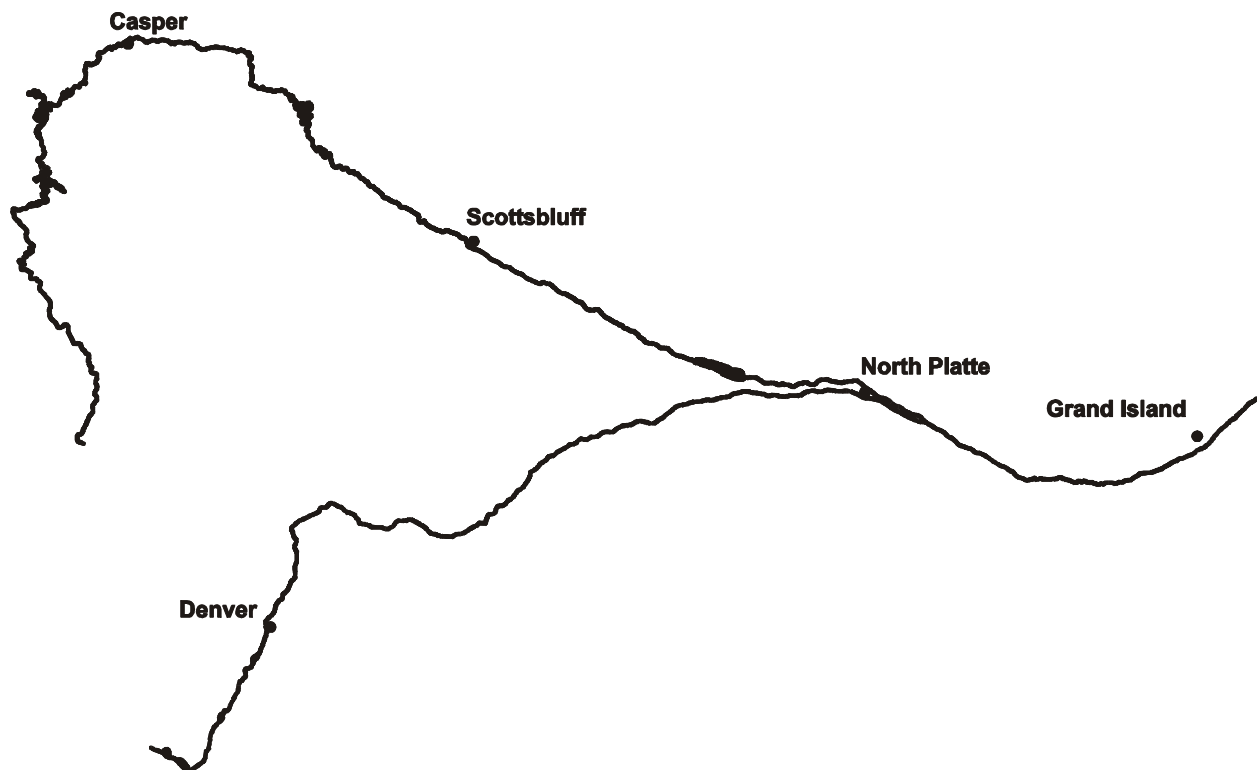


Platte River Recovery
Implementation Program
Draft Environmental Impact Statement

**Assessing Alternatives for Implementation of a Basinwide, Cooperative,
Endangered Species Recovery Program**

December 2003



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

COVER SHEET
Draft Environmental Impact Statement
Platte River Recovery Implementation Program

Prepared by: U.S. 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 Draft Environmental Impact Statement (DEIS) is prepared to address requirements of the National Environmental Policy Act (NEPA). This DEIS also serves as the Biological Assessment for consultation under Section 7 of the ESA. **Public comments are requested.**

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

Interior has prepared this 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 this DEIS, or to obtain additional copies of the DEIS, contact the Platte River EIS Office (PL-100), PO Box 25007, Denver CO 80225-0007, telephone (303) 445-2096 or fax (303) 445-6331. **Comments on the DEIS must be sent to the Platte River EIS Office no later than April 1, 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.



