

**COVER SHEET**  
**Summary of the Draft Environmental Impact Statement**  
**Platte River Recovery Implementation Program**

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

NEPA Cooperating Agencies: U.S. Natural Resources Conservation Service, Environmental Protection Agency, Western Area Power Administration, USDA-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 is a Summary of the Draft Environmental Impact Statement (DEIS) prepared to address requirements of the National Environmental Policy Act (NEPA). The DEIS also serves as the Biological Assessment for consultation under Section 7 of the ESA. **Public comments are requested on the DEIS and/or this Summary.**

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 the DEIS to analyze the impacts of the First Increment (13 years) of a proposed Recovery Implementation Program (Program) 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. The DEIS analyzes the impacts of four alternatives to implement the Program.

The programmatic DEIS 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 the DEIS, or to obtain copies of the DEIS, contact the Platte River EIS Office (PL-100), PO Box 25007, Denver CO 80225-0007, telephone (303) 445-2096, fax (303) 445-6331.

**Comments on the DEIS or this Summary must be sent to the Platte River EIS Office or emailed to [platte@prs.usbr.gov](mailto:platte@prs.usbr.gov) no later than April 2, 2004.**

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



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## Summary

# Platte River Recovery Implementation Program Draft Environmental Impact Statement

## **O**VERVIEW

The U.S. Department of the Interior (Interior) has prepared a Draft Environmental Impact Statement (DEIS) to assess the environmental consequences of the First Increment (13 years) of a proposed Recovery Implementation Program (Program) to benefit four threatened and endangered species and their habitat in and along the Platte River in Nebraska (the four “target species”). The four target species are the whooping crane, the interior least tern, the piping plover, and the pallid sturgeon. The analysis is carried out to meet requirements of the National Environmental Policy Act (NEPA) and the Endangered Species Act (ESA). **This document is a summary of the DEIS.**

In 1997, the States of Colorado, Nebraska, and Wyoming and 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).<sup>1</sup> In this agreement, the signatories agreed to pursue a Basinwide, cooperative effort to improve and maintain habitat for the target species using the Platte River in Nebraska. The Program is the proposed Federal action analyzed in the DEIS.

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 (Basin) for the target species, as well as for certain future water uses during the first increment of 13 years.

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<sup>1</sup>Available at <[www.platteriver.org](http://www.platteriver.org)> or from the Office of the Executive Director, Governance Committee (see “Cover Sheet”).

## STUDY AREA

The study area and the affected environment for the report are the mainstem and tributaries and associated water projects of the Platte River<sup>2</sup> in Nebraska; the South Platte River and tributaries in Colorado, Nebraska, and Wyoming; and the North Platte River and tributaries in Colorado, Nebraska, and Wyoming (see map of the Basin, figure E-1). Some effects may occur in the Missouri River close to the mouth of the Platte River. The study area also includes irrigated lands in the Basin, where water may be leased or sold to the Program, thus affecting land use and farming operations.

While elements of the action alternatives are located throughout the entire Basin, the intent of these actions is to improve habitat conditions in two habitat areas—the Central Platte River between Lexington, Nebraska, and Chapman, Nebraska (shown as the “Central Platte Habitat Area” in figure E-2) (for the whooping crane, piping plover, and interior least tern) and that reach in the Lower Platte River from the Elkhorn to the confluence with the Missouri River (for the pallid sturgeon). Potentially significant impacts are examined wherever they occur.

## PURPOSE OF ACTION

The signatories to the Cooperative Agreement believe that the best approach for addressing the ESA issues in the central and lower Platte region is a Basinwide, cooperative effort to improve and maintain these habitats for the target species (the proposed Program). The signatories believe that an incremental, Basinwide, cooperative approach is the most effective, efficient, and equitable method, and that it will provide greater certainty for water users regarding compliance with the ESA. The purposes of the cooperative effort are to:

- % Improve land and water habitat for the target species to assist in their conservation and recovery.
- % Ensure that the effects of future water development activities are offset so that they are not likely to jeopardize the continued existence of the species.
- % Provide greater regulatory certainty for water users by providing ESA compliance for existing and new water development projects.

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<sup>2</sup>In the DEIS, “North Platte River” refers to the river from its headwaters in northern Colorado through Wyoming, and through Nebraska to Lake McConaughy. “South Platte River” refers to the river from its headwaters in Colorado to its junction with the North Platte River in Nebraska. The “Central Platte River” refers to the river from Lake McConaughy to Chapman, Nebraska (this includes part of the North Platte River). The river from this point to its confluence with the Missouri River near Omaha, Nebraska, is referred to as the “Lower Platte River.”

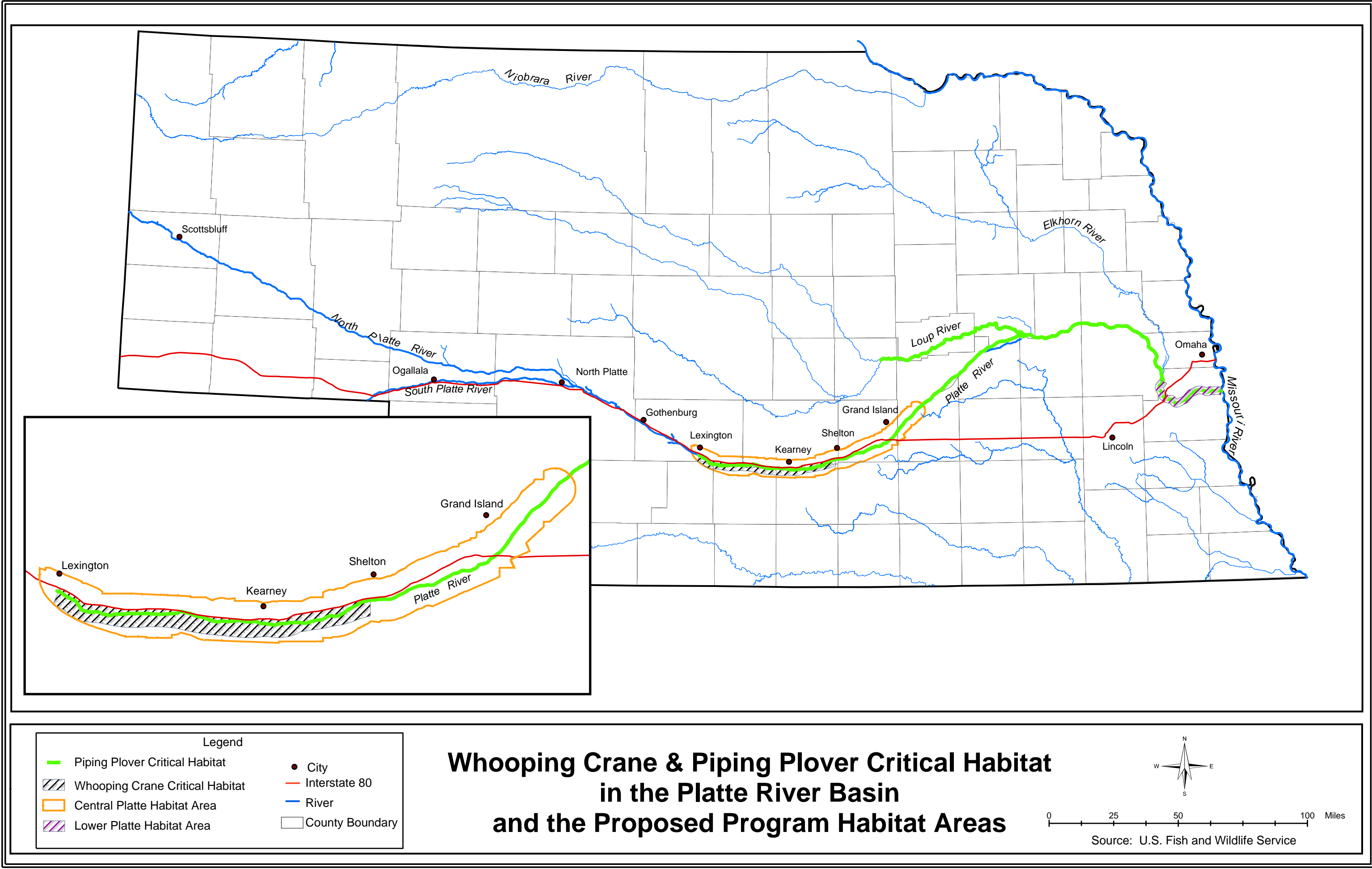


Figure E-2.— Central Platte map with critical habitat for whooping cranes and piping plovers, and Central and Lower Platte Habitat Areas.



Sub-basins of the Platte River as Defined in the EIS

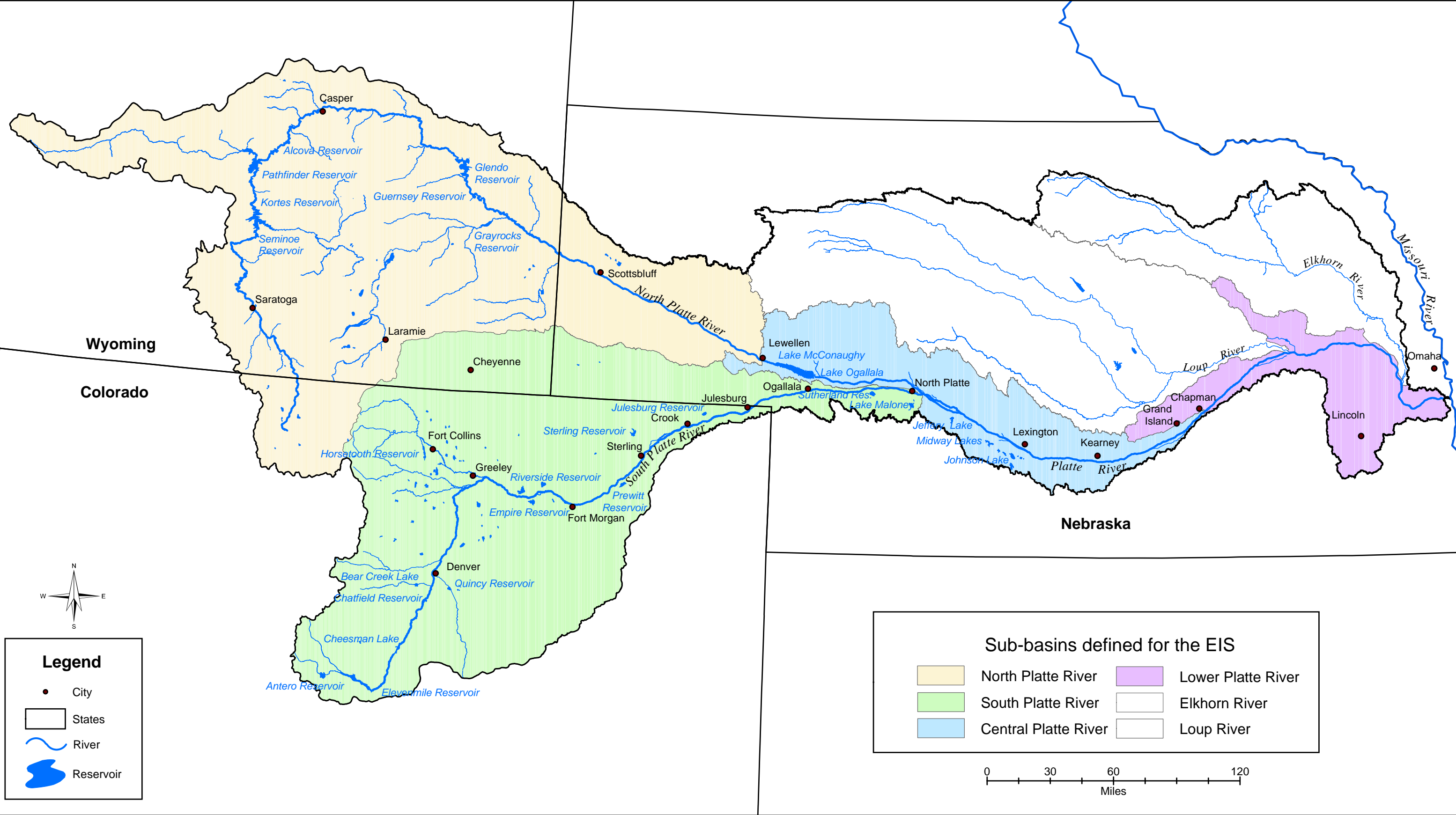


Figure E-1.—Platte tri-basin map with each sub-basin colored (no designation of habitat areas).

- % Help prevent the need to list more species.
- % Accomplish these objectives in a Basinwide, comprehensive, and collaborative fashion that will help ensure that Program actions are coordinated and effective.

## ALTERNATIVES

The Cooperative Agreement established a Governance Committee, representing the three States, water users, environmental groups, and Federal agencies, to develop a proposal for the Program. Pursuant to the Cooperative Agreement, the members of the Governance Committee have formulated a proposal for the Program to be evaluated by Interior under the NEPA and ESA (see Cooperative Agreement, attachment I, “Milestones for the Cooperative Agreement”). Although the Governance Committee has put this proposal forward for NEPA and ESA evaluation, no final decisions have yet been made by the Governance Committee or their member organizations to adopt or implement the proposal. Decisions on implementation by the State governors and the Secretary of the Interior (Secretary) are not expected until early 2005, after completion of the NEPA and ESA review process.

As required by NEPA, the EIS analyzes the Governance Committee’s proposal and other action alternatives:

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

The study evaluates the benefits and impacts of these four action alternatives over the first 13 years of implementation (the First Increment of the Program). Interior has not selected its preferred alternative at this time.

It is important to note that this Summary does not provide details of the alternatives or the analysis. Footnotes and source citations are not included in this Summary. For details of the Draft EIS analysis, see the *Platte River Recovery Implementation Program Draft Programmatic EIS* (DEIS), available from the Platte River EIS Office and at [www.platteriver.org](http://www.platteriver.org). For a detailed description of the Governance Committee’s proposal, see the *Platte River Recovery Implementation Program Document*, available at [www.platteriver.org](http://www.platteriver.org) or from the office of the Executive Director, Governance Committee (see “Cover Sheet”).

## ENVIRONMENTAL CONSEQUENCES

The DEIS describes projected environmental consequences for resources affected by the Program for the target species and their habitat in the Platte River system. The impacts of the Governance Committee, Water Leasing, Wet Meadow, and Water Emphasis Alternatives are compared to the Present Condition.

The following tables present comparative information about the alternatives. Table E-1 displays a summary of the elements contained in each of the action alternatives. Table E-2 presents a quantitative summary of the principal effects of the action alternatives.

All impacts shown represent changes from the Present Condition. For the hydrologic analysis, most impacts are shown as the annual change from the Present Condition, averaged over the 48-year period of hydrologic record (1947–94) used as the benchmark for effects on reservoir storage, riverflows, irrigation deliveries, and other hydrologic measurements.

## PUBLIC INVOLVEMENT

The DEIS has received broad interest from water and power users, environmental and conservation groups, Federal and State agencies, and private citizens throughout the Basin. Information has been disseminated through public meetings and the website. In addition, presentations have been made to various interested organizations at various stages of the Program.

The scoping period began with the publication of the Notice of Intent in the Federal Register. The *Notice of Intent to Prepare a Programmatic Environmental Impact Statement* was published in the Federal Register on February 10, 1998, and included the schedules for 11 scoping meetings held between February and April 1998. These meetings were held to receive public input on the scope of the DEIS.

In addition, over 200 meetings of the Governance Committee and its subcommittees were held between October 1997 and August 2003. These meetings were also open to the public, with time set aside for public comment. (For full list of meetings held, go to <[www.platteriver.org](http://www.platteriver.org)>.)

As a result of the analysis of the oral and written scoping comments, potential impacts on several resources were determined to be issues of public concern. The EIS team analyzed, in detail, impacts on these resources and others, as follows:

- % Water
- % River Hydraulics and Sediment Transport
- % Water Quality
- % Central Platte River Terrestrial Vegetation Communities and Land Use Types

- 
- % 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. These resources are: State Listed and Species of Special Concern, Indian Trust Assets, and Environmental Justice.

Table E-1.—Elements of the Action Alternatives

Alternative Element	Present Condition	Alternatives				
		Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
<b>Program Water Supply</b>	----	Pathfinder Modification Project  Lake McConaughy Environmental Account  Tamarack Project, Phase I  Water Action Plan: 13 Conservation and Water Supply Activities	Pathfinder Modification Project  Lake McConaughy Environmental Account  Tamarack Project, Phase I  Water Action Plan 13 Conservation and Water Supply Activities	Pathfinder Modification Project  Lake McConaughy Environmental Account  Tamarack Project, Phase I  Water Leasing (60 kaf in each State)	Pathfinder Modification Project  Lake McConaughy Environmental Account  Tamarack Project, Phase I  Glendo 100 kaf New Program Water Right	Pathfinder Modification Project  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 (60 kaf in each State)
<b>North Platte River Channel Capacity at North Platte, Nebraska</b>	1,980 cubic feet per second	1,980 cubic feet per second	3,000 cubic feet per second  All Nebraska water leasing located below Lake McConaughy to reduce peak irrigation demand by 500 cubic feet per second			
<b>Capacity to Create Short-Duration Pulse Flows at the Habitat</b>	----	Pulse releases made only from Lake McConaughy environmental account	Pulsing using Lake McConaughy Environmental Account, Johnson Lake, Johnson-2 Forebay, and other system flexibilities			
<b>Land Plan Focus</b>	Land conditions in 1998	Emphasis on protection of best habitat, below Kearney	Emphasis on restoration of degraded habitat above Kearney		Emphasis on restoration of degraded habitat above Kearney, plus 7,000 acres of additional wet meadow	Fewer Program resources allocated to land. Land Plan reduced to 6,495 acres

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

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
<b>Water</b>					
<i>North Platte Basin</i>					
Reservoir storage <sup>3</sup>	Average 4 percent less		Average 3 percent less	Average 10 percent less	
Average riverflows in North Platte River above Lake McConaughy					
1. Winter 2. Summer	1. -1 percent 2. 5 percent	1. -1 percent 2. 5 percent	1. -4 percent 2. 12 percent	1. No change 2. 6 percent	1. -3 percent 2. 16 percent
Flood control	Magnitude of largest floods reduced				
Irrigation delivery shortages - number of years <sup>4</sup>					
1. North Platte Project 2. Kendrick Project 3. Glendo Unit 4. Non-project Lands	1. no change 2. 5 more years 3. 1 more year 4. 1 more year	1. no change 2. 5 more years 3. 1 more year 4. 1 more year	1. no change 2. 4 more years 3. 1 more year 4. 1 less year	1. 2 more years 2. 5 more years 3. 4 more years 4. 1 more year	1. 2 more years 2. 5 more years 3. 3 more years 4. 2 less years
<i>South Platte Basin</i>					
Total flows in the lower South Platte River, near the Colorado-Nebraska State line	-5,112 acre-feet per month on average for November, December, January, and June	-5,106 acre-feet per month on average for November, December, January, and June	-3,148 acre-feet per month on average for November, December, January, and June	-2,680 acre-feet per month on average for November, December, January, and June	-3,827 acre-feet per month on average for November, December, January, March, and June
Irrigation water deliveries	No change		39,300 acre-feet fewer deliveries in average year	No change	39,300 acre-feet fewer deliveries in average year

<sup>3</sup>Consists of total average storage changes in September for Seminole, Kortes, Pathfinder, Alcova, Grey Reef, Glendo, and Guernsey Reservoirs.

<sup>4</sup>Out of the 48-year period of record used for the hydrologic analysis.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Central Platte Basin					
Lake McConaughy storage	Lower by 14 percent		Lower by 11 percent	Lower by 14 percent	Lower by 11 percent
Number of spills and amount of water spilled. <sup>5</sup>	About 55 percent fewer spills		Nearly 60 percent fewer spills	About 50 percent fewer spills	About 45 percent fewer spills
Total flows	Increase average annual flows, especially in spring and summer				
Irrigation delivery shortages; number of years for the Western Canal <sup>6</sup>	2 more years		no change		
Improvement toward target flows at Grand Island	142,000 acre-feet		148,000 acre-feet	118,000 acre-feet	185,000 acre-feet
River Hydraulics and Sediment Transport					
Mean annual flow at Overton, Nebraska	Increase 2.7 percent		Increase 7.7 percent	Increase 1.8 percent	Increase 5.8 percent
1.5-year peak flood at Overton, Nebraska	Increase 24.7 percent	Increase 70.7 percent	Increase 75.3 percent	Increase 69.6 percent	Increase 76.2 percent
Channel restoration	No island leveling	Clearing and island leveling of 417 acres at six locations			Clearing and island leveling of 482 acres at two locations
At 13 years, sand augmented by land plan <sup>7</sup> (tons)	0	3,687,000 tons			3,580,000 tons
At 61 years, sediment eroded from channel bed <sup>8</sup> at river mile (RM) 234	Decrease 1 percent	Decrease 25 percent	Decrease 30 percent	Decrease 33 percent	Decrease 1 percent
At 61 years, median grain size for channel bed <sup>9</sup>	Increase 18 percent	Decrease 1 percent	Decrease 11 percent		no change

<sup>5</sup>Spills include spillway flows and releases to prevent violating the FERC limits on maximum reservoir elevation.

<sup>6</sup>Out of the 48-year period of record used for the hydrologic analysis.

<sup>7</sup>Cumulative sand augmented is a measure of the sand input to the channel through mechanical island leveling activities.

