equal or exceed the income they would otherwise have received from the land or water. So, at the individual level, these transactions create an economic benefit. However, the Program payments to individuals for water and land are not all spent in the respective economic region and, therefore, do not fully offset locally the decreases in agricultural production and the associated local expenditures.

- **Instream flows:** Adding environmental instream flows to the existing demands on the Basin water supplies reduces lake levels at several Basin reservoirs, producing losses in recreation visitation and expenditures for certain activities.

In general, the alternatives which acquire or lease the most water, the Full Water Leasing and Water Emphasis alternatives produce negative effects on a regional level, due to reductions in agricultural production that filter throughout the other sectors in the economy. Payments to irrigators and landowners may offset impacts to irrigated agricultural production, so overall impacts may be positive even though impacts on many agricultural sectors would be negative. In addition, if there are investments from construction or recreation in the region, these help to offset these negative impacts, and overall effects could be positive. The Wet Meadow Alternative in the habitat region creates the greatest economic benefits because it does not take water out of irrigation due to leasing and puts the most money into habitat restoration.

PRIMARY PROGRAM COSTS

Table S-26 presents the primary Program costs associated with the alternatives. The costs shown below are for the primary Program actions having environmental effects, for the First Increment of the Program. The costs in the table do not represent a full Program budget. That is, they do not include project permitting costs, administrative costs, taxes, mitigation costs, or monitoring and research which have been estimated by the Governance Committee to total $50-$60 million in the Program's First Increment. The costs below do not include the value of contributed land and water (for which Program payment is not made). The shaded cells are costs from the Reconnaissance-Level Water Action Plan unless otherwise noted. The remaining costs are provided by the EIS Team. Details are provided in the Economics Appendix.

A full Program budget for the preferred alternative is in the Governance Committee Program Document: Attachment 1: Draft Finance Document and Program Budget.

Table S-26.—Primary Project Costs

	Governance Committee Alternative	Full Water Leasing Alternative	Wet Meadow Alternative	Water Emphasis Alternative
Central Platte groundwater mound conjunctive use				$4,725,000
Central Platte power interference	$1,790,000			$1,790,000
Central Platte offstream reservoir	$7,350,000			
Dawson and Gothenburg Canal groundwater recharge	$848,000			
Dry Creek/Fort Kearney Cutoff	$399,000			
Glendo Reservoir (water leasing)	$1,988,000			
Glendo new water right (100 kaf)			$100,000	$100,000
Central Platte groundwater management (Water Action Plan, option 1)	$716,000			
Net controllable conserved water	$3,965,000			
North Platte channel capacity restoration	$1,000,000	$1,000,000	$1,000,000	$1,000,000
Pathfinder Modification Project	$2,243,000		$2,243,000	$2,243,000
Pathfinder Wyoming Account (leasing)	$2,280,000			
Riverside drains				$10,426,000
Tamarack Project, Phase I			$3,434,000	
Tamarack Project, Phase III	$7,868,000			$7,868,000
Water leasing, Colorado2		$109,200,000		$54,600,000
Water leasing, Nebraska	$19,500,000	$93,600,000		$46,800,000
Water leasing, Wyoming	$17,940,000	$117,780,000		$31,200,000
Water management incentives	$9,000,000			
Island leveling/sand moving	$3,350,000	$3,350,000	$6,734,000	$2,136,000
Land acquisition	$17,440,000	$17,440,000	$35,072,000	$11,126,000
Legal and admin fees associated with land acquisition and management activities	$1,960,000	$1,960,000	$3,942,000	$1,250,000
Habitat restoration and maintenance	$10,750,000	$10,750,000	$16,040,000	$8,856,000
Total	**$100,387,000**	**$355,080,000**	**$68,565,000**	**$184,120,000**

SOCIAL ANALYSIS

Compared with the Present Condition, the action alternatives would not significantly affect population and demographic trends, health risk factors, flooding, land use, or income and employment.

Human Health

Based on the analysis of land use changes, the action alternatives are not likely to create new habitat that would promote increases in mosquito populations that could, in turn, carry human disease or create habitat that would encourage increases in resident goose and migratory waterfowl populations (e.g., ducks and geese). Thus, no increases are expected in health risks from mosquito-borne disease, waterfowl diseases, or waterfowl contamination of surface waters.

Surface Water Flooding

All alternatives provide additional flood control in the Platte River below Lake McConaughy, as lake elevations are reduced and flood storage space is increased, thus diminishing the frequency, extent, and duration of significant out-of-bank flooding. There are presently 9 years of the 48 years modeled with flows above floodflow (10,800 cfs) at Overton. This is reduced to 7 years under all of the action alternatives.