TABLE OF CONTENTS

	<i>Page</i>
CHAPTER 1 Purpose of and Need for Action	
Introduction	1-1
Study Area	1-3
Need for Action	1-4
Purpose of Action	1-6
Background	1-8
Potential Approaches to Habitat Restoration	1-9
Endangered Species Act Consultation	1-10
The Proposed Program	1-13
National Environmental Policy Act Analysis of the Program	1-17
Formulation of the Action Alternatives	1-19
Programmatic Analysis	1-19
Issues Identified During Scoping	1-24
Participating Agencies and Organizations	1-25
Legal Authorities	1-27
Organization of Document	1-29
 CHAPTER 2 History of Habitat Use and Habitat Trends for the Target Species	
Introduction	2-1
The Target Species	2-3
Habitat Features Historically Used by the Target Species	2-6
History of Land and Water Development	2-11
Central Platte River Channel	2-28
Target Species—Population Trends	2-47
 CHAPTER 3 Description of the Alternatives	
Introduction	3-1
First Increment Goals and Objectives	3-3

TABLE OF CONTENTS

	<i>Page</i>
No Action Alternative	3-4
The Action Alternatives	3-6
Governance Committee Alternative	3-21
Water Leasing Alternative	3-48
Wet Meadow Alternative	3-52
Water Emphasis Alternative	3-55
Elements Considered but Rejected	3-62
Alternatives Comparison Tables	3-62
CHAPTER 4 Affected Environment and the Present Condition	
Introduction	4-1
Geographic Markers	4-4
Central Platte River Schematic	4-5
Water Resources	4-8
River Hydraulics and Sediment Transport	4-28
Water Quality	4-43
Central Platte River Terrestrial Vegetation Communities and Land Use Types	4-60
Whooping Cranes	4-69
Least Terns and Piping Plovers	4-81
Pallid Sturgeon	4-96
Other Federally Listed Species, Candidate Species, and Designated Critical Habitat	4-103
Sandhill Cranes	4-118
State-Listed and Species of Special Concern	4-134
North Platte River Basin Fisheries	4-154
Nebraska Sport Fisheries: Lake McConaughy and the Lower Platte River	4-165
Hydropower	4-174
Recreation	4-178
Agricultural Economics	4-188
Regional Economics	4-197
Social Environment	4-202
Cultural Resources	4-211
Indian Trust Assets	4-217
Environmental Justice	4-218
CHAPTER 5 Environmental Consequences	
Introduction	5-1
Water	5-3
River Hydraulics and Sediment Transport	5-50

TABLE OF CONTENTS

	<i>Page</i>
Water Quality	5-69
Central Platte River Terrestrial Vegetation Communities and Land Use Types	5-83
Whooping Cranes	5-91
Least Tern and Piping Plover	5-105
Pallid Sturgeon	5-137
Other Federally-Listed Species, Candidate Species, and Designated Critical Habitat	5-137 5-147
Summary of Effects Determinations for All Listed Species	5-155
Sandhill Cranes	5-159
State Listed Species and Species of Special Concern	5-173
North Platte Fisheries	5-183
Lake McConaughy Sport Fishery Analyses	5-199
Hydropower	5-211
Recreation	5-217
Agricultural Economics	5-229
Regional Economics	5-243
Primary Program Costs	5-251
Social Analysis	5-253
Cultural Resources	5-261
Analysis of Cumulative Effects	5-271
Relationship Between Short-Term Uses and Long-Term Productivity, and Irreversible and Irrecoverable Commitment of Resources	5-281
 CHAPTER 6 Consultation and Coordination	
Introduction	6-1
Public Involvement	6-1
Agency Coordination and Consultation	6-5
 CHAPTER 7 Environmental Commitments	
Introduction	7-1
 Abbreviations and Acronyms	
List of Preparers	
Glossary	
Bibliography	
Technical Appendices	
Technical Reports	
Attachments	