<sup>8</sup>Assuming that no channel restoration or sand augmentation occurs after the 13-year First Increment of the Program.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
At 13 years, average change in channel width for Central Platte Habitat Area <sup>9</sup>	Increase 1 percent	Increase 6 percent	Increase 7 percent	Increase 6 percent	Increase 7 percent
At 61 years, average change in channel width for Central Platte Habitat Area <sup>10</sup>	Increase 3 percent	Increase 4 percent	Increase 8 percent	Increase 4 percent	Decrease 5 percent
Water Quality					
Central Platte River at Grand Island, Nebraska					
Daily probability of exceeding 90 EC (average for June, July, and August)	Slight improvement at 0.321	Slight improvement at 0.323	Improvement at 0.317	Slight improvement at 0.327	Improvement at 0.318
Concentration of copper in sediments	Increase of roughly 150 parts per million	Increase of roughly 140 parts per million		Increase of roughly 160 parts per million	Increase of roughly 195 parts per million
Central Platte River Terrestrial Vegetation Communities and Land Use Types					
Land Cover Type Changes					
Agriculture	-1 percent				-0.1 percent
Bottomland grasslands	9 percent	10 percent		18 percent	2 percent
Woodlands	-4 percent	-7 percent		-11 percent	-3 percent
Shrublands	-7 percent	-9 percent		-12 percent	-2 percent
Herbaceous riparian wetlands	-5 percent	-7 percent		-10 percent	-3 percent
Bare sand	2 percent	1 percent			7 percent
Emergent wetlands	-1 percent			-2 percent	No change
Sand and gravel mines	No change				
Whooping Crane					
Channel Habitat					
Open channel area	No change	32 percent			21 percent
Roost habitat quality (average for April, October, and November)	16 percent	34.3 percent		29.6 percent	30 percent
Out of channel habitat - change in acres	9 percent	11 percent		18 percent	2 percent

<sup>9</sup>The Central Platte Habitat Area is RM 247 to 160, or Lexington to Chapman, Nebraska.

<sup>10</sup>Assuming that no channel restoration or sand augmentation occurs after the 13-year First Increment of the Program.



Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Interior Least Tern and Piping Plover					
Least Tern					
Nest timing	Allows earlier nest initiation by 1-15 days				
Nesting opportunity	1- to 3-day increase in fledging time available				
Nest elevation (overall)	Nest elevation not improved over the Present Condition	Nest elevation improved over the Present Condition			
Forage fish habitat	Significant improvement				
Piping Plover					
Nesting timing	Allows earlier nest initiation by 1-14 days	Allows earlier nest initiation by 1-20 days			
Nesting opportunity	1- to 4-day increase in fledging time available.				
Nest elevation	Insufficient	Sufficient			
Pallid Sturgeon					
Spawning flows	No significant change		Very slight positive	Slight negative	No significant change
Habitat forming flows	Very slight negative			Slight negative	No significant change
Food base flows	Slight positive				Moderate positive
Summer flows	Moderate positive				
Other Federally Listed Species					
Colorado					
Bald eagle	No impact				
Nebraska					
Bald eagle	Numerous benefits				
Western prairie fringed orchid	Reduced peak flows diminish wet meadow recharge at known sites				
Wyoming					
Preble’s meadow jumping mouse	No impact				
Wyoming toad	No impact				
Ute ladies-tresses orchid and Colorado butterfly plant	No impact				

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Sandhill Cranes					
Roosting Habitat					
Roosting depth availability	Reduce somewhat	Increase in managed areas; reduce elsewhere			
Unobstructed channel width	Increase in management areas				
Acres of wet meadow forage area near river	Increase in managed areas				
North Platte Fisheries					
Reservoir Volume <sup>11</sup>					
Seminole Reservoir (less than ~200,000 acre-feet)	40 additional months <sup>12</sup>	40 additional months	34 additional months	52 additional months	49 additional months
Pathfinder Reservoir (less than ~200,000 acre-feet)	44 additional months		34 additional months	70 additional months	63 additional months
Glendo Reservoir (less than ~100,000 acre-feet)	11 additional months		5 additional months		
Fish Production Index (MEI)					
Seminole Reservoir	-2 percent		-4 percent	-6 percent	-4 percent
Pathfinder Reservoir	-5 percent		-6 percent		-4 percent
Alcova and Glendo Reservoir	Changes less than +/- 2 percent				
Lake McConaughy Sport Fishery					
Lake McConaughy Conditions Conducive for Reproduction (Percent of Years)					
Walleye	Reduced from 73 to 44 percent of years			Reduced from 73 to 40 percent of years	Reduced from 73 to 44 percent of years
White bass	Rise from 8 to 12 percent		No change		
Smallmouth bass	Reduced from 79 to 33-38 percent of years				
Gizzard shad	Reduced from 90-94 to 52-75 percent of years	Reduced from 90 to 52-60 percent of years			
Rainbow trout loss of habitat resulting from elevations lower than 3,240 feet	Elevation <3,240 feet 14.6 percent more years				

<sup>11</sup>The impact to the fisheries would be significant for any period of time that reservoir volumes fall below the specified critical elevation levels.

<sup>12</sup>Out of the 48 years used in the hydrologic analysis.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Lake Ogallala trout fishery	May adversely affect				
Hydropower					
North Platte					
Percent change in electrical generation	0.4 percent		0.1 percent	-0.7 percent	-0.9 percent
Percent change dependable capacity	Summer: 4.7 percent Winter: -7.7 percent		Summer: 12.5 percent Winter: -8.8 percent	Summer: 0.4 percent Winter: -21.8 percent	Summer: -5.7 percent Winter: -25.6 percent
Central Platte					
Percent change electrical generation	3.2 percent	2.9 percent	4.3 percent	3.2 percent	6 percent
Percent change dependable capacity	Summer: -6 percent Winter: -2.4 percent	Summer: -6.1 percent Winter: -4.3 percent	Summer: -4.3 percent Winter: -3.3 percent	Summer: -4.6 percent Winter: -11.3 percent	Summer: -7.6 percent Winter: 2.6 percent
Recreation					
Change in Recreation Visits					
Colorado - South Platte Reservoirs <sup>13</sup>	Not affected		Not available <sup>14</sup>	Not affected	Not available <sup>14</sup>
Colorado - Tamarack Ranch State Wildlife Area	Slight increase				
Wyoming - North Platte Reservoirs <sup>15</sup>	-1.2 percent visits		-0.9 percent visits	-1.2 percent visits	-1.1 percent visits
Nebraska - Lake McConaughy	-6 percent visits	-5.8 percent visits	-2.8 percent visits	-6.3 percent visits	-4.5 percent visits
Nebraska - Middle Platte River	13,425 visits	2,685 visits	13,425 visits	15,215 visits	1,790 visits
Agricultural Economic Impacts					
Changes in Annual Consumptive Use of Irrigation Water (by Economic Region)					
Central Platte Habitat Area	-15,900 acre-feet		-27,000 acre-feet	No change	-27,000 acre-feet
Lake McConaughy Area	-100 acre-feet		-16,200 acre-feet	No change	-16,000 acre-feet

<sup>13</sup>Includes Boyd, Empire, Jackson, North Sterling, Julesburg, Prewitt, and Riverside Reservoirs.

<sup>14</sup>Small changes in surface area; impact not assessed due to lack of recreation data.

<sup>15</sup>For Seminole, Glendo, and Guernsey Reservoirs.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Scotts Bluff Area	-300 acre-feet		-18,400 acre-feet	-600 acre-feet	-19,100 acre-feet
Eastern Wyoming	-1,500 acre-feet		No change		
North Platte Headwaters	-8,400 acre-feet		-4,900 acre-feet	-2,300 acre-feet	-5,400 acre-feet
Eastern Colorado	No change		-23,200 acre-feet	No change	-23,200 acre-feet
<i>Changes in Agricultural Revenues</i>					
Central Platte Habitat Area	-\$2,350 to -\$4,409,000		-\$4,040,000 to -\$7,642,000	No change	-\$4,038,000 to -7,642,000
Lake McConaughy Area	\$2,000		-\$2,733,000	No change	-\$2,733,000
Scotts Bluff Area	\$18,000		-\$2,851,000	\$30,000	-\$2,973,000
Eastern Wyoming	-\$149,000		No change		
North Platte Headwaters	-\$745,000		-\$436,000	-\$204,000	-\$478,000
Eastern Colorado	No change		-\$4,150,000	No change	-\$4,150,000
Regional Economics					
<i>Changes in Regional Sales<sup>16</sup></i>					
Central Platte Habitat Area	-\$1,705,270	-\$1,471,060	-\$4,947,380	\$3,286,520	-\$4,460,340
Lake McConaughy Area	-\$281,660	-\$90,550	-\$1,929,070	-\$353,317	-\$1,994,990
Scotts Bluff Area	\$21,220		-\$1,219,880	\$35,700	-\$1,353,870
Eastern Wyoming	-\$93,320		-\$14,040	\$23,360	\$24,560
North Platte Headwaters	\$121,760		24,830	-\$139,690	-\$152,750
Eastern Colorado	No change		-\$3,342,740	No change	-\$3,342,740
<i>Changes in Regional Income<sup>17</sup></i>					
Central Platte Habitat Area	-\$563,000	-\$463,560	-\$1,246,170	\$822,880	-\$1,311,500
Lake McConaughy Area	-\$239,670	-\$206,700	-\$649,740	-\$243,230	-\$727,260
Scotts Bluff Area	-\$7,970		-\$452,090	-\$13,390	-\$487,840
Eastern Wyoming	-\$17,850		-\$4,430	\$7,370	\$7,750
North Platte Headwaters	\$23,270		-\$5,100	-\$55,320	-\$48,270
Eastern Colorado	No change		-\$272,150	No change	-\$272,150

<sup>16</sup>All economic impacts represent less than or equal to one tenth of one percent of the regional economic activity.

<sup>17</sup>All economic impacts represent less than or equal to one tenth of one percent of the regional economic activity.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Social Analysis					
Central Platte Habitat Area					
Human health issues	No impacts				
Out-of-bank flooding					
a. Years with flows > 10,000 cfs	a. 2 fewer years <sup>18</sup>	a. 2 fewer years	a. 1 less year	a. 2 fewer years	a. 1 less year
b. Change in maximum floodflows (cfs)	b. -4,263 cfs	b. -3,688 cfs	b. -4,003 cfs	b. -5,091 cfs	b. -4,182 cfs
Change in groundwater levels (feet) during wet years when flows are greater than 7,500 cfs:					
a. 500 feet from river	a. -0.127 feet	a. -0.111 feet	a. -0.085 feet	a. -0.260 feet	a. -0.237 feet
b. 1,000 feet from river	b. -0.068 feet	b. -0.054 feet	b. -0.032 feet	b. -0.166 feet	b. -0.161 feet
Change in groundwater levels (feet) during normal or dry years when flows are less than 7,500 cfs:					
a. 500 feet from river	a. 0.232 feet	a. 0.238 feet	a. 0.247 feet	a. 0.221 feet	a. 0.206 feet
b. 1,000 feet from river	b. 0.225 feet	b. 0.231 feet	b. 0.242 feet	b. 0.214 feet	b. 0.200 feet
Land use changes	Agricultural lands reduced by 1 percent or less in the Central Platte Habitat Area				
Cultural Resources					
North Platte Basin					
National Register of Historic Places					
Pathfinder Reservoir	Raising spillway height may impact dam’s historic character.				
Potential Disturbance to Archaeological Sites					
Seminole Reservoir	Subject to new exposure or erosion at low water.				
South Platte Basin					
Tamarack Project, Phases I and III	Construction of recharge ponds, pipelines, pumps, and canals would cause ground disturbance.				

<sup>18</sup>Out of the 48-year period of record used in the hydrologic analysis.

Summary of Impacts of Each Alternative Compared to the Present Condition (Impacts are quantified on an annual basis, unless otherwise noted)					
Resources, Significant Indicators, and Geographic Areas	Alternatives				
	Governance Committee, Scenario 1	Governance Committee, Scenario 2	Water Leasing	Wet Meadow	Water Emphasis
Central Platte Basin					
Lake McConaughy	Subject to new exposure or erosion at low water.				
Central Platte Offstream Regulatory Storage Reservoir	Construction would cause extensive ground disturbance.		No impact		
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		No impact		Construction of new wells, well pads, and pipelines expected to disturb localized areas
Riverside drains	Laying underground piping may affect resources		No impact		Laying underground piping may affect resources

## **THE TARGET SPECIES**

The target species for the Program are described briefly below. Photographs of the species can be seen in figure E-3.

### **Whooping Crane**

The whooping crane is found only in North America and is this continent's tallest bird. It is the rarest crane and one of the rarest bird species in the world. Historically, its range extended from the Arctic coast south to central Mexico and from the Rocky Mountain region in Utah eastward to the Atlantic coast. The only remaining wild, migratory flock of whooping cranes migrate from Texas to Canada and use the Central Platte River area in Nebraska as a stopover for roosting and foraging. The species was listed as endangered in 1967.

### **Interior Least Tern**

The least tern is one of the smallest tern species in North America. The interior population of the least tern breeds along the Missouri, Mississippi, Ohio, Red, and Rio Grande river systems, mostly on bare sandbars. The species was listed as endangered in 1985.

### **Piping Plover (Northern Great Plains Population)**

The piping plover is a small shorebird related to the more common killdeer. Three North American breeding populations of piping plovers are recognized. The greatest number of piping plovers breed in the Northern Great Plains. This breeding population occurs on the Missouri River and its tributaries in North and South Dakota and Nebraska. The piping plover nests on sandbars in these rivers, including the Platte River in Nebraska. The species was listed as threatened in 1985.

### **Pallid Sturgeon**

The pallid sturgeon is one of the largest fishes found in the Missouri-Mississippi River drainage, with specimens weighing up to 85 pounds (39 kilograms). The species is a bottom dweller, found in areas of strong current and sandy or gravel bottom in the main channel of large turbid rivers, such as the Missouri River and the Lower Platte River. The species was listed as endangered in 1990.



Figure E-3.—The Target Species (from top to bottom),  
Piping Plover, Pallid Sturgeon, Interior Least Tern, and Whooping Crane



## **PURPOSE OF THE PROPOSED PROGRAM**

The signatories to the Cooperative Agreement believe that the best approach for addressing the ESA issues in the Central and Lower Platte region is a Basinwide, cooperative effort to improve and maintain these habitats for the target species (the proposed Program). A Basinwide, cooperative approach is essential so that the responsibility for providing offsetting measures is shared among the concerned entities and to effectively accomplish many of the offsetting measures, such as ensuring delivery of water to the habitat and coordinated management of water projects. The coordinated approach will be more effective than the current project-by-project approach. It also is conducive to an incremental, adaptive management approach whereby remedial measures are undertaken, monitored, and evaluated so that the combined effect of these measures are understood and determinations of future remedial measures can be scientifically determined. However, in order for a coordinated, Basinwide program to be adopted, the basic provisions of a program must be ones which all parties can agree to implement.

The purposes of the cooperative effort are to:

- % Improve land and water habitat for the target species to assist in their conservation and recovery.
- % Ensure that the effects of future water development activities are offset so that they are not likely to jeopardize the continued existence of the species.
- % Provide greater regulatory certainty for water users by providing ESA compliance for existing and new water development projects.
- % Help prevent the need to list more species.
- % Accomplish these objectives in a Basinwide, comprehensive, and collaborative fashion that will help ensure that Program actions are coordinated and effective.

If a Basinwide, cooperative Program cannot be implemented, Federal agencies and the projects they operate, or for which they provide funds or authorizations (which include many state and private water projects), must still 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 is likely to be significantly more costly for water users and less effective for offsetting impacts to the species habitat.

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## NEED FOR THE PROGRAM

### Historic Habitat

The historic Platte River in Nebraska (before the 1880s) 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 very broad, shallow, sandy, and generally unvegetated channel. The general conditions of the river in the Central Platte are depicted in a photograph, taken in October 1866, near present-day Cozad, Nebraska (figure E-4). The river-related habitat historically used by the target species is summarized below:

- % Open channel habitat (including bare sandbars) for whooping crane roosting and for nesting and foraging of the piping plover and interior least tern.
- % Riverflows conducive to whooping crane roosting in spring and fall.
- % Riverflows conducive to nesting by piping plover and interior least terns.
- % Riverflows which support forage fish for the interior least tern.
- % Bottomland grasslands and wetlands for whooping crane foraging.
- % Lower Platte River habitat for the pallid sturgeon.

However, over the past 150 years, as much as 90 percent of the species' habitat in the Platte River has been lost, primarily from the effect of the many water storage and diversion projects throughout the Basin, and associated land development.

### Water Development

Water resource development in the Platte River began in the mid-1800s. Prior to water development, the Platte River averaged more than 2.8 million acre-feet (MAF) of flow annually at Grand Island. 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.



Figure E-4.—The Platte River opposite Platte City (near present-day Cozad, Nebraska) October 1866.  
(John Carbutt, photographer. From the collection of the Union Pacific Railroad.)

By the late 1880s, the waters of the South Platte and North Platte River Basins were largely over-appropriated; that is, the demand for irrigation water exceeded the available supply, especially during the late summer.

Construction of the first large reservoirs began shortly after. Today, the Basin contains 15 major dams and reservoirs, providing water for about 3.5 million people. The major dams store roughly 7.6 million acre-feet of water. Approximately 2 million acres of land are irrigated with these water supplies each year. Hydroelectric plants associated with these facilities generate more than \$50 million of electrical power each year.

Transbasin diversions (diversion of water from one river basin to another) were also initiated in an effort to meet water supply needs—particularly diversion 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. Between 1990 and 1999, annual diversions from the Colorado River into the South Platte River Basin averaged more than 350,000 acre-feet 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 Basin came from groundwater.

Particularly in the South Platte and the Central Platte River Basins, the most accessible groundwater aquifers near the river are hydrologically connected to the river; thus, pumping of 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. The State of 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. Currently, in the Platte River counties downstream from Lake McConaughy to Grand Island, more than 19,000 groundwater wells are used for irrigation. The State of Nebraska is studying the degree to which wells in the Central Platte Valley may be affecting Platte River flows and, as part of the Program, is developing a plan to avoid or offset any future depletions that would affect Program benefits for the target species.

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

A conservative estimate of the total consumptive use of Platte River water (use that reduces riverflows) above the Loup River confluence is 1.2 million acre-feet annually, or about 1,650 cfs of year-round flow.

## **CHANGES IN RIVER FLOWS**

### **Annual Volumes**

The bankfull discharge and the mean annual flow in a river strongly influence the width of the river channel. Prior to the construction of the first large storage reservoir, the mean annual flow of the Platte River near Overton, Nebraska, was 2.65 MAF per year during the period 1895 to 1909, and 84 percent of this flow came from the North Platte River. During the period 1970 to 1998, the mean annual flow of the Platte River near Overton, Nebraska, was 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 needed 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 between 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. Peak flows began dropping in 1909 following completion of the first large reservoir on the North Platte River behind Pathfinder Dam. In 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. Other monitored locations on the Platte River (Overton and Grand Island, Nebraska) showed similar patterns. Figure E-5 compares the median mean daily flow over two periods of record at Duncan, Nebraska. As this graph shows, the median annual peak flow from 1895 to 1909 was more than 15,000 cfs. In recent times, the median annual peak flow is roughly 3,000 cfs.

Although the largest reservoirs were constructed on the North Platte River, the construction of reservoirs and diversions on the South Platte also affected peak flows. By 1907, more than 900,000 acres were under irrigation in the South Platte Valley, with 450,000 acre-feet in storage. Analysis of South Platte River diversions and storage indicates that peak flows in the South Platte River are currently 3,000 to 5,000 cfs lower in May and June than during predevelopment conditions.

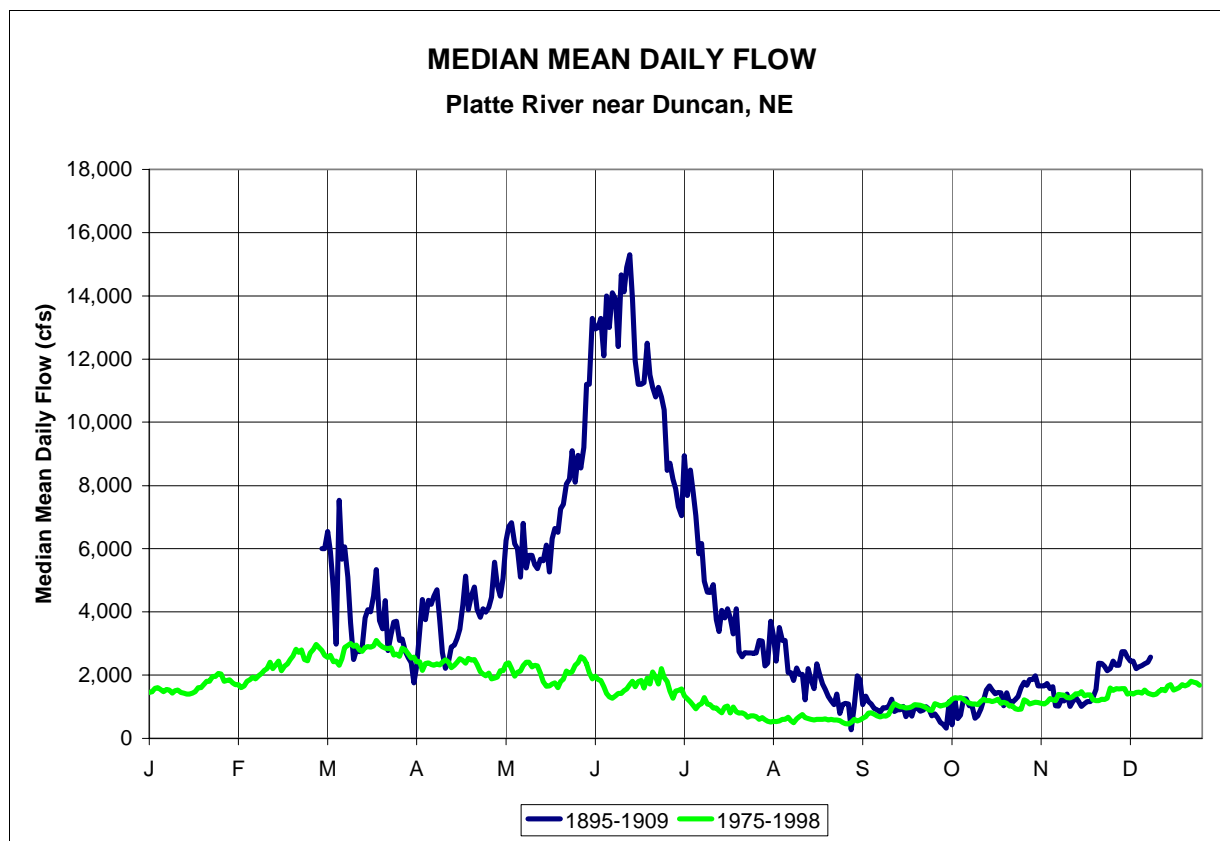


Figure E-5.—Median mean daily flow in the Platte River at Duncan, Nebraska, in 1895-1909 versus 1975-1998. (Source: U.S. Geological Survey gauge data.)