Groundwater Levels

At present, during wet years when riverflows are at the highest levels, groundwater levels also rise within roughly 500 to 1,000 feet from the river. Program alternatives reduce the highest peak surface flows through the Central Platte Habitat Area reach of the Central Platte River. As a result, surface flows are not as high under the action alternatives, and groundwater levels near the river (1,000 feet or less away) are also reduced by up to 3 inches for the wettest years and the highest flood periods.

During normal or dry years when surface flows are at average or low levels, the Program alternatives would augment surface flows in the spring for periods of 3 to 30 days. As a result, Program alternatives would raise groundwater levels about 3 inches for periods of 3 to 30 days during years when surface and groundwater levels are normal or low.

Land Use Changes

Potential social impacts from the Program's First Increment land acquisition component of the action alternatives are expected to be minimal, for the following reasons:

- The 10,000 acres of the Program's First Increment represents 2.3 percent (or 1.5 percent) of the entire Central Platte Habitat Area, which consists of about 434,199 acres.

- It is Program policy that all lands acquired for the Program will be on a willing seller/willing lessor basis; there will be no land condemnation (Land Action Committee, Good Neighbor Policy, Land Plan, 2003)[31].

[31]See Governance Committee Program Document: Attachment 4, Land Plan for the Land Plan cited in these bullets.

- On the 10,000 acres managed by the Program, it is expected that many of the existing lands uses (for example, grazing, hunting, and most other uses) would be allowed to continue (Land Plan, 2003).

- It is Program policy that any tax burden associated with Program will not be shifted to landowners (Land Action Committee, Good Neighbor Policy, Land Plan, 2003).

- If there are adverse effects, the Program will have local representatives readily accessible so that the nature and cause of any problem can be quickly determined and corrective actions can be taken in a timely manner (Land Plan).

- The Program will require its contractors to carry appropriate insurance to cover documented damage claims directly resulting from their actions (Governance Committee Program Document).

- In addition to acquiring such a small percentage of land in that area, the Program will focus on restoring habitat away from bridges and roads where mining activities are naturally located to reduce the cost of pit development and transport of material. It is notable that several existing sand and gravel operations have become involved in providing nesting habitat for interior least terns and piping plovers on unused areas of the mines employing various methods to control predation and disturbance of nests. There appears to be significant opportunity for the program to collaborate with sand and gravel operators to develop and protect channel habitat.

CULTURAL RESOURCES

The action alternatives could result in impacts to unspecified cultural resources as a result of:

- Construction of groundwater recharge ponds, pipelines, pumps, and canals near the South Platte River in Colorado as part of the Tamarack projects

- Construction of an offstream reservoir, groundwater recharge pits, or installation of drains in the Central Platte valley

- Habitat restoration in the Central Platte Habitat Area.

The minimum water surface elevation at Seminoe Reservoir for all but one of the alternatives would be lower than the minimum water surface elevation projected for the Present Condition, which may expose lands and any archaeological sites, if any exist. The Pathfinder Modification Project would modify the spillway, but it will not affect any historic structures at the Pathfinder Dam. Construction of a new offstream reservoir in the Central Platte valley, with possible land disturbances, and other land disturbances from habitat restoration could potentially cause negative impacts to cultural resource sites. Ground disturbance as a result of groundwater management or installing riverside drains could affect subsurface sites.

To date, no American Indian sacred sites that might be affected by the alternatives have been identified.

ENVIRONMENTAL COMMITMENTS

Environmental commitments generally are intended to avoid, minimize, or compensate for adverse environmental effects that would otherwise occur as a result of Program activities.

- **Compliance.** If a Program is adopted, specific actions that require evaluation and appropriate documentation under NEPA will be tiered off of this programmatic FEIS. Specific Program activities will also trigger consultation under FWCA. Under the Clean Water Act, site-specific Section 404 permit activities will also be undertaken. Site-specific analyses will also assess endangered species, migratory birds, and cultural resources as directed under the Endangered Species Act, Migratory Bird Act, and National Historic Preservation Act, as appropriate.

- **Monitoring.** The Governance Committee Alternative incorporates an extensive program of resource monitoring and research. The Integrated Monitoring and Research Program will monitor key resource features and provide ongoing feedback to Program decisionmakers about both trends in environmental and species conditions as well as the effect of Program actions on those resources. Selenium and metals (copper, lead, nickel) were identified during the FEIS analysis and should be incorporated into the Integrated Management Resource Plan.