TABLES

		<i>Page</i>
1-1	Key Issues Addressed in the Draft Environmental Impact Statement	1-25
1-2	Current Governance Committee Member Entities and Representatives and Voting Status	1-26
2-1	Diversions into the North and South Platte River Basins, 1990-1999	2-15
2-2	Storage Capacity of Major Platte River Basin Reservoirs	2-16
2-3	Irrigated Land Area Estimates for the Platte River Basin, 1995	2-18
2-4	Estimated 1995 Demands for Water in the Platte River Basin, Above the Loup River Confluence	2-19
2-5	Estimated Consumptive Use of Water in the Platte River Basin, Above the Loup River Confluence	2-20
2-6	Estimated Consumptive Use of Water in the Platte River Basin After Accounting for Offsetting Imports	2-21
2-7	Mean Platte River Flows	2-27
2-8	Platte River 1.5-Year Flood	2-28
2-9	Summary of River Channel Conditions (Predevelopment and Current)	2-30
2-10	Recent Permit Applications to the U.S. Army Corps of Engineers - Projects That Could Affect the Central Platte River Bank Erosion or Mobility	2-42
2-11	Estimated Depletions to Flow at Louisville, Nebraska	2-46
2-12	Current Status of Piping Plovers and Interior Least Terns (1987-1998 Long-Term Averages)	2-48
3-1	Summary of Target Habitat Complex Guidelines From the <i>Land Action Plan</i> , Table 1 (Governance Committee Program Document)	3-8
3-2	Summary of Non-Complex Habitat Guidelines From the <i>Land Action Plan</i> , Table 2	3-9
3-3	Species Flows (Cubic Feet Per Second at Grand Island)	3-12
3-4	Key Benefits of Species Flows	3-13
3-5	Annual Pulse Flow Targets at Grand Island (Cubic Feet Per Second at Grand Island)	3-15
3-6	Water Elements for the Governance Committee Alternative and Average Annual Improvement Toward Species and Annual Target Flows	3-23
3-7	Illustrative Distribution of Land Plan Acreage by River Segment, Governance Committee Alternative, Scenario 1 (Land Protection Emphasis and Current Water Transport Capacity)	3-44
3-8	Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Governance Committee Alternative, Scenario 1	3-45
3-9	Illustrative Distribution of Land Plan Acreage by River Segment, Governance Committee Alternative, Scenario 2 (Land Restoration Emphasis, Increased Water Transport Capacity)	3-47
3-10	Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Governance Committee Alternative, Scenario 2	3-48

TABLES

	<i>Page</i>
3-11 Average Annual Program Water (Acre-Feet Per Year) Contribution to Species' Target Flows Under the Water Leasing Alternative	3-50
3-12 Illustrative Distribution of Water Leased to the Program Under the Water Leasing Alternative	3-51
3-13 Average Annual Program Water (Acre-Feet Per Year) Contribution to Species' Target Flows Under the Wet Meadow Alternative	3-52
3-14 Illustrative Distribution of Program Lands, Managed by River Reach, for the Wet Meadow Alternative	3-54
3-15 Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Wet Meadow Alternative	3-55
3-16 Average Annual Program Water (Acre-Feet Per Year) Contribution to Species' Target Flows Under the Water Emphasis Alternative	3-56
3-17 Illustrative Distribution of Water Leased to the Program Under the Water Emphasis Alternative	3-59
3-18 Illustrative Distribution of Program Lands, by River Reach, for the Water Emphasis Alternative	3-61
3-19 Summary Table of Estimated Land Cover Changes for All Land Parcels Managed in the Water Emphasis Alternative	3-62
3-20 Summary of Action Alternatives	3-64
3-21 Summary Table of Impacts for Each Alternative	3-65
4-1 Geographic Markers for the Central Platte River	4-6
4-2 Average End-of-Month Content (Thousand Acre-Feet) for the Present Condition (1947-1994)	4-11
4-3 Average End-of-Month Elevation (Feet Mean Sea Level) for the Present Condition (1947-1994)	4-11
4-4 Years With Storage Less Than the Low Storage Indicator Under the Present Condition (1947-1994)	4-11
4-5 Average May - August Drawdown Under the Present Condition (1947-1994)	4-12
4-6 Years With Spills From Guernsey Reservoir Under the Present Condition (1947-1994)	4-12
4-7 Average Flows in the North Platte River (Cubic Feet Per Second) Under the Present Condition (1947-1994)	4-13
4-8 Average Monthly and Annual Volume of Irrigation Deliveries (Thousand Acre-Feet) Under the Present Condition (1947-1994)	4-13
4-9 Irrigation Delivery Shortages Under the Present Condition (1947-1994)	4-14
4-10 Average End-of-Month Content (Thousand Acre-Feet) Historic Values (1950-1994)	4-18
4-11 Additional Major Storage Reservoirs in South Platte River Basin	4-19
4-12 Average Monthly Flows (Cubic Feet Per Second) Under the Present Condition (1947-1994)	4-19