### Timing of Flows

The pattern of flows during the year can affect the ability of the tern and 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 flows declining through the rest of the summer.

Figure E-6 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 years 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.

C                  C                  C    I                  J

Figure E-7 illustrates the complex routing of flows through the Central Platte River system and into the Central Platte Habitat Area beginning just upstream of Overton, Nebraska. In this figure, the width of each canal or section of river is proportional to the average annual volume of water it carries. The Sutherland Canal and the Tri-County Canal divert approximately 50 and 70 percent of riverflows, respectively. Flow in these diversions is used for irrigation and hydropower generation. Discharge from the Tri-County Canal (the Johnson-2 [J-2] Return Channel) is located downstream of Cozad, Nebraska, and a few miles upstream from the Overton gauging station.



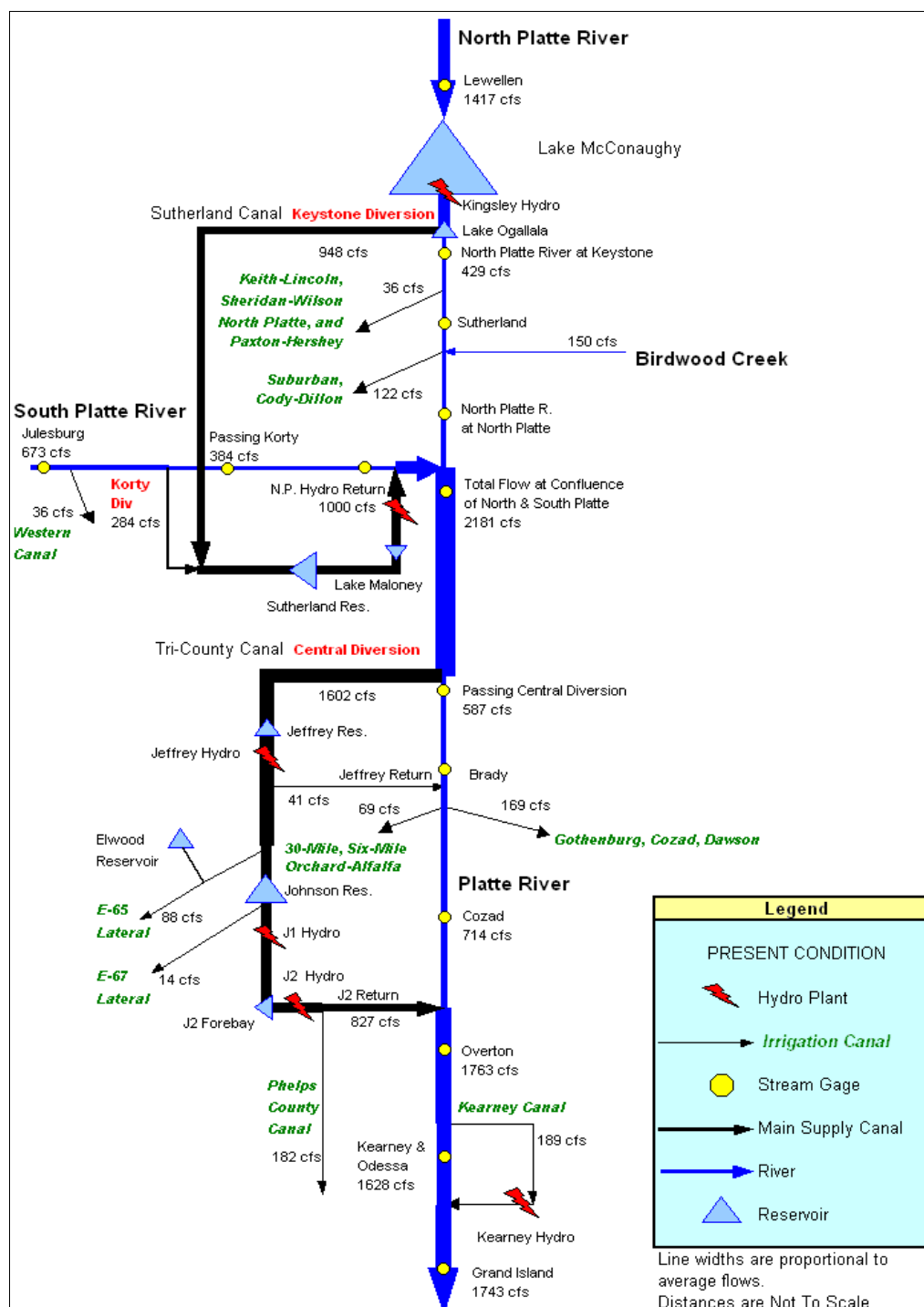


Figure E-7.—Central Platte schematic displaying average annual flow.

Where flows in the river are reduced by diversions, the reduced flows transport less sediment. Because of these canal diversions, much of the river's sediment load is deposited in the reach of the South Platte River between Julesburg and Paxton, and the reach of the Central Platte River between the towns of North Platte and Lexington, Nebraska. Although sediment is dredged from both canals and redeposited below the diversion points, the reduced flows downstream are not able to transport this load, and these reaches slowly aggrade.

### **Channel Depth**

In some reaches of the Central Platte Habitat Area, the depth of the river channel has increased. This change results from a reduction in sediment supply, a shift in source with more sediment originating from the coarser grains of the South Platte River, and from erosion of the channel bed (degradation) downstream from points where clear canal waters are returned to the river.

A recent survey of the Central Platte River shows this trend of riverbed degradation continuing, most notably downstream of the clear water return flows at the J-2 Return Channel. Repeat cross-section surveys of the river channel in 1989 and 2002 (Howard, 2000 and 2002) indicate that the channel degradation during this 13-year period ranges from 6 feet near the J-2 Return Channel to 1 foot nearly 18 miles downstream. This degradation is expected to continue its advance downstream unless there is a significant increase in sediment supply to this reach.

### **Vegetation Encroachment**

A reduction in flows and the supply of medium-grain sand to the Central Platte River have resulted in vegetation encroachment and a narrower river. As riverflow and sediment load decrease, the width of channel that is inundated, and where sand is regularly shifted by riverflows, is also decreased. Vegetation is then able to colonize the area of the channel that is no longer regularly inundated. This area is then excluded from the active river channel and no longer provides useful habitat for the target bird species.

### **Channel Width**

The factors of reduced sediment supply, a coarser source of sediment, the substantial flow of clear water into the habitat area, and the reduction of peak flows, have all contributed to a deeper, narrower channel, with encroaching trees and vegetation.

Most early journals described the Platte River as exceptionally wide compared to other rivers in the U.S. Figure E-8 shows a 1904 property survey map from Dawson County, with river widths of roughly 1 mile.

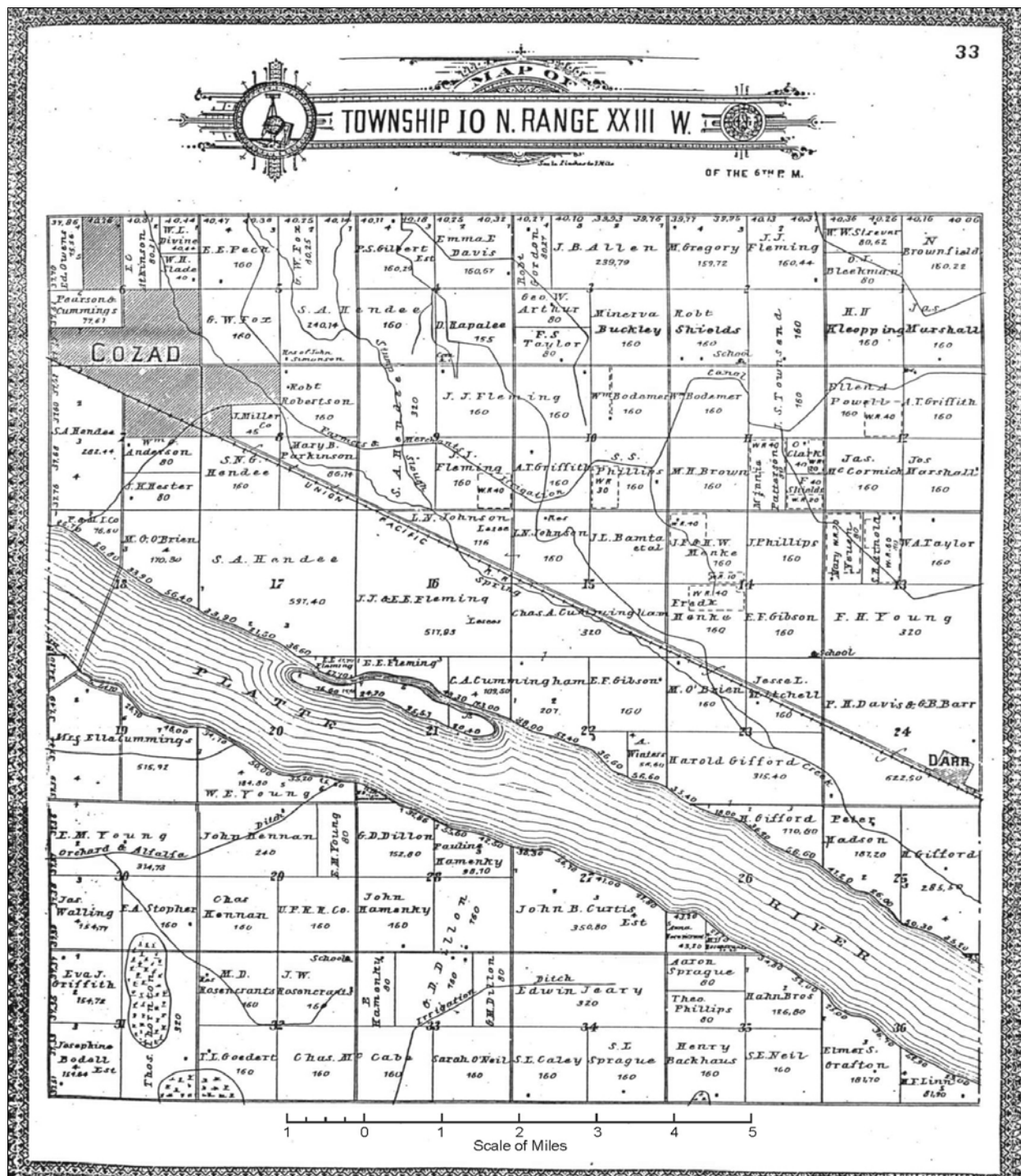


Figure E-8.—Property survey map of Dawson County, Nebraska, in 1904, showing river widths of approximately 1 mile.

Figure E-9 shows changes in channel width for several Central Platte River locations over the last 135 years. Most notable is the pattern of narrowing from upstream to downstream. In 1865, the Central Platte River was wider in the western end and narrowed toward Grand Island. While all reaches of the Central Platte River have narrowed, the channel has narrowed most dramatically in the western reaches. Today, the channel is narrower in the west and wider downstream toward Grand Island.

The trend of reduction in channel width mirrors the pattern of coarsening of the riverbed sediments from west to east. Murphy and Randle (2003) conclude that, while the western part of the habitat reach has fully narrowed and probably reached equilibrium, the section from Kearney to Chapman, Nebraska, could continue to narrow, roughly to 800 feet (total width of all channels).

## **SUMMARY OF CHANGES IN THE RIVER AND CHANNEL HABITAT**

The development of water projects upstream of the central Platte River habitat area has significantly changed the supply of sediment to the central Platte River as well as the volume and pattern of riverflows. These changes have substantially affected the size and characteristics of the river channel, reducing the availability of habitat for the target species. These changes are summarized in table E-3.

## **CHANGES IN WET MEADOWS**

According to several sources, wetlands and wet meadows have been significantly reduced in the last 100 years. Farmers drained wetlands because spring water levels did not dissipate in time for planting.

Wells in hydrologically connected aquifers adjacent to the river can also cause lowering of groundwater levels. Declines in riverflows and a downcutting of the river channel have further lowered surface and ground water levels in the river and in surrounding lands. Since settlement, wet meadow acreage in the Central Platte River has declined 73 percent. Between 1938 and 1982, wet meadow acreage declined up to 45 percent.

Other human activities along the Platte River have also degraded wetland habitats. Interstate 80, a major interstate highway, follows the Platte River for more than 100 miles in central Nebraska. Due to the highway's construction near the river, the habitats near the river have been significantly degraded. Historically, these areas were wet meadows and sloughs that "provided some of the best nesting and feeding habitat for migratory birds along the Platte River."

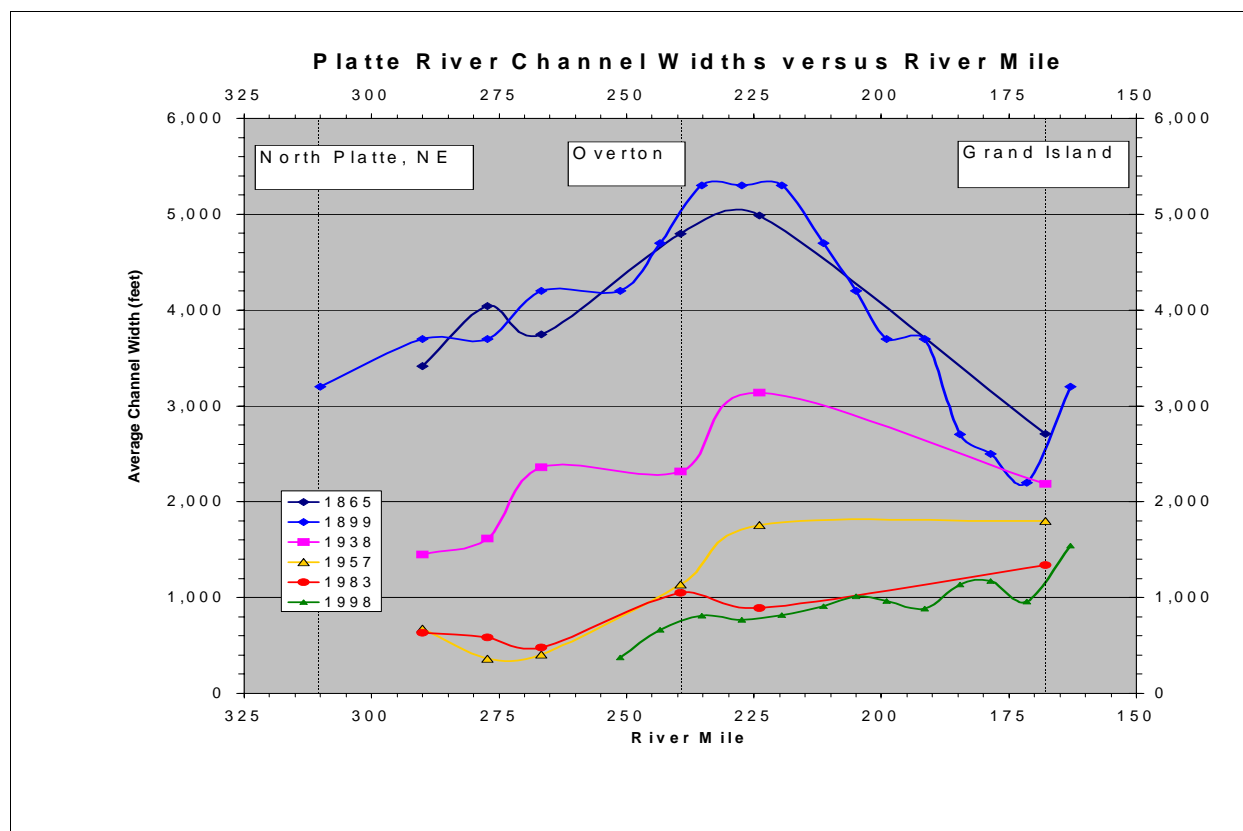


Figure E-9.—Widths of the Central Platte River at six time periods.

Table E-3.—Summary of River Channel Conditions (Predevelopment and Current)

Factor	Predevelopment Condition*	Current Condition
Annual Flow	- 2.8 million acre-feet	- 1.4 MAF (on average, ranging from - 0.6 to 2.8 MAF)
Peak Flow	- 15,000 to 45,000 cfs, exceeding - 17,000 cfs in 2 out of 3 years	- 3,000 to 24,000 cfs, exceeding - 6,000 cfs in 2 out of 3 years
Periods of No Flow	No flow may have occurred along significant reaches of river during the summer months	Relatively infrequent and relatively short occurrences of no flow
Bed Material	Sand (medium diameter - 0.41 mm)	Sand (medium diameter - 0.86 milli-meter), some gravel
Bed Forms	Shifting bars, described as continually changing forms with short offsets like shingles on a roof	Large-scale sandbars and islands
Sediment Load	Large sediment load (1.6 million tons per year). River described as muddy and turbid	Significant sand load (but less than pre-development), significantly reduced wash load (due to diversions and return flow). Total sediment load estimated to be - 0.7 million tons per year
Channel Classification	Braided with sandbars and wooded islands	Braided/anabranching, with significantly greater extent of wooded islands and bars than under pre-development
Total Channel Width	1 to 2 miles (predominantly, with narrower reaches)	292 to 3,311 feet, averaging - 1,260 feet
Active Channel Width	Estimated - 90 percent of total channel width	- 9 to 28 percent of pre-development total channel width
Riparian Vegetation	Densely wooded islands (primarily willow and cottonwood) with relatively narrow and relatively sparser band of bank vegetation. Vegetation estimated to occupy - 10 percent total channel width. Bank vegetation limited by prairie fires and buffalo	Densely wooded islands with extensive woody riparian vegetation along banks; covers - 72 to 91 percent of pre-development total channel width
Source: Adapted from Simons and Associates, 2000.		
*Or earliest data available.		

## POTENTIAL APPROACHES TO HABITAT RESTORATION

Remedies for the loss of habitat involve reversing or minimizing habitat changes that have reduced the value of the Central Platte and Lower Platte River areas for the target species. The Service has assessed the needs of the three bird species and the pallid sturgeon for Platte River channel and adjacent habitat in the Central Platte Valley, and has identified various potential habitat changes to improve conditions for the target species. These changes include:

- % Restoring some areas of wide, open river channel with unvegetated sandbars.
- % Improving flows in the river during migration of the whooping crane and nesting of the tern and plover species, and to maintain fish populations used as forage by the tern.
- % Protecting and restoring wet meadows for crane foraging.
- % Offsetting the ongoing erosion and downcutting of the riverbed in the habitat reach.
- % Reducing disturbance to roosting, nesting, and foraging target species.
- % Increasing sediment transport to the Lower Platte for pallid sturgeon habitat; increasing the occurrence of significant spring rise in the river to provide spawning cues, nutrient cycling, and reproductive habitat for the pallid sturgeon and its food base.

## **D**ESCRIPTION OF ALTERNATIVES

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

Each action alternative emphasizes a different focus or approach; however, many additional combinations of the elements which make up the alternatives are possible. For example, a land habitat element from one alternative could be combined with the water sources from another. The programmatic DEIS is not intended to portray all possible combinations of elements.

### **NO ACTION ALTERNATIVE**

Under National Environmental Policy Act (NEPA) guidelines, the No Action Alternative presents the likely future in a given project area if the Federal action (in this case, a Basinwide, cooperative Recovery Implementation Program) is not undertaken. This condition typically serves as the reference point against which a proposed action and other alternatives are compared in an Environmental Impact Statement (EIS).

For the No Action Alternative to serve as a baseline for the DEIS, it would be necessary to project quantitatively the conditions that would result without a cooperative Recovery Implementation Program. Without a Program, each water project or activity in the Basin that requires Federal approval, permitting, or funding would undergo Endangered Species Act (ESA), Section 7 consultation separately,

implementing separate offsetting measures.

Thus, defining the No Action Alternative in the usual way would have required estimating Basinwide riverflows and reservoir levels and associated agricultural and economic conditions resulting from consultation on every water activity in the Basin with a Federal connection. While it is possible to estimate the aggregate water and land contributions that might be required from all projects, allocating those contributions to individual projects prior to actual consultation would be entirely speculative. For this reason, the DEIS uses the Present Condition in lieu of the customary No Action Alternative.