TABLES

		<i>Page</i>
4-13	Lake McConaughy Average End-of-Month Content and Elevation Under the Present Condition (1947-1994)	4-22
4-14	Lake McConaughy Spills (Thousand Acre-Feet) Under the Present Condition (1947-1994)	4-22
4-15	Average Monthly Flows (Cubic Feet Per Second) Under the Present Condition (1947-1994)	4-24
4-16	Average Flows Under the Present Condition (Cubic Feet Per Second)	4-25
4-17	Average Monthly and Annual Flow Irrigation Deliveries (Thousand Acre-Feet) Under the Present Condition (1947-1994)	4-26
4-18	Shortages for the Western Canal Under the Present Condition (1947-1994)	4-26
4-19	Approximate River Mile of Landmarks Along the Central Platte River	4-29
4-20	Mean Annual Flow and the 1.5-Year Peak Flow for the Present Condition, 1947 to 1994	4-33
4-21	Summary, by Reach, of Cumulative Sand Transport and Deposition at 13 Years and 61 Years Under the Present Condition	4-35
4-22	Summary, by Reach, of Average Median Grain Size for Nonvegetated Channel Under the Present Condition	4-37
4-23	Frequency of Annual Peak Riverflows	4-40
4-24	Summary, by Reach, of Width of Total Water (Feet) Under the Present Condition	4-42
4-25	Summary of August Minimum Habitat or “Worst Case” Combinations of Temperature and Dissolved Oxygen Related to Different April Water Surface Elevations	4-48
4-26	Comparison of Kingsley Dam Maximum Release Temperatures (°F) for Different Initial Water Surface Elevations in Each of Four Simulated Years	4-50
4-27	Summary of Present Condition Water Quality in Lake Ogallala	4-51
4-28	Summary of Platte River Sediment Chemical Analysis (Parts Per Million)	4-55
4-29	Concentrations of Four Metals in Bed and Bank/Island Sediments in Samples Collected in 2000 in the Central Platte River in the Vicinity of Grand Island, Nebraska	4-56
4-30	Summary of the Present Condition Relative to the 1,200 Cubic Feet Per Second Target Flows and the Probability of Exceeding the Nebraska Temperature Standard	4-58
4-31	Present Condition Central Platte Habitat Area Land Cover/Land Use Classification Summary	4-62
4-32	Average Amount (Weighted Acres) of Whooping Crane Roost Habitat Available Under the Present Condition in the Central Platte River Valley	4-74