Although it is not possible to foresee just what form compliance with the ESA without a cooperative Program would take for those projects having a Federal nexus, the following seems likely to occur:

- % Owners and users of water projects would be individually responsible for offsetting past and future adverse effects on the target species and critical habitat using a combination of water, land, and financial measures.
- % Any interim ESA compliance available during the Cooperative Agreement would be lost for those projects subject to ESA compliance. Project owners and operators would not know their requirements, if any, prior to ESA consultation.
- % Without a cooperative Program, it is possible that lawsuits filed by water users, environmental groups, States, or others might greatly complicate required Section 7 consultations. Court orders could require existing projects to cease operations until re-initiation of consultation.
- % The overall goals for restoration of lands and riverflows would be higher than the 130,000 to 150,000 acre-feet of flow improvement and 10,000 acres of land habitat proposed for the First Increment of the Program.
- % There would be no Basinwide, cooperative effort to accomplish these water and habitat goals, thus placing a financial burden on individual project operators.

Other important characteristics of separate ESA compliance could include:

- % Less flexibility for individual offsetting measures to include “noncomplex habitat” lands such as sand pits, small wetlands, and wet meadows. Instead, offsetting measures for individual projects would likely focus on restoring large areas of degraded river and wet meadow habitat consistent with the concept of habitat complexes. Actions to offset the ongoing erosion and downcutting of the riverbed in the habitat area would also likely be a necessary component of ESA compliance.



- % Lands would be acquired by lease, easement, or purchase by individual project operators. Entities with condemnation authority could elect to exercise their authorities in order to meet their ESA responsibilities.
- % Taxes on any habitat lands acquired by tax-exempt entities might not be paid to the county.
- % Existing State water export laws may greatly increase costs of water needed for ESA compliance. Protection of water for ESA purposes within and between States may be limited or nonexistent.
- % There would be no formal coordination of monitoring or research efforts between groups, reducing the likelihood that scientific uncertainty related to the target species and their habitat needs would be addressed.
- % Federal agency budget and personnel needs would increase in order to complete separate, required consultations on individual projects needing Federal authorization, permits, licenses, or other compliance. Schedules for completion of consultations would be limited by the Service's available budget and personnel.

## ACTION ALTERNATIVES

The study considered four action alternatives (summarized in table E-1):

- % **Governance Committee Alternative:** As described in the Governance Committee Program Document.
- % **Water Leasing Alternative:** Land habitat elements are the same as those in the Governance Committee Alternative; water leasing is emphasized in addressing the Program's water goals.
- % **Wet Meadow Alternative:** This alternative focuses on restoring wet meadow areas near the river. There is less emphasis on water management.
- % **Water Emphasis Alternative:** This alternative focuses on acquiring water for the Program. There is less emphasis on land habitat management.

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## COMMON ELEMENTS OF ACTION ALTERNATIVES

In achieving the Program objectives, each action alternative incorporates the following elements or adheres to the following principles.<sup>19</sup>

- (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.
- (2) **Incremental Approach:** Any Program will be implemented in increments, with only the First Increment of the Program under review at this time. Program implementation will occur in increments that will be tracked and evaluated so that the Program can be adjusted over time to best meet the needs of the target species. The Program will consist of actions taken over an initial 13-year increment. The adaptive management process will include documenting baseline data for target species habitat, monitoring target species and their habitats, setting objectives and timetables for review, developing specific milestones and research activities, evaluating species and habitat responses to Program activities, incorporating peer review, evaluating Program effectiveness, and reviewing and adjusting Program goals and objectives.

Interior and the States have committed to achieving the following objectives by the end of the first increment of the Program:

%Improving the occurrence of Platte River flows in the Central Platte associated habitats relative to the present occurrence of species and annual pulse target flows (hereinafter referred to as “reducing shortages to the target flows”) by an average of 130,000 to 150,000 acre-feet per year at Grand Island, through re-regulation water conservation/supply projects. The Interior and the States agree that the Service’s target flows are subject to Program Adaptive Management and peer review and may be modified by the Service accordingly. The Interior and the States have agreed, however, that during the first increment, species and annual pulse target flows serve as an initial reference point for determining periods of excess and shortage in the operation of Program re-regulation and water conservation/supply projects.

%Protecting; restoring, where appropriate; and maintaining at least 10,000 acres of habitat in the central Platte River area between Lexington and Chapman, Nebraska. The Governance

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<sup>19</sup>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.

Committee may agree to undertake, fund, or give credit for land activities outside this area to provide biological benefits to the target species.

- (3) **Adaptive Management:** The effectiveness of the Program will be improved based upon learning from the initial steps. 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 or methods will be adjusted, as appropriate, based on results of monitoring and research and experience gained in implementing the Program actions.
- (4) **Water Sources:** The three initial State projects (Pathfinder Modification Project, Lake McConaughy EA, and Tamarack Project, Phase I) are included in each alternative as a basic water supply for the Program (see details below, under the "Three State Projects" section). They provide an average of approximately 80,000 acre-feet per year of the 130,000-150,000 acre-feet per year flow improvement objective of the First Increment of the Program. Various additional water sources are used in the action alternatives to provide the remaining flow improvement and illustrate different ways of providing varying amounts of flow improvement.
- (5) **Water Protection, Tracking, and Accounting:** Each State would take steps, as necessary, to provide legal and institutional protections for Program water to and through the habitat reach (Lexington to Chapman, Nebraska). Each State's method of regulating, tracking, and accounting for water would be applicable to account for the status of Program-provided water.
- (6) **New Depletion 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.
- (7) **Water Management:** Water developed by a Program would be managed to improve habitat conditions for the target species. The Service has recommended priorities to guide use of water from the McConaughy EA and other Program water elements. The Service's EA Manager would coordinate management of this water to improve riverflows with the other water managers participating in the Program, through the Reservoir Coordinating Committee (RCC) and the Environmental Account Committee (EAC).

Reservoir operations for Lake McConaughy would be in accordance with Federal Energy Regulatory Commission (FERC) license requirements currently in effect for Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD) projects. Operations of the Pathfinder Dam EA and the Tamarack Project, Phase I, would be in accordance with rules approved by the Governance Committee.

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- (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 the Governance Committee Program Document, “Land Action Plan,” tables 1 and 2. Two specific tracts of land have already 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—NPPD 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 Property—The State of Wyoming owns 470 acres along the Platte River, near Kearney, that would be managed as part of the Program.

- (9) **Pallid Sturgeon:** Each action alternative **includes a process** to provide benefits for the pallid sturgeon in the First Increment of the Program.

- (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. Also proposed is an Executive Director with staff for day-to-day implementation of the Program, a Finance Committee to manage cost-sharing and approval of funds, and committees providing advice on land management, water management, technical issues, and outreach.

Funding is contributed by the Federal Government and the States of Colorado, Nebraska, and Wyoming. Changes in State water law, Federal laws and project authorizations, and Federal and private contracts may be necessary to implement specific projects (for example, to facilitate water leasing). The DEIS analysis assumes that all such arrangements—legal, financial, and institutional structures—are in place and functioning during the First Increment of the Program.

- (11) **Integrated Monitoring and Research Plan (IMRP):** A systematic program of monitoring and research will be used to track and evaluate the effects of the activities implemented in the First Increment of the Program on the associated habitats and the response of the target species to those effects. The IMRP is designed to provide information useful in habitat management and evaluation consistent with the overall Adaptive Management approach.

(12) **Cost Sharing:** A cost-sharing framework will be used, with the Federal Government paying 50 percent of Program costs and the States sharing the other 50 percent. It is assumed that any action alternative is fully funded.

(13) **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 any others who might be affected by Program activities. All land management would be in accordance with a “Good Neighbor Policy” and related policies.

## Water Objectives

The water objective for the first, 13-year increment of a Program is to improve achievement of river flow targets by 130,000 to 150,000 acre-feet on an average annual basis through changes in the timing, magnitude, and duration of flows.

The Program seeks to increase the extent to which three types of flow targets are achieved, as described below.

### *Species Flows*

These 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. They are summarized in table E-4.

Table E-4.—Species Flows (cfs at Grand Island)

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 all others.

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### *Annual Pulse Flows*

In addition to recommending species flows for each period of the year, the Service recommends that pulse flows occur annually during natural periods of 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, measured at Grand Island. Over the long term, May through June, 30-day pulse flows would average 3,400 cfs. These flows serve multiple functions at different times of the year.

Currently, average riverflows fall short of these flow targets by more than 400,000 acre-feet per year. The water objective for the first, 13-year increment of a Program is to improve river flow targets by 130,000 to 150,000 acre-feet on an average annual basis through changes in the timing, magnitude, and duration of flows.

### *Short-duration High Flows Near Bankfull*

Investigations by the Bureau of Reclamation (Reclamation) have highlighted, in the Service’s opinion, the importance of high flows near bankfull in the Central Platte Habitat Area for maintaining and/or restoring channel conditions essential to the recovery of the three species.

As an adaptive management strategy to be tested during the First Increment, flows of approximately 3- to 5-days’ duration, with magnitudes approaching but not exceeding bankfull channel capacity in the habitat reach, are desired on an annual or near-annual basis to help scour vegetation encroaching on Program channel areas and to mobilize sand and build ephemeral sandbars to benefit the target species. Bankfull capacity in the Central Platte Habitat Area is greater than or equal to 10,000 cfs. Desired flows would be in the range of 6,000 to 9,000 cfs.

## **Land Objectives**

The land objective for all the action alternatives for the First Increment is to protect and restore 10,000 acres of habitat in the Central Platte area. The primary focus is to restore and maintain “habitat complexes,” which are blocks of habitat containing significant stretches of river channel and nearby wet meadows. The target characteristics for the complexes are displayed in table E-5.

Some lands would also be managed that are not habitat complexes. The target characteristics of “noncomplex” habitat are found in table E-6.

**Plans:** Land Management Plans would be developed to address management, restoration, or maintenance appropriate to a parcel of land acquired for the Governance Committee Alternative.

Table E-5.—Summary of Target Habitat Complex Guidelines From the Land Action Plan, Table 1 (Governance Committee Program Document)

<b>Riverine Habitat</b>	<b>Characteristics</b>
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 - 100 percent of channel area inundated during migration periods.
Water Velocity	During migration seasons, velocity should be less than 4 mph in shallow areas.
Sandbars/Channel Morphology	Non-permanent sandbars and low, non-permanent islands, high enough to provide dry sand during the tern/plover nesting season and free of vegetation that obstructs tern/plover and crane view.
Proximity to Wet Meadow	Within 2 miles, but contiguous is preferred.
Distance From Disturbance	<i>For whooping cranes:</i> In general, not less than 0.5-mile distant or appropriately screened from potential disturbances.  <i>For interior least tern/piping plover:</i> In general, not less than 0.25 mile distant, or appropriately protected from human disturbances.
Unobstructed View	Good 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.
<b>Wet Meadow Habitat</b>	<b>Characteristics</b>
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 - 12.5 percent of the growing season.
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 non-wetland 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.
<b>Buffer</b>	<b>Characteristics</b>
	That portion of a complex used to isolate channel areas and wet meadows from potential disturbances. In general, it is up to 0.5 mile wide.

Table E-6.—Summary of Noncomplex Habitat Guidelines From the Land Action Plan

<b>Sandpit Habitat for Interior Least Terns and Piping Plovers</b>	<b>Characteristics</b>
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 to avoid human disturbance to terns and plovers.
<b>Nonriparian Habitat for Whooping Cranes</b>	<b>Characteristics</b>
Location	Off-channel but within 3.5 miles of the centerline of the channel area, between Lexington and Chapman.
Type of Habitat	Wetland area, wet meadow area or both.
Wetlands	Depressional wetlands with semipermanent, permanent or seasonal shallow body(ies) of water.
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.

**Habitat Complexes:** Specific actions would be matched to land characteristics. In general, restoration would seek to increase the amount of available open channel habitat for roosting and nesting, the amount of wet meadow habitat for crane foraging, and the continuity of “buffer” lands around channel and wet meadow habitat to protect against disturbance.

**Noncomplex Habitat:** There are two types of nonriverine habitats related to noncomplex habitats; sandpit habitat for terns and plovers and nonriparian habitat for whooping cranes.

Management of sandpits may involve vegetation control through harrowing, disking, and pre-emergent herbicides. Vegetation management may also include hand-pulling of grasses and weeds and cutting of willow and cottonwood seedlings as needed. These vegetation management efforts are conducted around potential nesting areas on an annual basis to curtail vegetation encroachment.



Predator control can also be a significant issue on sandpits. Portable and permanent electric fencing has been used to discourage predators from entering nesting areas.

Nonriparian wetlands will be managed to assure protection of whooping cranes from human disturbance.

## GOVERNANCE COMMITTEE ALTERNATIVE

Many elements of the Governance Committee Alternative are defined. These aspects, such as the amount of water managed and the amount of land managed, are included in what is called the “core” description of the alternative. Some significant aspects of the alternative remain uncertain because a number of important management decisions will not be made until the Program is being implemented. Two scenarios were derived to bound the range of reasonably likely outcomes that could result from implementation of this alternative. Other scenarios are possible; however, the two scenarios presented would likely bound the scope and scale of actions that would be undertaken for this alternative, and thereby serve to cover the likely range of environmental effects for this programmatic analysis. These scenarios are described following the description of the core features.

### Water Elements

Several elements of the Governance Committee Alternative provide and/or manage water to improve flows to and through the Central Platte Habitat Area. Table E-7 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.

The water elements implemented during the First Increment of the Governance Committee Alternative would improve achievement of the Service’s species and annual pulse flows by approximately 142,000 acre-feet per year in an average year.

#### *Three State Projects*

Colorado, Nebraska, and Wyoming each provide a water project to the Governance Committee Alternative.

- % **Wyoming—Pathfinder Reservoir Environmental Account:** The Pathfinder Modification Project would restore the capacity of the existing Pathfinder Reservoir by approximately 54,000 acre-feet to recapture storage space lost to sediment. The modification would raise the elevation of the existing spillway by approximately 2.4 feet. Approximately 34,000 acre-feet

Table E-7.—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 (Average Acre-feet Per Year)
State Projects	
Total for these elements Lake McConaughy EA Pathfinder Modification Project Tamarack Project Phase I	80,000
Water Action Plan Conservation/Supply Activities	
Total for these elements Nebraska <ol style="list-style-type: none"> <li>1. Offstream reservoir in the Central Platte</li> <li>2. Water leasing</li> <li>3. Water Management Incentives</li> <li>4. Groundwater Management in the Central Platte Groundwater Mound Area</li> <li>5. Dry Creek/Fort Kearney Cutoffs</li> <li>6. Dawson &amp; Gothenburg Canal Groundwater Recharge</li> <li>7. Central Platte Power Interference (change in timing of releases to generate power)</li> <li>8. Net Controllable Conserved Water</li> </ol>	*62,000
Wyoming <ol style="list-style-type: none"> <li>1. Pathfinder Wyoming Account</li> <li>2. Glendo Reservoir Storage</li> <li>3. Water Leasing</li> <li>4. La Prele Reservoir leasing</li> </ol>	
Colorado <ol style="list-style-type: none"> <li>1. Tamarack Phase III</li> </ol>	
Total	142,000

\* 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.

of the proposed 54,000-acre-foot modification would be accounted for in an EA and operated for the benefit of the endangered species and habitat in central Nebraska.

% **Colorado—Tamarack Project, Phase I:** Colorado’s proposed Tamarack Project, Phase I, involves diversion of water during periods when flows at Grand Island, Nebraska, are in excess to flow targets and when available under the South Platte River Compact. The water is

diverted to small storage/recharge ponds and then infiltrates into the surrounding alluvial aquifer and returns to the river during periods of shortage to species and annual pulse flow targets. Water that has been recharged and returns to the river at times of shortage to flow targets can then offset target flow shortages.

- % **Nebraska—Lake McConaughy Environmental Account:** Nebraska’s project, an EA in Lake McConaughy, is already in operation as part of the FERC license requirements currently in effect for CNPPID and NPPD projects. Implementation of this or the other action alternatives would increase the volume of water stored in and managed from the EA. Under this alternative, the EA would receive 10 percent of the storable inflows to Lake McConaughy during the months of October through April, up to a maximum of 100,000 acre-feet (100 kaf) in any one year. The amount in the account also would be set at 100 kaf anytime Lake McConaughy fills. Water not released from the EA in one year carries over to the next year as long as the total capacity limit of 200,000 acre-feet is not exceeded. Within certain limitations, the EA manager (an employee of the Service) determines when water is to be released from that account. Waters released from the Pathfinder Reservoir EA, plus the retimed flows from the Tamarack Project that can be exchanged for Lake McConaughy storage, and contributions from elements of the Water Action Plan, can also be stored in Lake McConaughy, subject to certain limits. Those waters would also be released at times that would improve achievement of target flows for the species.

Together, these three State projects increase achievement of target flows by roughly 80,000 acre-feet on an average annual basis. Details of the operation of the three State Projects can be found in the Governance Committee Program Document.

#### Water Action Plan

The Governance Committee Alternative includes a Water Action Plan that contains thirteen water supply and conservation projects and activities to supply an additional average of 50,000 to 70,000 acre-feet per year of improvement toward meeting target flows. As summarized in table E-7, the thirteen presently-identified conservation and water supply projects are expected to yield 62,000 acre-feet improvement toward target flows. Below are described, by State, the individual projects and how they were analyzed for the DEIS.

#### Nebraska Water Supply and Conservation Projects

Projects in Nebraska identified under the Water Action Plan are described below.

**Offstream Reservoir in the Central Platte.**—The Water Action Plan identified six possible sites for offstream storage reservoirs in the Brady to Lexington reach of the Platte River. For the purpose of the analysis, the DEIS has utilized a reservoir located near the Johnson-2 (J-2) Return Channel, with a storage

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capacity of 1,718 acre-feet. The capacity is one-half of the capacity presented in the Water Action Plan in order to simulate the yield to the Program from this project. The reservoir would store excess flows from CNPPID's canal to be released back to the river at times advantageous to the species. The project is expected to yield about 6,300 acre-feet per year of improvements to target flows for the Program. The State of Nebraska has reserved approximately one-half of the yield from this project to offset future depletions.

**Water Leasing in Nebraska.**—Under this activity, willing farmers would have the opportunity to lease some of their water rights to the Program. Of the water leased to the Program, only the portion that would have been consumed through irrigation of crops would be allocated to the Program for management. The Water Action Plan includes 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 7,000-acre-foot-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. Conservation measures could include conservation cropping, deficit irrigation, land fallowing, or improving irrigation technology. Only the avoided consumptive use of water would be available to the Program for management. The expected yield, through a combination of these measures, is an average improvement toward target flows of 7,000 acre-feet on an average annual basis.

**Groundwater Management in the Central Platte Groundwater Mound.**—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 and may include:

- % Pumping water from the Mound (where it is judged to be too high or a nuisance) into creeks that drain back to the Platte River.
- % Paying willing farmers to dryland farm every other year and using their water supplies for Program purposes.
- % Paying willing farmers to use groundwater instead of their Lake McConaughy storage, which would be allocated to the Program.
- % Diverting excess water from CNPPID's canals in the fall and winter and recharging the groundwater mound, then pumping an equivalent amount from the mound during the following irrigation season. This would allow water normally released from Lake McConaughy in the

summer for irrigation to be managed by the Program without causing long-term declines in the groundwater table.

The goal for these options is to provide an average improvement toward target flows by 6,000 acre-feet on an average annual basis, of which 1,400 acre-feet per year would be allocated to the Program; the remainder is reserved by the State of Nebraska to offset future depletions to the Platte.

**Dry Creek/Fort Kearney Cutoffs.**—The Dry Creek/Fort Kearney Cutoffs consist of two options. The first option, just south of Kearney, involves a “cutoff” (creating a small drainage channel) from Lost Creek to North Dry Creek, and the second option involves a cutoff from Lost Creek to the Fort Kearney Improvement Project Area. The two options could return existing flows in Lost Creek or releases from the Funk Lagoon to the Platte River, providing an estimated annual average of 2,200 acre-feet per year of water to the Platte River habitat area (based on yield tables in the Water Action Plan).

**Dawson and Gothenburg Canal Groundwater Recharge.**—The Gothenburg and Dawson canals divert water from the Central Platte River just upstream of the 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. Much like the Tamarack Project, 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 14,000 and 19,000 acre-feet 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.**—Year-round releases are made from Lake McConaughy that generate hydropower at the Kingsley Dam hydropower plant and at the CNPPID and NPPD canal powerplants. Waters not diverted to irrigation return to the Platte River above the habitat area. Under the Central Platte Power Interference element, 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.**—CNPPID has undertaken various conservation measures to reduce its total diversions from the Platte River, based on an agreement with the National Wildlife Federation. These measures have included:

- % Revised operations for Elwood Reservoir to minimize seepage.
- % Installed pipelines, earth compaction, membrane lining, and related canal improvements.
- % On-farm irrigation system improvements, such as installation of center pivots, gated pipe, flowmeters, and surge valves, and management improvements such as changes in irrigation scheduling, adjustments to irrigation set times, and alternate flow irrigation.

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The current estimate is that these measures have resulted in an average of 5,000 acre-feet per year of target flow shortage reduction that could be made available to the Program.

#### Wyoming Water Supply and Conservation Projects

Projects in Wyoming identified under the Water Action Plan are described below.

**Pathfinder Modification Project, Wyoming Account.**—The Pathfinder Modification Project would restore the original storage capacity of the reservoir by raising the spillway crest. This would yield an additional 20,000 acre-feet of storage space (over current conditions) for a State of Wyoming municipal water supply account with a firm annual water yield of 9,600 acre-feet per year. Because the current demand for additional municipal water is less than 9,600 acre-feet per year, a portion of the balance of the annual firm yield may be used by Wyoming for release for endangered species as part of the Program. Wyoming could annually lease the unneeded portion to the Program (an estimated average of 4,800 acre-feet per year for the First Increment of the Program) when the water is not needed to meet municipal demands.

**Glendo Reservoir Storage.**—Glendo Dam and Reservoir are located on the North Platte River about 4-1/2 miles southeast of the town of Glendo, 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 First Increment of the Program) when the water is not needed to meet long-term contracts or other obligations in Wyoming.

**Water Leasing.**—The members of irrigation districts or individual farmers willing to participate in temporary water leasing as part of the Program are not known. An incentive program would be established for willing Wyoming irrigators to make temporary leases of their water to the Program. The goal would be to lease approximately 16,500 acre-feet of water per year. The Program would obtain control of the amount corresponding to consumptive use of this water, or approximately 8,200 acre-feet, and the remaining portion would be released to maintain return flows. The shortage reduction at the habitat area would be about 3,900 acre-feet on an average annual basis.

**La Prele Reservoir Water Leasing.**—La Prele is an existing irrigation and industrial supply reservoir in Wyoming located on La Prele Creek, approximately 13 miles upstream of the confluence with the North Platte River. Under La Prele leasing, the Panhandle Eastern Pipeline Company, which holds right to 5,000 acre-feet 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.

#### Colorado Water Supply and Conservation Projects

Projects in Colorado identified under the Water Action Plan are described below.

**Tamarack Project, Phase III.**—Colorado proposes to provide an estimated average of 17,000 acre-feet of water per year to the Governance Committee Alternative via an expanded Tamarack Project, involving a mix of several projects. The potential projects include groundwater recharge management on public and private lands and acquisition of water previously developed by private individuals and ditch and reservoir companies from approximately Ft. Morgan, Colorado, to the Nebraska State line. Most activities would likely occur within a few miles of the South Platte River.

#### Program Releases and Flows

This section describes how the Governance Committee Alternative would manage Program water to improve habitat flows.

**Pathfinder Environmental Account Water.**—Program water stored in Pathfinder Reservoir typically would be released to flow downstream to Lake McConaughy in Nebraska from April through September to be stored in Lake McConaughy as part of its EA.

**Tamarack Water.**—Water that has been retimed through the Tamarack Project would flow downstream and be protected from consumptive use to the habitat area. While details of an exchange arrangement remain to be approved, Tamarack waters may be used to replace water deliveries from Lake McConaughy, and thereby be exchanged into the Lake McConaughy EA.

**Lake McConaughy Environmental Account Management.**—The Program Agreement and CNPPID's FERC license require that all releases made from the EA to augment streamflows would be in amounts low enough to keep the riverflows below flood stage (as determined by the National Weather Service) and within the existing capacity of the river.

#### Depletion Management Plans

In addition to the water elements that improve achievement of target flows, the Program seeks to ensure that other water-related actions do not reduce achievement of target flows. State and the Federal agencies are, therefore, developing plans to mitigate or avoid any future depletions that increase shortages to the species and annual pulse flow targets or otherwise undermine Program flow improvements. The DEIS analysis assumes that these plans are implemented as part of any Program and are effective in protecting Program target flow benefits.

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### Program Benefits for the Pallid Sturgeon

One of the Governance Committee Alternative's long-term goals is “. . . testing the assumption that managing flow in the Central Platte River also improves the pallid sturgeon's Lower Platte River habitat.”

A “Plan for Testing the Ability of the Program to Affect Lower Platte River Flows” was approved by the Governance Committee on March 4, 2002. The results of the study indicate that anticipated Program actions would result in only small changes to these flow parameters in the Lower Platte and, therefore, provide marginal benefits to the pallid sturgeon. As an alternative to relying on monitoring relatively small flow effects and the response of the pallid sturgeon to those small effects, the parties have chosen to direct funds toward research activities. This research and monitoring has been incorporated into the IMRP.

### **Land Elements**

The land objective for the First Increment of the Governance Committee Alternative 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 (including Cottonwood Ranch and the Wyoming property).

While the “best case” for acquiring habitat land for a habitat complex is a single parcel of land of the size and with the characteristics described in table E-5, land ownership patterns in the Central Platte River area suggest that habitat complexes would need to be formed from lands acquired through multiple transactions over time. During the First Increment of the Program, the Program may acquire land for one or more complexes that it intends to augment during subsequent increments. The Governance Committee has the flexibility and responsibility to exercise its judgment in choosing among the parcels actually available to best implement the First Increment of the Program within practical constraints.

### **Governance Committee Alternative, Scenario 1 (Land Protection Emphasis and Current Water Transport Capacity)**

This scenario illustrates the results of possible choices regarding implementation of the Governance Committee Alternative. This scenario is used in the DEIS to illustrate one end of a range of possible outcomes for this Alternative.

**Location of Program Lands:** This scenario focuses Program land interests in the downstream section of the habitat area (mostly below Kearney, Nebraska), where most of the best habitat for the target bird species remains. While the exact location of Program lands would be determined by which landowners wish to participate, this scenario illustrates the environmental effects of this general approach to land management for the Program.



**Extent of Land Restoration:** Because the lands that are managed in this scenario more closely approximate the characteristics of habitat complexes in table E-5, relatively less restoration is undertaken. Also, restoration of channel habitat is limited to clearing vegetation from islands and banks. No leveling of islands or moving island sand back into the river channel is undertaken.

**Program Capacity to Move Water:** For this scenario, no additional actions are taken to increase the safe channel capacity of the North Platte River at North Platte. Channel capacity remains at its current capacity of 1,980 cfs.

No additional measures or structures are added to the three State Projects or the Water Action Plan to increase the Program capacity to create short-duration high flows near bankfull in the habitat area.

Table E-8 shows the acres of land managed under this scenario for various reaches of the river. For example, the table shows that the majority of managed lands are below Kearney, where most of the remaining good habitat for the target bird species remains. Again, while the exact location of lands managed by a Program will be determined by the specific landowners who choose to participate, this scenario illustrates an emphasis on acquiring interest in lands primarily where good habitat remains.

Under this scenario the Program manages approximately 9,200 acres of land for the purpose of establishing habitat complexes and approximately 800 acres of non-habitat complex land.

**Table E-9** shows how this land management scenario modifies various types of land cover types as restoration is undertaken. In this scenario, land acquisition and management are focused below Kearney on lands which are some of the best remaining unprotected habitat lands. Restoration efforts focus on improving lands to approximate the habitat characteristics in table E-3. In this scenario, then, most restoration work outside of the channel involves removing trees and shrubs and other activities needed to restore wet meadows. Table E-9 shows the conversion of 1,232 acres of wooded land to wet meadows. The largest change in land use is the conversion of 1,786 acres of agricultural land to wet meadows.

In the river channel, 29 acres of vegetated islands are cleared of vegetation to create potential roost and nest sites for the target bird species.

The 800 acres of noncomplex habitat lands will be managed for tern and plover nesting (sandpits) and for whooping crane roosting and foraging (nonriparian wetlands).

Table E-8.—Illustrative Distribution of Land Plan Acreage by River Segment,\* Governance Committee Alternative, Scenario 1 (Land Protection Emphasis and Current Water Transport Capacity)

<b>River Reach</b>	<b>Acreage</b>
Lexington to Johnson-2	24
Johnson-2 to Overton	4
Overton to Elm Creek	<sup>20</sup> 2,554
Elm Creek to Odessa	57
Odessa to Kearney	59
Kearney to Minden	1,574
Minden to Gibbon	75
Gibbon to Shelton	1,095
Shelton to Wood River	711
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	1,603
Phillips to Chapman	2,044
<b>Total</b>	<b>**10,090</b>

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

\*\*The objective for the First Increment of the Program is 10,000 acres. For the programmatic analysis, the total land area has not been forced to exactly equal 10,000 acres.

<sup>20</sup>NPPD's Cottonwood Ranch property, proposed for inclusion in the Governance Committee Alternative, is 2,650 acres. The acreage for this parcel used in the DEIS programmatic analysis is 2,554 acres, as calculated using the GIS system.

Table E-9.—Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Governance Committee Alternative, Scenario 1

Restoration Activities	Change in Cover Type	Acres	Subtotal
To wet meadow	Wooded to wet meadow	1,243	
	Herbaceous to wet meadow	224	
	Agriculture to wet meadow	1,786	
	Shrubs to wet meadow	348	
	Grasses to wet meadow	94	
	Emergents to wet meadow	8	3,703
To bare sand	Wooded to bare sand	21	
	Shrubs to bare sand	4	
	Herbaceous to bare sand	4	29
Restored lands		3,732	3,732
Unmodified lands		5,557	5,557
Total noncomplex habitat		801	801
<b>Totals</b>		<b>10,090</b>	<b>*10,090</b>

\*The objective for the First Increment of the Program is 10,000 acres. For the programmatic analysis, the total land area has not been forced to exactly equal 10,000 acres.

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**Governance Committee Alternative, Scenario 2  
(Land Restoration Emphasis, Increased Water Transport Capacity)**

In this scenario, an emphasis is placed on managing lands in the upstream reach of the habitat area, on restoration of habitat lands, on increasing channel capacity at North Platte, and increasing the Program's ability to create short-term high flows near bankfull capacity in the habitat reach. This scenario illustrates the upper range of likely outcomes and environmental impacts for the Governance Committee Alternative, in terms of the extent of land restoration, channel restoration, moving island sand back into the channel, and impacts on the flows in the habitat area.

**Location of Program Lands:** This scenario focuses Program land interests in the upstream section of the habitat area (mostly above Kearney, Nebraska), where little suitable habitat remains.

**Extent of Habitat Restoration:** Because the majority of lands that are managed in this scenario do not meet most of the characteristics of habitat complexes in table E-5, relatively more restoration is undertaken. Restoration of channel habitat includes both clearing vegetation from islands and banks and lowering the elevation of cleared islands to improve open view in the channel and to return island sand back to the river. Sand from these islands is moved back into the river channel to help offset the downcutting of the river in the habitat reach (see figures E-10 and E-11).

#### **Methods for Increasing Open View and Offsetting Erosion in the Channel**

Changes primarily in riverflow and sediment supply in the Central Platte Habitat Area have led to a significant loss of areas of wide channel with unobstructed view for nesting or roosting target bird species. Currently, many areas of the historic river channel, especially above Kearney, have become filled with wooded islands. The resulting multiple river channels are narrow, and sight distance is limited within the channels. Many of the wooded islands are 3 to 4 feet above the average water surface. Erosion and downcutting of the river continue in the Central Platte Habitat Area, which narrows the channel further.

Restoration measures have been proposed to increase the extent of open view and sight distance in channels with many wooded islands, and to begin offsetting the downcutting of the channel bed. Among the measures that have been proposed are clearing trees and vegetation from wooded islands, and then lowering the height of the islands to an elevation that would be regularly overtopped by flows within the riverbanks. These measures would increase the unobstructed sight distance across and down the channel.

The wooded islands currently in the river channel are former sections of riverbed that have become vegetated as the river has incised around them. Lowering these islands will move river sand back into the incised river channel, helping to offset erosion caused by clear water return flows from canals. It is anticipated that the additional supply of sand to the river will also encourage formation of additional sandbars for roosting and nesting.

The Governance Committee Alternative proposes to test and study these and other methods to increase unobstructed view and offset downcutting in the channel. The IMRP describes a series of investigations and field tests that would be undertaken in the first years of a Program. Methods which prove effective and without adverse consequences would be applied at an increasing scale during the First Increment of the Program.

For the DEIS analysis, the Governance Committee Alternative, Scenario 1, assumes that these methods do not prove out and are not implemented during the First Increment of the Program. For Governance Committee Alternative, Scenario 2 (and the remaining action alternatives), it is assumed that these methods prove out and are implemented at a scale of roughly 50 acres of wooded islands cleared and leveled each year over the last 10 years of the First Increment of the Program (Governance Committee Program Document, IMRP).

Figure E-10.—Methods for increasing open view and offsetting erosion in the channel.

Figure E-11 shows how a cross-section of the river channel at Cottonwood Ranch is modified under this scenario to improve channel width and open view. It illustrates the result of clearing vegetation from a high wooded island in the channel and lowering the island closer to the average water surface. Under the Program IMRP, this process would be accomplished in phases over several years. Initial efforts would be small in scale, with monitoring of progress and effects, as described in detail in the IMRP. In this scenario, approximately 500 acres of wooded islands on Program lands are cleared and lowered by the end of the First Increment of the Program.

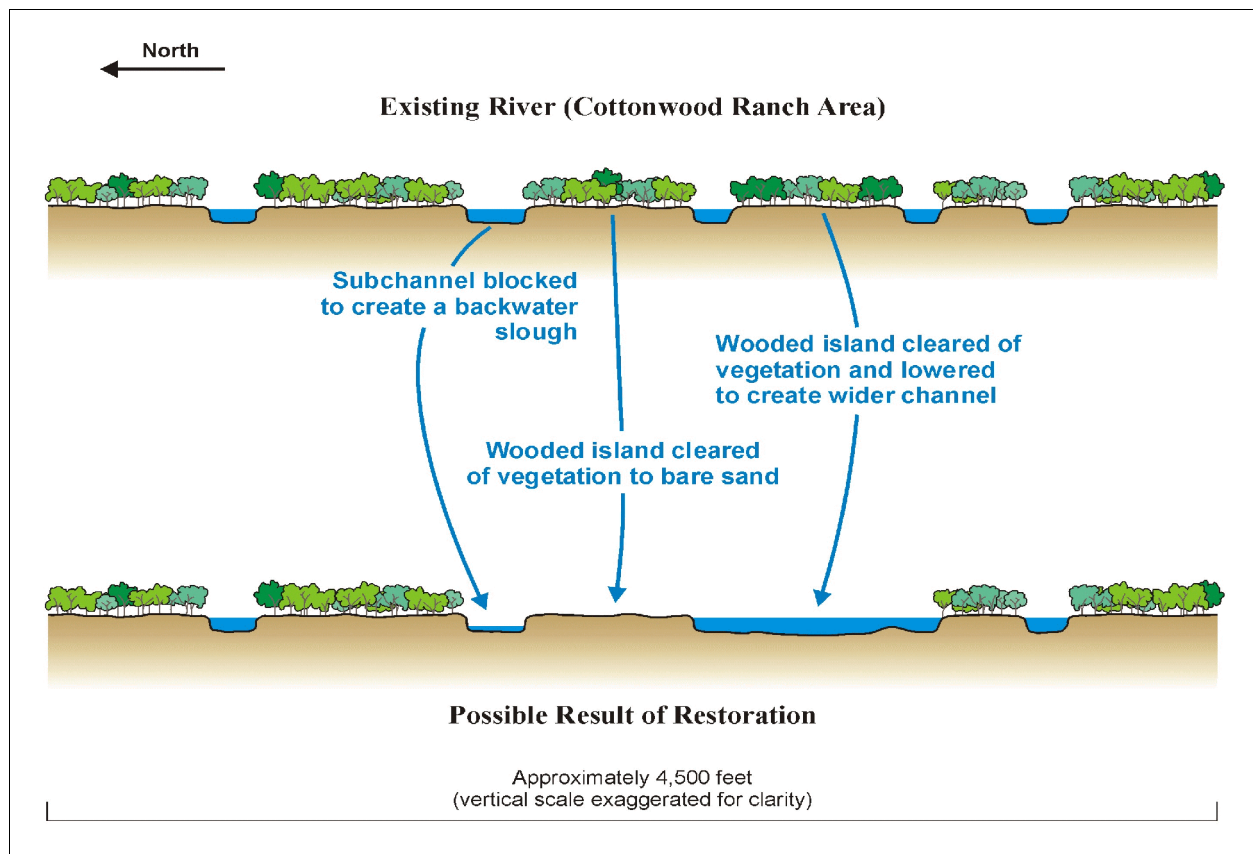


Figure E-11.—Cross-section of the river on Cottonwood Ranch illustrating the types of channel restoration activities described in this scenario.

Program Capacity to Move Water—For this scenario:

- % The safe channel capacity of the North Platte River at North Platte is increased to 3,000 cfs. Options being considered by the Governance Committee are shown in figure E-12.
- % To reduce conflicts between EA water releases and irrigation waters moving through this reach in the summer, the Program's water leasing in Nebraska and water management incentives are focused downstream of North Platte so as to reduce peak irrigation demand by 500 cfs.
- % The Program capacity to create short-duration high flows near bankfull in the habitat area is increased by using various facilities in the CNPPID and NPPD system (Lake Mahoney, Johnson Lake, and Plum Creek Lake) to store and release a 2-day pulse from the Jeffrey and J-2 Return Channels. Options for accomplishing this are described in figure E-13.

Figure E-14 shows the present median riverflows at Grand Island. It also shows the species and annual pulse flow targets, and how flows might be managed under the Governance Committee Alternative, Scenario 2, to move toward those targets.

**Options for Increasing the Program's Capacity to Move Water to the Habitat Area**

The Governance Committee Program Document describes approaches to restoring the safe channel capacity that may be explored by the Program.

“The decreased carrying capacity, as determined by the National Weather Service, may be the result of various factors, including the growth of phragmites, blockage of artificial and natural drains, and the increase in size of sandbars in the River. The following are example actions from the IMRP and Water Action Plan that the Program may implement to improve the ability to deliver Program water. However, similar to the actions in the Water Action Plan, these actions have not been analyzed in sufficient detail to determine if they are feasible or will work; therefore, the Governance Committee will use adaptive management to deal with situations where these actions are not feasible or not effective in improving the ability to deliver Program water.

1. Existing North Platte Channel—enhance ability to move Program water.
  - a. Protect properties (flood proof by means of berms)
  - b. Divert water from properties (restore north diversion channel)
  - c. Manage/eliminate vegetation/overbank obstructions (phragmites, beaver dams, rock structures, crossings, etc.)
  - d. Restore downstream outlet
  - e. Create berms in main channel to increase flow velocity and mobilize bed
  - f. Dredging
  - g. Buy out property owners in flood plain
2. Existing System Facilities—increase flexibility of operations to deliver Program water.
  - a. NPPD system
  - b. Central District system
3. Consider delivery problem in evaluating and implementing Program water projects.” (Governance Committee Program Document)

Figure E-12.—Options for increasing the Program's capacity to move water to the habitat area.



The EIS Team developed the following options for how a Program might create short-duration high flows in the Central Platte Habitat Area that approach bankfull for 2-3 days (approximately 6,000 - 8,000 cfs). Each of the following options assumes that the safe channel capacity of the North Platte River at North Platte has been restored to at least 3,000 cfs. These options involve changes in management of facilities operated by CNPPID and NPPD. Although the EIS Team believes that these options are feasible, the options have not received detailed technical review or approval by these entities. This summary does not address possible compensation for changes in operations.

**Pulse Option A: Sutherland Canal Requires Ramping (Spring pulse)**

Increase flows in the Sutherland Canal by 200 cfs per day to a maximum of 1,800 cfs on the first day of pulsing in the North Platte River channel. Assume that the pulse to the North Platte River from Lake McConaughy lasts for 3 days (the pulse would be coordinated very closely with downstream irrigation canal operators). Do not divert at Korty and do not store water in Sutherland Reservoir during the pulse. Store 1,100 af in Lake Mahoney and use the water to maintain the flow out of the Sutherland Return at 1,850 cfs for 3 days. Divert normally at Tri-County, but do not store water in Elwood Reservoir or divert water for irrigation during the 2 days of pulsing out of Johnson Lake. Instead, release water that would otherwise go to irrigation or to fill Elwood Reservoir from the Jeffrey Return (this water would be charged against the EA in Lake McConaughy). Store the water used to ramp up the flow in the Sutherland Canal, 2,500 af in Johnson Lake, and 1,000 af in the J2 forebay (Plum Creek). Release the storage in Johnson Lake and Plum Creek at a rate such that 2,000 cfs passes through the J1 and J2 hydroplants for 2 days. Match Sutherland Return, Jeffrey Return, and J2 Returns to coincide with pulses coming down the North Platte and Platte Rivers.

**Pulse Option B: Sutherland Canal Diversion at or Near 1,850 cfs (Spring pulse)**

This option is the same as Option 1, except there is no ramping of the Sutherland Canal and thus no need to store water in Lake Mahoney. This option is likely to occur if EA releases are already occurring in the spring to meet 7-to-30 day pulse flow targets.

Assume that the pulse to the North Platte River from Lake McConaughy lasts for 3 days (the pulse would be coordinated very closely with downstream irrigation canal operators). Do not divert at Korty and do not store water in Sutherland Reservoir during the pulse. Maintain the flow out of the Sutherland Return at 1,850 cfs for 3 days. Divert normally at Tri-County, but do not store water in Elwood Reservoir or divert water for irrigation during the 2 days of pulsing out of Johnson Lake. Instead, release water that would otherwise go to irrigation or to fill Elwood Reservoir from the Jeffrey Return (this water would be charged against the EA in Lake McConaughy). Store 2,500 af in Johnson Lake and 1,000 af in the J2 forebay. Release the storage in Johnson Lake and Plum Creek at a rate such that 2,000 cfs passes through the J1 and J2 hydroplants for 2 days. Match Sutherland return, Jeffrey Return, and J2 Returns to coincide with pulses coming down the North Platte and Platte Rivers.

**Pulse Option C: Pulse in Late August or Early September**

Instead of pulsing in May, try for a pulse in August or September, after the terns and plovers have left the nest. Wait for a rain event in the McConaughy-Cozad reach. Then, instead of reducing the Sutherland Return and the J2 Return, release the maximum amount possible. Irrigation canals do not divert for 3 days. This avoids or minimizes the problems of ramping in the Sutherland Canal, because the Canal and the North Platte River are already at capacity.