TABLES

	<i>Page</i>	
4-33	Distribution of Whooping Crane Roost Habitat for the Present Condition in Each of Four Hydrologic Reaches of the Central Platte River Study Area (Spring and Fall Averaged)	4-75
4-34	Average of the Widest Channels for 29 Transects of the Central Platte Habitat Area Under the Present Condition	4-76
4-35	Maximum 30-Day Average and Maximum 7-Day Average Peak Flow Events (at Grand Island) During the Early Spring and Late Spring Periods for the Present Condition (Cubic Feet Per Second)	4-78
4-36	Approximate Length of Bank of the Platte River and North Platte River Primary Channel That Are Owned or Controlled for Crane Habitat Conservation	4-80
4-37	Area, Perimeter, and Area:Perimeter Ratio of Habitat Parcels on the Main Channel Owned or Managed for Crane Habitat	4-81
4-38	Fish Habitat, Percent of Optimal, at Overton and Grand Island, Nebraska, for Years of High Flows (10 and 20 Percent Exceedance) and Low Flows (80 and 90 Percent Exceedance) for the Present Condition	4-93
4-39	Water Temperature Analysis at Grand Island for the Present Condition	4-94
4-40	Federally Listed and Candidate Species and Designated Critical Habitat in the Action Areas of the North Platte River, South Platte River, and Platte River Basins	4-104
4-41	Mean Wetted Width (3- to 9-Inch Depth Range) at Eight Habitat Transect Sites (2 Through 12a) at Various Flows (Cubic Feet Per Second)	4-125
4-42	Mean Transect Length Within the 3- to 9-Inch Depth Range for 29 SEDVEG Transects Within 13 Bridge Segments Between Lexington and Chapman, Nebraska	4-127
4-43	Three Categories (in Acres) of Unobstructed Width Compared (1982 and 1998) by Bridge Segment	4-128
4-44	Acreages (1998 Compared to 1982) for Corn and Other Crops Within 3.5 Miles of the Platte River, Between 3.5 Miles West of Lexington to Chapman, Nebraska	4-131
4-45	Acreages (1998 Compared to 1982) for Lowland Grasses, Alfalfa, and Upland Grasslands Within 3.5 Miles of the Platte River From Overton to Chapman, Nebraska	4-132
4-46	Channel Area, Channel Width Greater Than 501 Feet, Channel Area Cleared, Lowland Grasses, Corn (1998 Acres), and Percent Nocturnal and Diurnal Crane Use of Study Segments	4-133
4-47	Colorado, Nebraska, and Wyoming State Listed Threatened, Endangered, and Species of Special Concern	4-134
4-48	Summary of Elevations Less Than 6,289 Feet (~200,000 Acre-Feet) in Seminoe Reservoir Under the Present Condition	4-160

TABLES

		<i>Page</i>
4-49	Summary of the Total Months Below Minimum Volume (50,000 Acre-Feet) for a Viable Fishery in Seminole Reservoir Under the Present Condition	4-160
4-50	Summary (Median) Morphoedaphic Index and Projected Fish Standing Crop Results for Seminole Reservoir Under the Present Condition	4-161
4-51	Summary of Elevations Less Than 5,787 Feet (~200,000 Acre-Feet) in Pathfinder Reservoir Under the Present Condition	4-161
4-52	Summary of the Total Months Below Minimum Volume (50,000 Acre-Feet) for a Viable Fishery in Pathfinder Reservoir Under the Present Condition	4-161
4-53	Summary (Median) Morphoedaphic Index and Projected Fish Standing Crop Results for Pathfinder Reservoir Under the Present Condition	4-162
4-54	Summary of Elevations Less Than 4,580 Feet (~100,000 Acre-Feet) in Glendo Reservoir Under the Present Condition	4-162
4-55	Summary of the Total Months Below Minimum Volume (64,000 Acre-Feet) for a Viable Fishery in Glendo Reservoir Under the Present Condition	4-162
4-56	Summary (Median) Morphoedaphic Index and Projected Fish Standing Crop Results for Glendo Reservoir Under the Present Condition	4-163
4-57	Flows Less Than 500 Cubic Feet Per Second for North Platte River at Kortez Reservoir Outflow Under the Present Condition	4-163
4-58	Flows Less Than 75 Cubic Feet Per Second for North Platte River in Fremont Canyon (Pathfinder) Turbine Bypass Under the Present Condition	4-163
4-59	Flows Less Than 500 Cubic Feet Per Second for North Platte River at Gray Reef Reservoir Outflow Under the Present Condition	4-164
4-60	Flows Less Than 25 Cubic Feet Per Second for North Platte River at Glendo Reservoir Outflow Under the Present Condition	4-164
4-61	Hydropower Facilities in Central Platte Region	4-175
4-62	Hydropower Facilities in North Platte Region	4-175
4-63	Present Condition for the Hydropower Resource	4-177
4-64	Visitor Use at Selected Wyoming Sites	4-181
4-65	Present Condition, Summary of Baseline Conditions	4-187
4-66	Platte River Economic Regions and County Groupings	4-189
4-67	Economic Sector Categories and Representative Crops	4-191
4-68	Harvested Acreage of Irrigated Crops, State Totals, 10-Year Average (1988-1997)	4-192
4-69	Harvested Acreage of Irrigated Crops, by Impact Region, 10-Year Average (1988-1997)	4-193
4-70	Weighted Average Crop Yields, By Region (1988-1997)	4-194
4-71	Estimated Crop Revenues by Crop and Impact Region, 10-Year Average (1988-1997)	4-195