Figure E-13.--Potential Methods for Increasing Program Capacity to Create Short-Duration High Flows Near Bank-full in the Central Platte Habitat Area  
(Incorporated in Governance Committee Alternative (Scenario 2) and the Other Action Alternatives)



Figure E-14.-- Present Conditions median riverflows at Grand Island, and flows under the Governance Committee Alternative Scenario 2 compared to Service Species and Annual Pulse Flow targets.

Table E-10 shows the acres of land managed under this scenario for various reaches of the river. For example, the table shows that the majority of managed lands are above Kearney, where little good habitat for the target bird species remains.

Table E-11 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 E-5, Governance Committee Alternative, Scenario 2 converts roughly 500 acres of wooded 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 E-10.—Illustrative Distribution of Land Plan Acreage by River Segment,\* Governance Committee Alternative, Scenario 2 (Land Restoration Emphasis, Increased Water Transport Capacity)

<b>River Reach</b>	<b>Acreage</b>
Lexington to Johnson-2	24
Johnson-2 to Overton	4
Overton to Elm Creek	**2,554
Elm Creek to Odessa	1,607
Odessa to Kearney	1,074
Kearney to Minden	1,574
Minden to Gibbon	75
Gibbon to Shelton	1,095
Shelton to Wood River	116
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	1,603
Phillips to Chapman	13
<b>Total</b>	<b>***10,030</b>

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

\*\*The contribution to the Program land habitat plan from Cottonwood Ranch is credited at 2,650 acres. 2,554 is the acreage calculated with the EIS Teams Geographic Information System for purposes of the programmatic EIS analysis.

\*\*\*The objective for the First Increment of the Program is 10,000 acres. For the programmatic analysis, the total land area has not been forced to exactly equal 10,000 acres.

Table E-11.—Summary Table of Estimated Land Cover Changes for All  
Land Parcels Managed in the Governance Committee Alternative, Scenario 2

Restoration Activities	Change in Cover Type	Acres	Subtotal
To lowland grasses	Wooded to lowland grasses	1,698	
	Herbaceous to lowland grasses	247	
	Agriculture to lowland grasses	2,097	
	Shrubs to lowland grasses	292	
	Upland grasses to lowland grasses	101	
	Emergents to lowland grasses	12	4,447
To wetted channel	Wooded to wetted channel	252	
	Shrubs to wetted channel	207	
	Herbaceous to wetted channel	35	
	Bare sand to wetted channel	0	
	Lowland grasses to wetted channel	7	
	Emergents to wetted channel	0	497
To bare sand	Wooded to bare sand	12	
	Shrubs to bare sand	0	
	Herbaceous to bare sand	2	14
Restored lands		4,962	4,962
Unmodified lands		4,267	4,267
Total noncomplex habitat		801	801
<b>Totals</b>		<b>10,030</b>	<b>*10,030</b>

\*The objective for the First Increment of the Program is 10,000 acres. For the programmatic analysis, the total land area has not been forced to exactly equal 10,000 acres.

## **WATER LEASING ALTERNATIVE**

The Water Leasing Alternative was developed to emphasize nonstructural approaches to meeting the Program's flow goals. The water elements are shown in table E-11. This alternative uses the three State water projects. The remaining reduction in target flow shortages is accomplished by leasing water from willing participants in the three States. The Program would lease water from willing lessors sufficient to allow release of enough water to improve achievement of target flows by roughly 68,000 acre-feet per year.

The water elements for this alternative (table E-12) are the three State water re-regulation elements (Pathfinder EA; Tamarack Project, Phase I; and Lake McConaughy EA), plus water leasing in the three States.

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 and State policies. For the analysis, the amount of water assumed to be leased was divided among reservoirs or projects as follows to illustrate a range of possible effects (table E-13). In actual implementation, Program water leasing would likely be more widely distributed.

After accounting for conversion of stored water to consumptive use and for transit losses, this element would yield approximately 68,000 acre-feet per year of target flow improvement at the habitat.

Table E-12.—Average Annual Program Water (Acre-Feet Per Year)  
Contribution to Species' Target Flows Under the Water Leasing Alternative

Program Water Features and Elements	Projected Improvement Toward Target Flows (Acre-Feet Per Year)
<b>State Projects</b>	
Total for these elements: Lake McConaughy EA Pathfinder Dam Modification Tamarack Project, Phase I	80,000
<b>Additional Water Elements</b>	
Total for these elements: Colorado Water Leasing (approximately 60,000 to 70,000 acre-feet per year leased) Nebraska Water Leasing (approximately 60,000 to 70,000 acre-feet per year leased) Wyoming Water Leasing (approximately 60,000 to 70,000 acre-feet per year leased)	68,000
<b>Total</b>	<b>148,000</b>

Table E-13.—Illustrative Distribution of Water  
Leased to the Program Under the Water Leasing Alternative

	<b>Acre-Feet</b>
<b>Colorado</b>	
Jackson Lake	6,500
Empire Reservoir	5,200
Riverside Reservoir	11,900
Prewitt Reservoir	6,300
North Sterling Reservoir	13,600
Julesburg Reservoir	5,300
Fossil Creek Reservoir	2,000
Boyd Lake	9,200
<b>Nebraska</b>	
Lake McConaughy	60,000
<b>Wyoming (North Platte River Reservoirs)*</b>	
North Platte Project	58,200
Kendrick Project	8,000
Glendo Unit	1,000

\*A significant amount of the water in these Wyoming reservoirs serves agricultural lands in the panhandle of Nebraska.

## Land Elements

The Land Plan for this alternative is the same as for the Governance Committee Alternative, Scenario 2.

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## WET MEADOW ALTERNATIVE

This alternative focuses Program resources on increasing the amount of wet meadow habitat in the habitat area. The alternative shifts some resources from water supply and management to land management.

### Water Elements

This alternative uses the three State projects, plus a 100,000 acre-foot new water right for the Program in Glendo Reservoir.

- % Lake McConaughy EA: See Governance Committee Alternative.
- % Pathfinder Dam Modification: See Governance Committee Alternative.
- % Tamarack Project Phase I: See Governance Committee Alternative.
- % New Program 100,000-Acre-Foot 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 water right on that space. Currently, 300,000 acre-feet of the space in Glendo Reservoir is dedicated to the re-storage 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 38,000 acre-feet of reduction in target flow shortages at Grand Island.

### Land Elements

Land elements are discussed below and summarized in tables E-14 and E-15.

Table E-13 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, Scenario 2, but adds roughly 7,000 acres of additional wet meadow acquisition and/or restoration. Methods for restoration of wet meadows are described in the Platte River Endangered Species Partnership, *Habitat Management Methods for Least Terns, Piping Plovers, and Whooping Cranes*, 2000. Primary actions include removal of woody and herbaceous vegetation and regrading some areas to restore swales and sloughs.



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

<b>River Reach</b>	<b>Acreage</b>
Lexington to J-2	24
J-2 to Overton	4
Overton to Elm Creek	2,554
Elm Creek to Odessa	2,596
Odessa to Kearney	1,871
Kearney to Minden	2,568
Minden to Gibbon	1,256
Gibbon to Shelton	1,707
Shelton to Wood River	1,193
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	1603
Phillips to Chapman	1,186
<b>Total</b>	<b>16,854</b>

Table E-15.—Summary Table of Estimated Land Cover  
Changes for All Land Parcels Managed in the Wet Meadow Alternative

Restoration Activities	Change in Cover Type	Acres	Subtotal
To lowland grasses	Wooded to lowland grasses	3,037	
	Herbaceous to lowland grasses	400	
	Agriculture to lowland grasses	3,693	
	Shrubs to lowland grasses	461	
	Upland grasses to lowland grasses	118	
	Emergents to lowland grasses	21	7,730
To wetted channel	Wooded to wetted channel	252	
	Shrubs to wetted channel	203	
	Herbaceous to wetted channel	35	
	Bare sand to wetted channel	0	
	Lowland grasses to wetted channel	7	
	Emergents to wetted channel	0	497
To bare sand	Wooded to bare sand	12	
	Shrubs to bare sand	0	
	Herbaceous to bare sand	2	14
Restored lands		8,241	8,241
Unmodified lands		7,810	7,810
Total noncomplex habitat		801	801
<b>Totals</b>		<b>16,852</b>	<b>16,852</b>

## WATER EMPHASIS ALTERNATIVE

This alternative emphasizes acquisition of water for Program purposes, with fewer resources allocated to local habitat. This alternative reduces shortages to target flows at Grand Island by 185,000 acre-feet per year, on average, while its Land Plan manages only about 6,200 acres.

### Water Elements

Table E-16 shows the water elements for the Water Emphasis Alternative. This alternative improves achievement of target flows by 185,000 acre-feet.

Additional capacity to move Program water to the habitat is included, as under Governance Committee Alternative, Scenario 1.

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

Program Water Features and Elements	Projected Improvement Toward Target Flows (Acre-Feet Per Year)
<b>State Projects</b>	
Total for these elements: Lake McConaughy EA Pathfinder Dam Modification Tamarack Project, Phase I	80,000
<b>Additional Water Elements</b>	
Total for these elements: Colorado <ol style="list-style-type: none"> <li>1. Tamarack Project, Phase III</li> <li>2. Water leasing (60,000 to 70,000 acre-feet leased per year)</li> </ol> Nebraska <ol style="list-style-type: none"> <li>1. Central Platte hydropower re-regulation</li> <li>2. Water leasing (60,000 to 70,000 acre-feet leased per year)</li> <li>3. Groundwater management in the Central Platte groundwater mound</li> <li>4. Riverside drains</li> </ol> Wyoming <ol style="list-style-type: none"> <li>1. Glendo 100,000-acre-foot storage right</li> <li>2. Water leasing (60,000 to 70,000 acre-feet leased per year)</li> </ol>	105,000
<b>Total</b>	<b>185,000</b>

- 
- % **Lake McConaughy EA:** See Governance Committee Alternative.
  - % **Pathfinder Dam Modification:** See Governance Committee Alternative.
  - % **Tamarack Project Phase I:** See Governance Committee 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 exceed the Service's species and annual pulse flow 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 voluntary element involves installing agricultural drains in the Central Platte 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. 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 40,000 acre-feet per year, of which about 10,000 acre-feet 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 68,000 acre-feet 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 E-17).<sup>21</sup>

After accounting for conversion of stored water to consumptive use and for transit losses, this element would yield approximately 80,000 acre-feet per year of target flow improvement.

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

	Acre-Feet
<b>Colorado</b>	
Jackson Lake	6,500
Empire Reservoir	5,200
Riverside Reservoir	11,900
Prewitt Reservoir	6,300
North Sterling Reservoir	13,600
Julesburg Reservoir	5,300
Fossil Creek Reservoir	2,000
Boyd Lake	9,200
<b>Nebraska</b>	
Lake McConaughy	60,000
<b>Wyoming</b>	
North Platte Project	58,200
Kendrick Project	8,000
Glendo Unit	1,000

- % **Groundwater Mound:** 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.

<sup>21</sup>For the DEIS analysis, it is assumed that when water is leased by farmers to the Program, the Program will require that other sources of water not be used to replace the leased supply, in order to avoid any secondary impacts on groundwater and riverflows.

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.

- % **New Program 100,000-Acre-Foot Water Right in Glendo Reservoir:** The Program participants would file in Wyoming for a new water right and change of use for 100 kaf of the approximately 300,000-acre-foot storage space in Glendo Reservoir that currently is dedicated to the re-storage 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.
- % **Tamarack Plan Phase III:** Colorado proposes to provide an estimated average of 17,000 acre-feet per year to the Governance Committee Alternative via an expanded Tamarack Project, involving a mix of several projects. The potential projects include groundwater recharge management on public and private lands and acquisition of water previously developed by private individuals and ditch and reservoir companies from approximately Ft. Morgan, Colorado, to the Nebraska State line. Most activities would likely occur within a few miles of the South Platte River.
- % **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 April to September. For this alternative, the capacity to move water to the habitat and to create short-duration high flows near bankfull would be the same as that for the Governance Committee Alternative, Scenario 2.
- % **Tamarack Water:** Through procedures to be developed by the Governance Committee, waters that have been re-timed by the Tamarack Project may be exchanged for waters stored in Lake McConaughy, adding to the Lake McConaughy EA.
- % **McConaughy EA Management:** The water in the Lake McConaughy EA is stored and released under the direction of the Service.

## 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 Water Leasing Alternatives. As shown in table E-18, the plan involves 6,690 acres of land. Management of the parcels would be similar to that for the Governance Committee

Alternative, Scenario 2, but on a smaller scale.

- % **Land Management:** 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 E-18.— Illustrative Distribution of Program  
Lands, by River Reach, for the Water Emphasis Alternative

<b>River Reach</b>	<b>Acreage</b>
Lexington to J-2	24
J-2 to Overton	4
Overton to Elm Creek	2,611
Elm Creek to Odessa	57
Odessa to Kearney	59
Kearney to Minden	533
Minden to Gibbon	75
Gibbon to Shelton	25
Shelton to Wood River	2,956
Wood River to Alda	230
Alda to Doniphan	61
Doniphan to Phillips	42
Phillips to Chapman	13
<b>Total</b>	<b>6,690</b>

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

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

Restoration Activities		Acres	Subtotal
To lowland grasses	Wooded to lowland grasses	422	
	Herbaceous to lowland grasses	80	
	Agriculture to lowland grasses	247	
	Shrubs to lowland grasses	36	
	Upland grasses to lowland grasses	87	872
To wetted channel	Wooded to wetted channel	240	
	Shrubs to wetted channel	60	
	Herbaceous to wetted channel	11	
	Bare sand to wetted channel	6	
	Lowland grasses to wetted channel	0	317
To bare sand	Wooded to bare sand	58	
	Shrubs to bare sand	6	
	Herbaceous to bare sand	6	70
Restored lands		1,260	1,260
Unmodified lands		4,629	4,629
Total noncomplex habitat		801	801
<b>Totals</b>		<b>6,690</b>	<b>6,690</b>

## ELEMENTS CONSIDERED BUT REJECTED

During the public scoping process, many options were suggested by the public and by the EIS team to meet the purpose and need of the proposed Federal action. Most of these options focused on ways to improve Platte River flows or land habitat in central Nebraska. These options, or elements, were evaluated, and some were eliminated from further consideration. For example, options were eliminated from further consideration for the following reasons:

- % They did not address the habitat areas along the Platte River. Examples of such options include creating habitat in other states or cloning the species;
- % They were much more expensive than other options or exceeded the \$5,000 per af of yield criterion used for the screening analysis. An example of an option eliminated for this reason include building a pipeline around Kingsley Dam to transport sediment to the lower river;



- % They did not provide significant flow improvement at the Central Platte Habitat area . Options eliminated for this reason include increasing timber cutting or weather modification in the Platte River headwaters; or
- % They might adversely affect other endangered species, such as increasing transbasin diversions from the Colorado River to the Platte River Basin, which could affect other endangered species in the Colorado River Basin.

In all, dozens of options were evaluated for inclusion in the action alternatives. The complete *Screening Analysis* may be found at <[www.platteriver.org](http://www.platteriver.org)>.

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## **A**AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section summarizes the most significant projected environmental consequences for resources affected by the Program alternatives. The impacts of the Governance Committee (Scenarios 1 and 2), Water Emphasis, Wet Meadow, and Water Leasing Alternatives are compared to the Present Condition baseline. The quantitative summary of impacts is found in table E-2. More extensive analysis is found in the DEIS.

The discussion of each resource includes the following components:

- % Affected resources and scope of analysis
- % Indicators used to measure those impacts
- % Summary of impacts

Table E-20 lists the geographic markers that are used to describe locations in the Central Platte affected by Program actions.

### **WATER RESOURCES**

The Program alternatives involve several actions to manage water and move it to the Central Platte for benefit of the target species. These actions impact reservoir operations, reservoir storage, reservoir elevations, reservoir releases, flows through hydropower plants, streamflows, and irrigation deliveries throughout the Basin. These hydrologic changes then affect the species' habitat, as well as other resources such as hydroelectric power generation, reservoir fisheries and recreation, agricultural production and revenues and local economies, which are described in later sections.

#### **North Platte Basin**

##### *Affected Resources*

The potentially affected environment in the North Platte Basin consists of the river and reservoirs that might be affected by providing water for environmental deliveries, and the reservoirs, river and irrigated lands that might be affected by water leasing activities.

*Indicators*

- % Reservoir Storage in the North Platte System
- % Riverflows
- % Deliveries for Environmental Uses and for Irrigation

Note that impacts to all water resources are evaluated using a 48-year period of historic conditions to represent a range of hydrologic conditions.

*Effects of the Alternatives*

**Reservoir Storage.**—Compared to the Present Condition, average total storage in the North Platte River reservoir system would range from 3 percent less under the Water Leasing Alternative to 10 percent less under the Wet Meadow and Water Emphasis Alternatives due to environmental water deliveries. 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.

**Flows.**—When compared to the Present Condition, flow in the North Platte River would be reduced in the winter (by up to 12 %) and more in the summer (by up to 16%) under the action alternatives. Under the Present Condition, flows below Kortes and Gray Reef Reservoirs are maintained above 500 cfs to preserve fisheries; however, flows would fall below 500 cfs in one or two years below Kortes and one to three years below Gray Reef under the action alternatives, during the 48-year period.

**Irrigation Deliveries.**—Irrigation deliveries are affected in two ways: (1) leasing of water to the Program by farmers or districts reduces water deliveries to those water users, and (2) 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 increase the number of years where irrigation deliveries fall below either historic deliveries, or do not meet a full irrigation demand, by up to an additional 5 years for the Kendrick Project (out of the 48-year period of record).

**Effects of the Program on Water Use Above Pathfinder Reservoir.**—The action alternatives can only affect water users above Pathfinder Reservoir in Wyoming during times of increased water right administration for Pathfinder's 1904 right. Other affects of action alternatives associated with irrigation shortages or reduced spills from Guernsey Reservoir from water being made available for environmental use are borne by downstream water users.

Water users above Pathfinder Reservoir are affected when water right administration occurs for Pathfinder's 1904 right. Senior rights are limited to a diversion of 1 cfs per 70 acres and junior rights are

administered to prevent diversion. 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 7 months for the study period compared to the Present Condition. The Governance Committee and Water Leasing alternatives increase the number of months with water right administration by 3 months and 2 months, respectively, for the study period.

Information needed to determine the number of water rights junior to Pathfinder's 1904 right that would be prevented from diverting and information needed to determine the number of senior water rights that would be administered to diversions of 1 cfs per 70 acres is not readily available. This lack of information makes a meaningful quantification of the effects identified above difficult. Therefore, this DEIS does not quantify the changes in diversions and water use that might result in the North Platte Basin in Wyoming, above Pathfinder Reservoir.

Table E-20.—Geographic Markers for the Central Platte River

Bridge Segment	River Mile	Cities/Bridge	Protected Lands	Bridge/Highway Name	Gauge	Sed/Veg Transect
1	154	Chapman		HWY 34/ Hamilton County	Grand Island (RM 168)	17 (RM162.2)
	168	Grand Island				
2	168	Grand Island		HWY 280		16 (RM 170.3)
	175	Doniphan				
3	175	Doniphan	Crane Trust			15 (RM 178.4)
	182	Alda				
4	182	Alda		HWY 11		14 (RM 183.2)
	187	Wood River				
5	187	Wood River	Crane Trust/TNC			13 (RM 189.3)
	196	Shelton				
6	196	Shelton				12 (RM 199.5)
	202	Gibbon				
7	202	Gibbon	Audubon Rowe Sanctuary	HWY 10	Kearney (RM 215)	11 (RM 203.3)
	208	Minden				
8	208	Minden	State of Wyoming Property	HWY 44		10 (RM 209.8)
	215	Kearney				
9	215	Kearney				9 (RM 219.8)
	224	Odessa				
10	224	Odessa	Crane Trust	HWY 183		8 (RM 228.7)
	231	Elm Creek				
11	231	Elm Creek	Cottonwood Ranch		Overton (RM 240)	7 (RM 237.5)
	239	Overton				
12	239 247	Overton				6 (RM 244.0)
13	247 255	Lexington		HWY 283	J-2 (RM 249)	5 (RM 250.5)
Keystone Diversion Dam						
CNPPID Diversion Dam (also known as the Tri-County Diversion Dam)	310	North Platte			North Platte	3 (RM 310)
Johnson 2 Return Canal (J-2 Return)	246	Lexington			J-2	6 (RM 244)

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## South Platte Basin

### *Affected Resources*

The potentially affected environment in the South Platte Basin consists of the river, riverine and upland areas within a few miles of the river that might be affected by groundwater recharge projects, and the reservoirs, river and irrigated lands, mostly below Greeley, Colorado, that might be affected by water leasing activities.

### *Indicators*

- % Reservoir Storage in the South Platte System
- % Riverflows
- % Deliveries for Environmental Uses and for Irrigation

### *Effects of the Alternatives*

**Reservoir Storage.**—Compared to the Present Condition, storage in South Platte Basin reservoirs would not change under the Governance Committee<sup>22</sup> and Wet Meadow Alternatives. Under the 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.

**Flows.**—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 Water Leasing and Water Emphasis Alternatives, due to water leasing for Program purposes from off-channel reservoirs above or along this reach. Estimated average increases in flow at Fort Morgan are 142 cfs in May and 1 cfs in June. 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, 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, Water Leasing, and Wet Meadow Alternatives. Estimated average reductions in flow at Julesburg, Colorado, for each of these 4 months range from 1,812 to 7,782 acre-feet, depending upon the alternative and the month. Estimated average increases in flow for the remaining months of the

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<sup>22</sup>In the North and South Platte River Basins, there is no difference between the two Governance Committee Alternative scenarios.

year range from 67 to 4,982 acre-feet per month. The same is true for the Water Emphasis 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 Water Leasing and Water Emphasis Alternatives, leasing of water for Program purposes would, on average, reduce deliveries of water to lower South Platte irrigators in Colorado by about 39,300 acre-feet per year.

## Central Platte Basin

### *Affected Resources*

The potentially affected environment in the Central Platte Basin consists of the river and reservoirs that might be affected by providing water for environmental deliveries, and the reservoirs, river and irrigated lands that might be affected by water leasing activities.

### *Indicators*

- % Lake McConaughy end-of-month storage
- % Lake McConaughy end-of-month reservoir water elevation
- % Years with storage below 500 kaf
- % Largest May through August drawdown
- % Spills

### *Effects of the Alternatives*

**Lake McConaughy Storage.**—Reservoir storage would be less than the Present Condition under all action alternatives due to increased deliveries for environmental purposes. Average storage would be 11 percent less under the Water Leasing and Water Emphasis Alternatives and 14 percent less under the Governance Committee, Scenarios 1 and 2, and Wet Meadow Alternatives.

All alternatives would reduce spills by over 50 percent for every alternative except the Water Emphasis Alternative.

**Flows and Diversions.**—Average flows in North Platte River below Lake McConaughy would decrease in May and June due to the reduction in spills under all action alternatives compared to the Present Condition. Flow in the reach below the Tri-County Diversion Dam to the Johnson-2 (J-2) Return Channel would be less in June due to reductions in spills and flow in May would be higher due to the release of environmental account (EA) water. Flows between Overton and Grand Island would decrease in January and December due to operational changes. Flows would also decrease in June due to a

reduction in spills. Flow would increase in the remaining months. Peak flows in the Central Platte Habitat Area are reduced by all action alternatives.

The alternatives increase the achievement of target flows at Grand Island, Nebraska, by a range of 118,000 up to 185,000 acre-feet 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 action alternatives.

## RIVER HYDRAULICS AND SEDIMENT TRANSPORT

All of the alternatives undertake measures which can affect the characteristics of the river channel in the Central Platte Habitat Area and the quality of the habitat provided there for the three target bird species. This occurs primarily through the changes in river flow, described in the previous section, coupled with direct management of channel width and sediment load in the river, described below. Ultimately, these actions affect the amount of usable roosting, nesting, and foraging habitat available in the river channel for the target bird species.

### *Affected Resources*

The affected area is the mainstem of the Platte River in Nebraska, beginning at the confluence of the North Platte River and the South Platte River, river mile (RM) 310 (table E-19), at North Platte, Nebraska, and ending downstream at RM 160, near Chapman, Nebraska. The primary area of habitat management is the Central Platte Habitat Area beginning at RM 244, near Lexington, Nebraska, and ending downstream at RM 160, near Chapman, Nebraska.

### *Indicators*

- % Mean Annual Flow and the 1.5-year Flow
- % Sand Transport, Deposition, and Erosion
- % Grain Size
- % Sandbar-Building Potential
- % Width of Total Water in the Channel



*Effects of the Alternatives*

**Alternatives Comparison for Flow, Sand Transport, and Grain Size:** The Water Leasing and Water Emphasis Alternatives have the greatest mean flows, 4 to 8 percent more than the Present Condition. The Governance Committee Scenario 1 does not have a significant pulse flow in comparison to the remaining alternatives.

The Water Emphasis Alternative is fairly consistent at moving the most sand. The Water Leasing Alternative often ranks second in total sediment transported. Present Conditions and Governance Committee Scenario 1 commonly move the least volume of sand. From the desired aspect of increasing sand deposition, Water Leasing had the greatest volume and Governance Committee Scenario 1 the least volume of deposition.

The Governance Committee Alternative, Scenario 1, generally leads to the largest grain sizes in the Cooperative Agreement study area, which promotes further narrowing of the channel. In the short term (13 years), the alternatives with the same land plan—the Governance Committee, Scenario 2; Water Leasing; and Wet Meadow Alternatives—have the smallest average grain size.

**Alternatives Comparison for Sandbar-Building Potential and Channel Width:** In general, the alternatives with land plans that incorporate the clearing and leveling of river islands are predicted to have wider channel widths at the 13th year compared to widths under the Present Condition. Of the four alternatives that include the clearing and leveling of river islands, the Water Leasing and Water Emphasis Alternatives have the highest mean flows and 1.5-year flow. These two alternatives are predicted to have the greatest increases in channel width at the 13th year.

The clearing and leveling of river islands at sites nearer the upstream end of the degrading river channel would be more effective at controlling river channel degradation than at sites farther downstream. Therefore, the Governance Committee, Scenario 2; Water Leasing; and Wet Meadow Alternatives would be the most effective at controlling channel degradation, increasing and sustaining open view widths, and creating more sandbars at higher elevations. Of these three alternatives, the Water Leasing Alternative has the water plan with the highest annual mean flows and 1.5-year flow. The Water Emphasis Alternative also includes short-duration, high flows near bankfull capacity and the clearing and leveling of river islands, but with a much greater emphasis at downstream locations. The Governance Committee Alternative, Scenario 1, only includes the clearing of vegetation from river island and modest increases in annual peak flows and, therefore, does not control channel degradation, increase open view widths, or build sandbars much more than under the Present Condition.

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## WATER QUALITY

The changes in reservoir operations and streamflows, described earlier, can affect the water quality in lakes and streams and hence the value of the lake and stream habitat for fisheries, including fish eaten by the target tern species.

### *Affected Resources*

The area of effect includes surface and groundwater in the entire Platte River Basin in Colorado, Nebraska, and Wyoming.

### *Impact Indicators*

- % Total dissolved solids (TDS)
- % Temperature
- % Dissolved oxygen (D.O.) levels
- % Contaminants concentration
- % Reservoir pool elevation

### *Effects of the Alternatives*

The action alternatives would cause the following:

- % Very slight decreases or increases in TDS in some of the North Platte reservoirs and stream gauge locations.
- % A small decrease in specific conductance in the South Platte River at Julesburg.
- % A significant reduction in the extent of the zone in Lake McConaughy which has water temperature and DO levels suitable for trout.
- % A reduction in the chances of exceeding 90 degrees Fahrenheit (°F) in the Central Platte River in the summer months.

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

Movement of river sand from islands back into the river channel (included in all alternatives except the Governance Committee Alternative, Scenario 1) could increase somewhat the concentration of copper suspended in river sediments and in bed sediments.

## **CENTRAL PLATTE RIVER TERRESTRIAL VEGETATION COMMUNITIES AND LAND USE TYPES**

All of the alternatives include land management plans that seek to restore and maintain land habitat valuable to the target bird species. This is accomplished primarily by converting some Program lands with wooded areas or agricultural lands to wet meadows, and by clearing shrubs and trees from river islands. Some alternatives involve moving island sand back into the river channel. All of these actions result in changes in land use and the existing vegetative communities, increasing the availability of open channel habitat and wet meadow habitat used by the target bird species.

### *Affected Resources*

The effect of land habitat management for the alternatives will be focused in the 90-mile Central Platte River Habitat Area between Lexington and Chapman, Nebraska (study area; see figure E-2).

### *Impact Indicators*

%    Acreages of increase or decrease in land use and cover types based on land actions.

### *Effects of the Alternatives*

Land cover types would change by 1 to 11 percent (see impacts summary table E-2 for details). Minimal negative effects on resident terrestrial species populations are expected.

## **WHOOPING CRANE**

The land and water actions for the alternatives modify river flows, channel habitat, and wet meadow habitat for the whooping crane.

### *Affected Resources*

Generally, the Central Platte River between Lexington and Chapman, Nebraska, and associated habitats.

### *Impact Indicators*

- %    Amount and spatial distribution of channel roost habitat
- %    Extent of riparian grasslands, and the soils and hydrology of riparian grasslands and wetlands
- %    Ecological processes sustaining riverine and riparian habitats
- %    Prevention and avoidance of disturbances and intrusions on crane habitat.

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*Effects of Alternatives*

**Channel Roosting Habitat:** The Governance Committee, Scenario 2; Water Leasing; and Wet Meadow Alternatives most improve both the amount and the distribution of roost habitat beyond the Present Condition. Improvements are primarily due to mechanical channel manipulation (widening). These three alternatives receive the same amount of island leveling, and the degree of improvement of open channel roost habitat is similar among the three. Among the action alternatives, Governance Committee Alternative, Scenario 1, provides the least improvement in channel roost habitat. It is expected to be comparable to the Present Condition.

**Feeding Habitat:** The impacts on feeding are mixed. For all alternatives, the grassland acreage would increase. Mineral soils converted to grassland would likely support lower biodiversity and be less productive than native meadows, however. The quality of food resources in those areas could be relatively low. For all alternatives, groundwater levels that are necessary for wetland maintenance would be negatively impacted in years of the highest riverflows but improved during years with normal riverflows. For all alternatives, this would generally benefit the lowest elevation and wettest meadows, but would negatively impact transitional meadows at intermediate and higher elevations relative to the river.

**Habitat Sustainability:** During years 4 to 13 of the Program, all alternatives except the Present Condition and Governance Committee Alternative, Scenario 1, would use mechanical intervention (i.e., sand augmentation) to help offset the impacts of sediment transport imbalances in the habitat recovery area that presently exist. This would artificially help to maintain wide channels and reduce the channel degradation rates for the Governance Committee, Scenario 2, and Water Leasing Alternatives and, to a lesser degree, the Wet Meadow and Water Emphasis Alternatives.

However, the natural sediment transport and geomorphic processes will continue to be as impaired as the Present Condition, or become somewhat worse. No alternatives substantially modify the hydrologic processes to restore habitat sustainability. This means that changes in the system would diminish the natural maintenance of geomorphic processes, and habitats would continue to be reliant, perhaps increasingly so, on mechanical intervention for maintenance.

**Security:** The land plan of the Wet Meadow Alternative provides the greatest amount of habitat. It also provides the greatest level of security and protection in terms of channel length protected. Governance Committee, Scenarios 1 and 2, and Water Leasing Alternatives are nearly equal in the length of channel protected. Governance Committee Alternative, Scenario 1, has somewhat greater exposure to disturbances and intrusion on crane habitat from surrounding lands.

## **INTERIOR LEAST TERN AND PIPING PLOVER**

The land and water actions for the alternatives modify riverflows and channel habitat for the least tern and the piping plover.

### *Affected Resources*

The primary focus of the analysis is riverine habitat in the Central Platte River between Lexington and Chapman. Because actions taken in the Central Platte River reach could have a residual effect on Lower Platte River least tern and piping plover nesting habitats (i.e., Chapman to the confluence with the Missouri River), potential impacts are discussed. This section also discusses potential impacts to least terns and piping plovers nesting at Lake McConaughy and at sandpits along the river.

### *Impact Indicators*

The key indicators for these species are:

- % Timing of nest initiation
- % Sediment transport
- % Channel Stability
- % Channel Width
- % Water Quality
- % Riverine forage fisheries (terns only)
- % Invertebrate forage (plovers only)
- % Nesting opportunities
- % Sandbar elevation potential

### *Effects of the Alternatives*

## **Interior Least Tern**

### **Governance Committee Alternative, Scenario 1**

The Governance Committee Alternative, Scenario 1, does not have a sand augmentation provision, and would therefore ultimately result in increased erosion, in addition to resulting in a larger sand grain size compared to the other alternatives. This would result in reduced sandbar elevations and adverse impacts.

The Governance Committee Alternative, Scenario 1, out-performed the other alternatives for sandbar elevation potential for the 3-year analysis of managed areas. Sandbar elevation, however, would be strongly influenced by the parameters of Channel Width, Channel Stability, and Sediment Transport. Therefore, the Governance Committee Alternative, Scenario 1, would likely under-perform when

compared to the others, but the others are all functionally similar. As a result, any of the other alternatives would result in an improvement over the Present Condition for the 1-year, unmanaged elevation scenario.

Sediment Transport and, therefore, Channel Width and Stability, would not improve without the provisions outlined in the Governance Committee Alternative, Scenario 2, due to the lack of pulse flow capability and sand augmentation. Therefore, the sediment transport and channel dynamics would be expected to follow trends experienced in the Present Condition, resulting in continued habitat degradation.

It is not anticipated that the Governance Committee Alternative, Scenario 1, would affect selenium levels in forage fish within the project area. Water in the EA would help alleviate excessive water temperatures and, thereby, improve conditions for the forage fishery.

### **Governance Committee Alternative, Scenario 2**

The Governance Committee Alternative, Scenario 2, includes not only island clearing, but also mechanical leveling, resulting in sand/sediment augmentation. Sediment Transport, and therefore Channel Width and Stability, would improve with the provisions outlined in the Governance Committee Alternative, Scenario 2, as a result of the 3,000 cfs channel capacity at North Platte which would allow for greater managed pulse flow capability. Sand augmentation would improve sediment transport and channel bed ephemerality. In the long term, this would result in wider channels in which sandbars are built and routinely washed away, translating into improved habitat for the least tern.

The overall health of the forage fish community is important to the success of least tern nesting efforts. In the forage fish analysis, when the outcomes of all analyses are taken as a whole, all the action alternatives show significant improvement over the Present Condition. Between the alternatives, however, there is relatively little difference. In terms of the alternatives' effect on the ability of the river to provide a fishery that serves as an adequate prey base for least terns, temperature moderation is likely the most important function, followed by physical habitat availability, then reaction distance as a function of turbidity and depth as a function of channel cross section. Given this, the Governance Committee Alternative, Scenario 2, would provide more improvement for fish than other alternatives. All the alternatives do, however, represent an improvement over the Present Condition.

### **Water Leasing, Wet Meadow, and Water Emphasis Alternatives**

Like the Governance Committee Alternative, Scenario 2, these three alternatives each have provisions for a 3,000 cfs capacity at North Platte, and similar amounts of island clearing and leveling (sand augmentation). Therefore, the differences seen in the model results are a factor of how the water is delivered. Although each of the alternatives, with the exception of the Governance Committee

Alternative, Scenario 1, have similar result trends, each is affected by its water supply method. The Governance Committee Alternative, Scenario 2, appears to result in greater beneficial results for Riverine Fisheries, a very important parameter for the least tern.

Model results indicate that these three alternatives react very similarly for Riverine Fisheries, Nesting Opportunity, and Timing of Nest Initiation, and each show improvements. Differences in model results between these three alternatives are likely within the error margin of the analyses. Each of these three alternatives would provide benefits for sandbar (nest) elevation for the managed and unmanaged, 1-year scenarios, and adverse impacts for the managed and unmanaged, 3-year scenarios.

Sediment Transport and, therefore, Channel Width and Stability, would improve with the provisions outlined in these alternatives as a result of the ability to produce a regular regime of pulse flows. Sand augmentation is also part of each of these alternatives, improving sediment transport and channel bed ephemerality. In the long term, this would result in wider channels in which sandbars are built and routinely washed away, translating into improved habitat for the least tern.

## **PIPING PLOVER**

### **Governance Committee Alternative, Scenario 1**

The Governance Committee Alternative, Scenario 1, does not have a sand augmentation provision or the ability to provide sediment-moving pulse flows, and would ultimately result in increased erosion, in addition to resulting in a larger sand grain size. This would result in reduced sediment transport, which in turn results in lower sandbar elevations, reduced sandbar ephemerality, leading to reduced sandbars for foraging (for invertebrates), increased channel stability, and overall habitat degradation.

None of the four elevation scenarios showed improvement over the Present Condition for the Governance Committee Alternative, Scenario 1. Model results indicated reduced elevations except for managed, 1-year, which showed no functional change.

### **Water Leasing, Water Emphasis, Wet Meadow, and Governance Committee Alternative, Scenario 2**

These alternatives include not only island clearing, but also mechanical leveling, resulting in sand/sediment augmentation. They also call for the channel capacity at North Platte to be increased to 3,000 cfs, which would allow for a larger, more effective short-term pulse flows and more efficient sediment transport.

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The availability of foraging habitat, which is driven by Sediment Transport and Channel Stability, is the key to the Invertebrate Forage indicator. It is assumed that greater invertebrate habitat availability will result in greater availability of invertebrates, upon which piping plovers forage, given suitable hydrology. Therefore, the Invertebrate Forage indicator should mirror the Sediment Transport/Width/Stability indicator. Because these alternatives have the potential to provide increased sediment, and pulse flows to move that sediment, they would be capable of building and rebuilding vegetation-free nesting and foraging sandbars. Therefore, beneficial impacts would be realized for Sediment Transport, Channel Width, Channel Stability, Invertebrate Forage, as well as improvements to both the managed and unmanaged elevations for the 1-year scenarios.

All of these alternatives provide benefits for Timing of Nest Initiation.

### **Nesting on the Lower Platte River**

Flows from the Loup River provide supplemental sediment to the Lower Platte River, and are largely responsible for maintaining sediment-distributing flows below Columbus, Nebraska. In years such as 2002 and 2003, when the Central Platte River went dry for extended periods during the summer, the Lower Platte River below Columbus continued to support plover nesting. Because each action alternative includes an EA, each alternative will result in the potential of supplemental flows reaching at least the Central Platte River. Although flows would likely be attenuated significantly by the time they reach the Lower Platte River, any increase in flows during otherwise low summer flows would be beneficial as long as they do not result in flooding. Alternatives which result in increased flows in the Central Platte River would also provide flows, however attenuated, to the lower reach. The lower reach of the Platte River currently has enough sediment and flows for sandbar formation and redistribution; however, any sediment from restoration/sediment augmentation in the central reach that makes it to the Lower Platte River would only serve to improve sandbar dynamics, and thus improve nesting habitat for piping plovers.

## **PALLID STURGEON**

During the Program first increment, benefits for the pallid sturgeon will be provided through a program of research and monitoring. This section describes the effects of the alternatives on sturgeon habitat.

### *Affected Resources*

The area of potential impact includes fisheries associated with the North Platte reservoirs from Seminole downstream to Guernsey, and the Platte River below these reservoirs.



### *Impact Indicators*

- % Spawning period--April through June
- % Habitat formation and maintenance and food base production period--February through July
- % Summer period--June through August
- % Other periods--September through November and December through January

### *Effects of the Alternatives*

The analyses provided below indicate 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, CANDIDATE SPECIES, AND DESIGNATED CRITICAL HABITAT**

The alternatives were assessed to determine their potential to impact habitat for species listed under the ESA other than the target species (see list in impacts summary table E-2)

The analysis found that the western prairie fringed orchid may be adversely affected by all action alternatives. Otherwise, impacts to other species or their habitat are expected to be minor if Program implementation activities are designed and located appropriately. Further site-specific analyses prior to implementation of Program activities will be necessary before impacts can be fully identified.

## **SANDHILL CRANE**

The land and water actions for the alternatives modify river flows, channel habitat, and wet meadow habitat for the sandhill crane.

### *Affected Resources*

The immediate area of potential effect includes two reaches of the North Platte River channel: (1) from Clear Creek Wildlife Management Area just upstream from Lake McConaughy west about two miles, and (2) between Sutherland and North Platte, Nebraska; and the Platte River channel between Lexington and Chapman, Nebraska.

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*Indicators*

- % Roosting depth availability
- % Unobstructed channel width
- % Discharge
- % Acres of corn and invertebrate food.

*Effects of the Alternatives*

Compared to the Present Condition, roosting suitability and food resources at the upper end of Lake McConaughy would be unchanged by the proposed action. Changes in discharge on the North Platte River between Sutherland and North Platte may result in further narrowing of the channel and thus affect roosting habitat suitability for sandhill cranes. The action alternatives may provide increases in roosting depth availability, unobstructed channel width, and acres of wet meadow for invertebrate food at Program-managed sites on the Platte River. 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. Roosting depth availability may be reduced at non-managed sites along the Platte River.

**NORTH PLATTE FISHERIES**

The changes in reservoir operations and reservoir levels can affect the amount of habitat available for fisheries existing in the North Platte reservoir system as well as in the intervening river reaches.

*Affected Resources*

The affected resources are the fisheries associated with the North Platte reservoirs from Seminoe downstream to Guernsey, and the Platte River below these reservoirs.

*Indicators*

- % Reservoir storage content (volume) and changes in elevation
- % Morphoedaphic Index (MEI) and MEI weighted for reservoir area.
- % Riverflows and changes in flows.

*Effects of the Alternatives*

Compared to the Present Condition, the action alternatives result in additional occurrence of drawdowns below both reservoir volumes identified by Wyoming Game and Fish as providing good conditions for fisheries, and also a small number of additional drawdowns below elevations identified as critical to the fishery at Seminoe, Pathfinder, and Glendo Reservoirs. Moderate adverse impacts to the lake fisheries are projected for Seminoe and Pathfinder Reservoirs.

There is no effect of the alternatives on Alcova Reservoir. Effects are not assessed on Guernsey Reservoir due to the absence of a viable fishery in this reservoir.

Compared to the Present Condition, all alternatives had 3 to 4 months in the 48 year period of record where Platte River flows below Kortes Dam fell to less than 500 cfs compared to the Present Condition, which had none. This is not projected to adversely affect the fishery.

Below Fremont Powerplant, the alternatives produced no additional periods of flow below 75 cfs. This is not projected to adversely affect the fishery.

For flows below Grey Reef Dam, there was little difference among alternatives. The Present Condition flows were always above 500 cfs. The action alternatives resulted in flows less than 500 cfs during 1 to 3 months over the 48-year period of record. This change is not projected to adversely affect the fishery.