TABLES

		<i>Page</i>
4-72	State-Level, Marketing Year Crop Prices, Average for 1988-1997	4-196
4-73	Annual Irrigation Deliveries Modeled by Impact Region, 48-Year Average, 1947-1994	4-197
4-74	Basin Minority Populations	4-219
4-75	Basin Poverty and Income	4-220
5-1	Average End-of-Month Elevation (Feet) for Seminole and Pathfinder Reservoirs	5-9
5-2	Years With Storage Less Than Low Storage Indicator (Thousand Acre-Feet)	5-10
5-3	Average May - August Drawdown (Feet)	5-11
5-4	Years With Spills From Guernsey Reservoir	5-11
5-5	Percent Change in Average Seasonal Flows (Cubic Feet Per Second) When Compared to the Present Condition	5-12
5-6	Months With Flows Less Than 500 Cubic Feet Per Second	5-13
5-7	Amount of Program Water Leasing (Thousand Acre-Feet)	5-15
5-8	Number of Years With Irrigation Delivery Shortages	5-16
5-9	Average Irrigation Deliveries Shortage (Thousand Acre-Feet)	5-17
5-10	Number of Times Water Right Administration Was Necessary on the North Platte River Above Pathfinder Reservoir	5-18
5-11	South Platte Reservoir Storage: Average Change in End-of-Month Content Relative to Historic Conditions, 1950-1994, in Acre-Feet	5-19
5-12	Average Gains or Losses to the South Platte River Per Month (Acre-Feet) Due to Tamarack Project Operations	5-20
5-13	Estimated Change in Average Monthly Flows (Cubic Feet Per Second), 1950-1994, Resulting From Water Leasing Operations	5-21
5-14	South Platte River Flow at Julesburg, Program Water for Environmental Purposes (Thousand Acre-Feet)	5-24
5-15	Lake McConaughy: Average End-of-Month Elevation (Feet)	5-26
5-16	Lake McConaughy Years With Storage Less Than 500,000 Acre-Feet	5-27
5-17	Lake McConaughy May - August Drawdown (Feet)	5-27
5-18	Lake McConaughy Years With Spills	5-28
5-19	Percent Change in Seasonal Average Monthly Flows (Cubic Feet Per Second) When Compared to the Present Condition	5-39
5-20	Irrigation Deliveries: Average Monthly and Annual Flow Volumes (Thousand Acre-Feet) for the Present Condition	5-40
5-21	Irrigation Deliveries: Estimated Water Leasing (Thousand Acre-Feet)	5-41
5-22	Shortages for the Western Canal	5-42
5-23	Average Program Water by Basin (Thousand Acre-Feet)	5-43
5-24	Short-Duration High Flows Under Each Alternative	5-44
5-25	Central Platte Program Releases and Achievement of Target Flows	5-46
5-26	Channel Restoration Plans	5-54
5-27	Mean Annual Flow and the 1.5-Year Flow for All Alternatives, and Percentage Difference Relative to the Present Condition	5-57

TABLES

		<i>Page</i>
5-28	Summary of Short-Term Cumulative Sand Transport, Deposition, and Augmentation From Land Management Plans Under Each Alternative	5-59
5-29	Summary of Long-Term Cumulative Sand Transport, Deposition, and Augmentation From Land Management Plans Under Each Alternative	5-60
5-30	Comparative Ranking of Alternatives by Net Deposition in the Central Platte Habitat	5-61
5-31	Summary of Differences in Median Grain Size From the Present Condition	5-63
5-32	Summary of Differences in Width of Total Water From the Present Condition (Feet)	5-67
5-33	Summary of the Water Quality Aspects of Platte River Endangered Species Recovery Alternatives Evaluation	5-72
5-34	Summary of Total Dissolved Solids (milligrams per liter) for Sites on the North Platte River Above Lake McConaughy	5-73
5-35	Summary of Alternatives Percent of Years of Meeting Critical April Elevations for Trout Habitat in Lake McConaughy for the Period 1947 Through 1994 (48 Years)	5-75
5-36	Comparison of the Number of Days in June, July, and August in the 48-Year Daily Study That the Flow at Grand Island Exceeded 1,200 Cubic Feet Per Second and a Comparison of the Probability of Exceeding the Temperature Standard of the Present Condition With That of Each of the Alternatives	5-78
5-37	Turbidity (JTU) Summary Statistics for the Present Condition and Each Alternative	5-79
5-38	Median Bed Sediment Contaminant Concentrations in the Platte River Near Grand Island, Nebraska (All in Parts Per Million)	5-82
5-39	Alternatives Summary Changes in Area of Land Cover Types Compared to the Present Condition	5-87
5-40	Predicted Changes in Irrigated Acres by Alternative (No Substitution of Dryland Farming for Irrigation Assumed)	5-89
5-41	Changes in Open Channel Area Relative to the Present Condition	5-94
5-42	Average Amount of Whooping Crane Roost Habitat (Weighted Acres) and Percent Change From the Present Condition During Spring and Fall Migration	5-95
5-43	Distribution of Whooping Crane Roost Habitat (Weighted Acres) in Each of the Four Hydrologic Reaches of the Central Platte River (the Spring and Fall Values Are Averaged for Each	5-95
5-44	Projected Trends in the Widest Channels for Upstream and Downstream Sections of the Central Platte River Habitat Area, Using a 48-Year Period Following Program Implementation	5-96

TABLES

		<i>Page</i>
5-45	Change in the Amount of Grassland Area in the Study Area Compared to the Present Condition (42,330 Total Grassland Acres)	5-98
5-46	Distribution of Acquired and Restored Grasslands in the Central Platte River, Lexington to Chapman, Nebraska	5-99
5-47	Change in the 30-Day Mean River Water Surface Elevations During Early Spring (Mid-February to Mid-March) From the Present Condition	5-100
5-48	Change From the Present Condition in the Maximum 30-Day Peak River Water Surface Elevation During Late Spring (Mid-April Through June) Over 48 Years	5-101
5-49	Change From the Present Condition in the Maximum 7-Day Peak River Water Surface Elevation During Late Spring (Mid-April Through June)	5-101
5-50	Approximate Length of Bank of the Platte and North Platte Rivers Primary Channels That Are Owned or Managed for Crane Habitat Conservation	5-102
5-51	Number of Bridge Segments for Program-Managed Land and the Area, Perimeter, and Area:Perimeter Ratio of Program Lands	5-103
5-52	Pallid Sturgeon Spawning Period Average and Absolute Change From the Present Condition by Alternative and Exceedance Interval	5-139
5-53	Habitat Formation and Maintenance Period Average Percent and Absolute Change From the Present Condition by Alternative and Exceedance Interval	5-140
5-54	Food Base Production Period Average Percent and Absolute Change From the Present Condition by Alternative and Exceedance Interval	5-141
5-55	Summer Period Average Percent and Absolute Change From the Present Condition by Alternative and Exceedance Interval	5-142
5-56	Daily Sediment Transport Rates of the Alternatives	5-144
5-57	Summary of Effects Determinations for the Target Species	5-157
5-58	Summary of Effects Determinations for Other Listed Species	5-158
5-59	Mean Transect Length Within the 3- to 9-Inch Depth Range for 29 Transects Within 13 Bridge Segments Between Lexington and Chapman, Nebraska	5-163
5-60	Mean Transect Length Within the 3- to 9-Inch Depth Range for 29 Transects Within 13 Bridge Segments Between Lexington and Chapman, Nebraska	5-168
5-61	Summary of Impact Indicator Values for Sandhill Cranes by Alternative	5-170
5-62	Summary of Elevations Less Than 6,289 Feet (~200,000 Acre-Feet) in Seminoe Reservoir	5-186