## **LAKE MCCONAUGHY SPORTFISHERIES**

The Program actions to provide improvements in 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.

### *Affected Resource*

Lake McConaughy and Lake Ogallala are on the North Platte River near Ogallala, all in Nebraska.

### *Indicators*

- % North Platte inflows to Lake McConaughy
- % Lake elevations in Lake McConaughy
- % Temperature and oxygen levels in Lake Ogallala

### *Effects of the Alternatives*

All alternatives reduce occurrence of Lake McConaughy elevations conducive to walleye reproduction from 73 percent of years to 40 to 44 percent of years.

Lake McConaughy white bass spawning in the North Platte River above Lake McConaughy is not changed by any of the alternatives except for the Governance Committee Alternative, which increases years of optimum spawning conditions from 8 to 12 percent of years.

All alternatives reduce the years for which conditions are conducive to successful smallmouth bass reproduction from approximately 79 percent to between 33 percent and 38 percent of years.

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The alternatives are expected to have little to no effect on spawning of channel catfish in the North Platte inlet to Lake McConaughy.

The alternatives reduce occurrence of reservoir elevations conducive to successful gizzard shad spawning from 90 percent of years to between 52 percent and 60 percent of years.

The alternatives reduce the frequency of conditions conducive to over-winter survival of gizzard shad from 94 percent to between 71 percent and 75 percent of years.

All alternatives show a fairly large increase in the frequency of loss of all or nearly all rainbow trout habitat in Lake McConaughy relative to the Present Condition.

Under each alternative, it is more likely that oxygen levels and temperatures which support the Lake Ogallala trout fishery may be negatively affected.

## HYDROPOWER

All of the action alternatives change both reservoir levels and releases through hydroelectric power plants, both in the North Platte and the Central Platte system. These changes can affect hydropower generation and capacity.

### *Affected Resources*

The immediate area of effect includes five hydropower generation facilities in the Central Platte Basin and six in the North Platte Basin (facilities in the South Platte Basin are outside the area of impact). Economic effects may be nationwide.

### *Indicators*

- % Amount of electrical generation
- % Dependable capacity of electrical generation
- % Economic value of the hydropower produced.

### *Effects of the Alternatives*

Most of the alternatives reduce dependable capacity in the North Platte hydropower system, the largest effects being a reduction of 21 percent for the Wet Meadow Alternative, and a reduction of 26 percent under the Water Emphasis Alternative.

The alternatives, in most cases, also reduce summer and winter dependable capacity in the Central Platte hydropower system, by as much as 12 percent.

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

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.

## **RECREATION**

The action alternatives affect reservoir and lake levels and streamflows throughout the basin, and create some additional recreation facilities in the Central Platte Habitat Area. These changes can affect the value of both flatwater and stream recreation at several locations.

### *Affected Resources*

The subjects of the analysis are those recreation areas in each state that would most likely be affected by the action alternatives.

### *Impact Indicators*

- % Visitor use
- % Changes in surface area
- % Economic value

### *Effects of the Alternatives*

On a Statewide basis the impacts on recreational use at Glendo, Guernsey, and Seminoe reservoirs in Wyoming are minor for all alternatives. The changes attributable to any alternative amount to less than 1.5 percent of the annual total identified in the Present Condition. Weather, gasoline prices, income, or other variables as well as water levels and surface areas (individually or collectively) will affect recreational use. This magnitude of change is well within the levels of expected fluctuation from year to year.

In Colorado, impacts to recreation visitation and associated value are not quantifiable with the data that is currently available. However, it is expected that the changes in visitor use and associated economic value will be minor. The implementation of the Tamarack Project would result in some (unquantified) increase in recreational use and value.

For all action alternatives Lake McConaughy in Nebraska experiences declines in recreational use: 2.8 percent to 6.3 percent (-\$368,000 to -\$829,000) . The Water Leasing and Water Emphasis Alternatives result in the least amount of change in surface area and thus, the least amount of decline in recreation visits and economic value. Somewhat offsetting the losses are the gains in habitat improvement and facilities development generated along the Central Platte River in the alternatives, especially in the Governance Committee, Scenario 1; Water Leasing; and Wet Meadow Alternatives where associated increases in economic value are approximately \$2.5 million and more.

## AGRICULTURAL ECONOMICS

All of the action alternatives change irrigation water deliveries, as a result of changes in reservoir operations, storage, and due to voluntary water leasing.

### *Affected Resources*

The effects of the action alternatives on agricultural production are assessed for eight multi-county subregions of the Platte Basin, identified below: [Two of the identified impact regions (South Platte Headwaters and Denver metro) incurred no economic impacts, regardless of alternative, and therefore are not included in the presentation.]

- % **Central Platte Habitat Area (Habitat Area):** Dawson, Buffalo, Gosper, Phelps, Kearney, Merrick, Hamilton, Hall, Adams
- % **Lake McConaughy Area:** Keith, Lincoln, Deuel, Garden, Arthur, McPherson, Custer, Cheyenne, Sedgwick\*, Logan\*
- % **Scotts Bluff Area:** Sioux, Scotts Bluff, Banner, Kimball, Morrill, Goshen\*
- % **Eastern WY:** Laramie, Platte, Albany
- % **North Platte Headwaters:** Converse, Natrona, Fremont, Carbon, Jackson\*
- % **Central CO:** Larimer, Weld, Morgan, Washington

\*Denotes counties belonging to an adjacent state.

### *Indicators*

- % Deliveries of irrigation water
- % Acres of farmland
- % Cropping patterns and crop production
- % Gross farm revenues.

### *Effects of the Alternatives*

In general, each of the alternatives analyzed is expected to cause a slight decrease in the amount of irrigation water delivered to farms within the Platte River Basin from a reduction of just over 2,000 to almost 91,000 af. Reduced irrigation water deliveries are expected to reduce both irrigated acres and the value of agricultural commodities produced. Irrigated acres are expected to decrease somewhere in the range of 1,400 to 49,000 acres, depending on how individual farmers respond to the change in available irrigation water, in addition to the specific alternative selected. The change in the amount of agricultural commodities produced is estimated to cause a decrease in farm revenues of from just over \$200,000 to almost \$18,000,000.

With the exception of the Wet Meadow Alternative (where the impacts are projected to occur primarily in the North Platte Headwaters area), the impacts to farm revenues will probably be spread throughout the entire Basin. However, under the Water Leasing and Water Emphasis Alternatives, farm revenue impacts are expected to be greatest in the Central Platte Habitat Area, followed by the Eastern Colorado area, with the Scotts Bluff and McConaughy areas being impacted almost equally. The Governance Committee Alternative reduces the farm revenue impacts in all but two regions (eastern Wyoming and North Platte), but it also causes a shift in the distribution of impacts such that the majority of farm revenue impacts occur in the Central Platte Habitat Area.

## **REGIONAL ECONOMICS**

The action alternatives affect regional economies in several ways. The Program pays willing participants for land easements, leasing, or acquisition, and for water acquisition or leasing. The Program also invests locally in construction of significant Program features and facilities and in land restoration and management, affecting both local income and business receipts. As some water is shifted to flows for the target species, some reduction in irrigated acreage occurs. This affects crop revenues and agricultural expenditures, which in turn affect the agriculture support sectors of the economies.

### *Affected Resources*

The alternatives have effects on the regional economies in several parts of the Platte River Basin. The affected areas of the Basin have been divided into economic areas, described in the previous section.

### *Indicators*

- % Regional Sales
- % Regional Income
- % Regional Indirect Business Taxes
- % Regional Employment

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*Effects of the Alternatives*

All of the alternatives bring money into the economic regions through construction investments, payments for land, or payments for water. Some investments produce increases in recreation and associated expenditures. Together, these constitute the economic benefits of the Program alternatives.

Regional economic losses are created primarily in two ways. 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 decreases in agricultural production and the associated local expenditures.

Second, 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.

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

In general, the alternatives which acquire or lease the most water, the 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. 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 has the greatest economic benefits because it does not take as much water out of irrigation, and puts the most money into habitat restoration.

**Primary Project Costs**

Table E-21 presents the primary project costs associated with the alternatives. 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. These costs are for the primary elements having environmental effects for the first increment of the Program (13 years). The shaded cells are costs for the Governance Committee Scenarios, taken from the Reconnaissance-Level Water Action Plan (Boyle Engineering, 2000) unless otherwise noted. The remaining costs are provided by the EIS Team.



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Table E-21. —Primary Project Costs

	Governance Committee Scenario 1	Governance Committee Scenario 2	Water Leasing	Wet Meadow Restoration	Water Emphasis
Water Elements					
Central Platte Groundwater Mound Conjunctive Use					\$4,725,000
Central Platte Power Interference*					
CNPPID Re-reg Reservoir	\$7,350,000	\$7,350,000			
Dawson/Gothenburg Canal	\$848,000	\$848,000			
Dry Creek/Fort Kearney Cutoffs	\$399,000	\$399,000			
Glendo Reservoir (Water Leasing)	\$1,988,000	\$1,980,000			
Glendo New Water Right (100 kaf)				\$100,000	\$100,000
Central Platte Groundwater Management (WAP Option 1)	\$716,000	\$716,000			
Net Controllable Conserved Water	\$3,965,000	\$3,965,000			
North Platte Channel Capacity Restoration		\$1,875,000	\$1,875,000	\$1,875,000	\$1,875,000
Pathfinder Modification	\$2,243,000	\$2,243,000	\$2,243,000	\$2,243,000	\$2,243,000
Pathfinder Wyoming Account (Leasing)	\$2,280,000	\$2,280,000			
Riverside Drains					\$10,426,000
Tamarack I			\$3,434,000	\$3,434,000	
Tamarack III	\$7,868,000	\$7,868,000			\$7,868,000
Water Leasing, Colorado**			\$46,800,000		\$46,800,000
Water Leasing, Nebraska	\$19,500,000	\$19,500,000	\$46,800,000		\$46,800,000
Water Leasing, Wyoming	\$17,940,000	\$17,940,000	\$46,800,000		\$46,800,000
Water Management Incentives	\$9,000,000	\$9,000,000			
Land Elements					
Land Acquisition	\$17,034,000	\$16,937,000	\$16,937,000	\$28,450,000	\$10,553,000
Habitat Restoration and Maintenance	\$6,157,000	\$8,708,000	\$8,708,000	\$14,353,000	\$2,591,000
<b>Total</b>	<b>\$97,288,000</b>	<b>\$101,609,000</b>	<b>\$173,597,000</b>	<b>\$50,455,000</b>	<b>\$180,781,000</b>

\*The Water Action Plan prepared by Boyle Engineering (2000) estimates total costs to CNPPID at \$12 acre-feet per year to redistribute 3,3000 acre-feet. Additional hydropower costst are estimated at \$123,100 per year. The results of the DEIS analysis suggests that power generatio is increased in the Central Platte system under all alternatives; therefore, no Program costs are shown.

\*\*The water leasing element for all three states assumes a \$60 acre-feet cost.

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## SOCIAL ANALYSIS

### *Affected Resource*

The area of effect includes eight counties in the North Platte Basin in Wyoming, 18 counties in the South Platte Basin in Colorado, and 22 counties in the Central Platte Basin in Nebraska. The area of primary effect includes the Central Platte Habitat Area, including the following nine counties in Nebraska: Dawson, Gosper, Phelps, Buffalo, Kearney, Hall, Adams, Merrick, and Hamilton.

### *Indicators*

- % Human health concerns
- % Changes in flooding patterns
- % Land use trends
- % Income and employment

### *Effects of Alternatives*

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

**Human Health Concerns:** 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 carry human disease, or create habitat that would encourage increases in resident goose and waterfowl populations. Thus, no increases are expected in health risks from mosquito-borne disease, waterfowl diseases, or waterfowl contamination of surface waters.

**Flooding:** The Program would decrease large, out-of-bank flood events in the Platte River from below Lake McConaughy down to Grand Island, Nebraska (table E-26). On the other hand, a slight increase in ground water levels close to the river (0.1 to 0.25 feet) will occur during the springtime (years when river flows are low to moderate) when Program peak flows are released.

At present, during wet years when surface flows are at the highest levels, ground water levels also rise within roughly 500 to 1,000 feet from the river. Program alternatives reduce the highest peak surface flows through the Habitat Area reach of the Central Platte River. As a result, surface flows are not as high under the action alternatives, and ground water 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.

**Land Use Changes:** Potential social impacts from the first increment land acquisition component of the action alternatives are expected to be minimal for the following reasons:

- % The Program first increment of 10,000 acres (or 6,880 acres if Cottonwood Ranch and the Wyoming Property are excluded) 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 Action Plan, 2003).
- % 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 Action 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 Action 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 (Habitat Protection Plan).
- % The Program will require its contractors to carry appropriate insurance to cover documented damage claims directly resulting from their actions (Program Document)

## **CULTURAL RESOURCES**

The alternatives have the potential, through water and land actions, to disturb or uncover cultural or archeological sites and artifacts which could then be lost or damaged. The potential for these impacts will be investigated further as site-specific actions are proposed.

### *Affected Resources*

The area of effect focuses on major water features in the North and South Platte Basins, and water features and land areas in and near the Central Platte River in the Central Platte Basin.

### *Indicators*

- % Changes in reservoir elevations that would expose or erode new lands.
- % Fluctuations in water levels and releases that are wider or more rapid than the Present Condition ranges.
- % Activities that disturb ground potentially containing cultural resources.

Sub-basins of the Platte River as Defined in the EIS

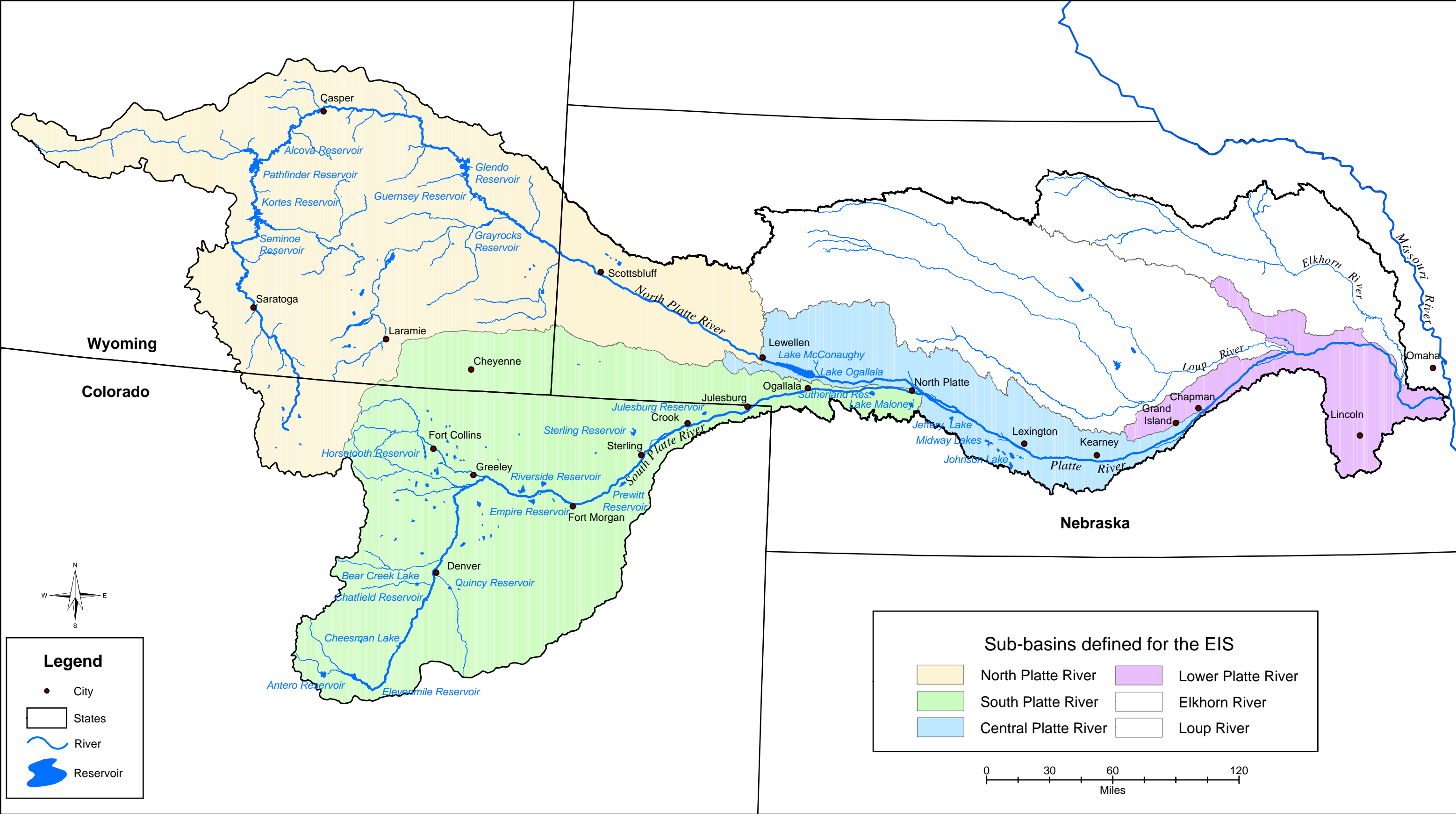


Figure E-1.—Platte tri-basin map with each sub-basin colored (no designation of habitat areas).

*Effects of the Alternatives*

Compared with the Present Condition, the action alternatives could result in modifications to the historic Pathfinder Dam, to unspecified cultural resources at Seminoe and McConaughy reservoirs as the lakebeds are exposed more extensively, to unspecified cultural resources at recharge sites in the South Platte Basin, and to cultural resource sites in the Central Platte Habitat Area during habitat restoration or construction of an off-stream reservoir.

Sub-basins of the Platte River as Defined in the EIS

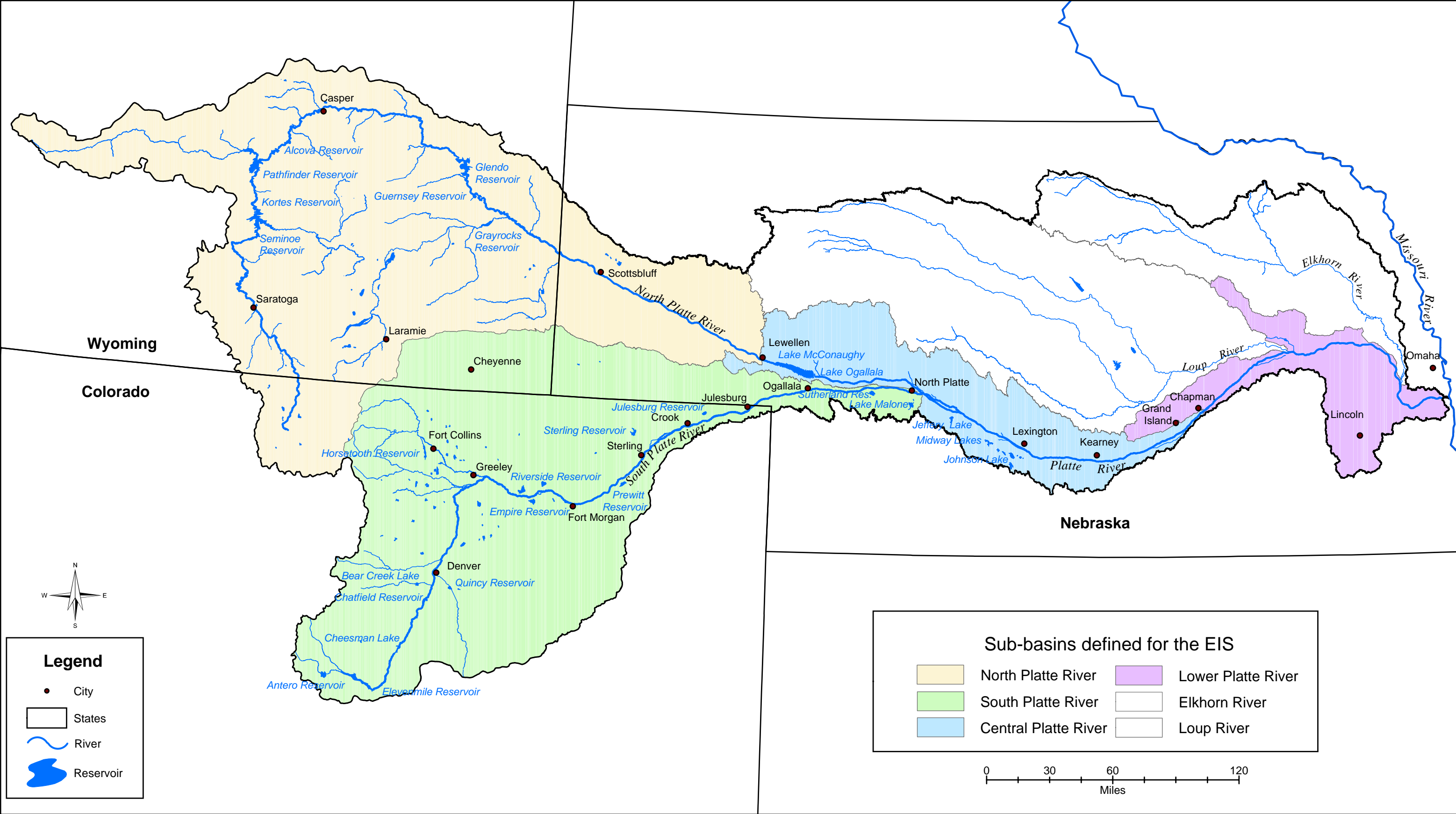


Figure E-1.—Platte tri-basin map with each sub-basin colored (no designation of habitat areas).