TABLES

		<i>Page</i>
5-63	Summary of the Total Months Below Minimum Volume (50,000 Acre-Feet) for a Viable Fishery in Seminole Reservoir	5-187
5-64	Percentage Change From the Present Condition Based on Area-Weighted Morphoedaphic Index in Seminole Reservoir	5-187
5-65	Summary of Elevations Less Than 5,787 Feet (~200,000 Acre-Feet) in Pathfinder Reservoir	5-188
5-66	Summary of the Total Months Below Minimum Volume (50,000 Acre-Feet) for a Viable Fishery in Pathfinder Reservoir	5-188
5-67	Summary of Elevations Less Than 5,486 Feet (~150,000 Acre-Feet) in Alcova Reservoir	5-189
5-68	Percentage Change From the Present Condition Based on Area-Weighted Morphoedaphic Index in Alcova Reservoir	5-189
5-69	Summary of Elevations Less Than 4,580 Feet (~100,000 Acre-Feet) in Glendo Reservoir	5-190
5-70	Summary of the Total Months Below Minimum Volume (64,000 Acre-Feet) for a Viable Fishery in Glendo Reservoir	5-191
5-71	Percentage Change From the Present Condition Based on Area-Weighted Morphoedaphic Index in Glendo Reservoir	5-191
5-72	Month-to-Month Volume Decreases at Glendo Reservoir	5-191
5-73	Month-to-Month Volume Increases at Glendo Reservoir	5-192
5-74	Net Flow Decrease at Kortes Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-192
5-75	Net Flow Increases at Kortes Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-193
5-76	Flows Less Than 500 Cubic Feet Per Second for North Platte River at Kortes Reservoir Outflow (Number of Water Years Out of 48)	5-193
5-77	Net Flow Decreases at Fremont Canyon (Pathfinder) Turbine Bypass: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-193
5-78	Net Flow Increases at Fremont Canyon (Pathfinder) Turbine Bypass: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-194
5-79	Flows Less Than 75 Cubic Feet Per Second for North Platte River in Fremont Canyon (Pathfinder) Turbine Bypass (Number of Water Years Out of 48)	5-194
5-80	Flow Decreases at Gray Reef Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-194
5-81	Flow Increases at Gray Reef Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-195
5-82	Flows Less Than 500 Cubic Feet Per Second for North Platte River at Gray Reef Reservoir Outflow (Number of Water Years Out of 48)	5-195
5-83	Flow Decreases at Glendo Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-195

TABLES

		<i>Page</i>
5-84	Flow Increases at Glendo Reservoir Outflow: Alternative Minus the Present Condition (Number of Water Years Out of 48)	5-196
5-85	Flows Less Than 25 Cubic Feet Per Second for North Platte River at Glendo Reservoir Outflow (Number of Water Years Out of 48)	5-196
5-86	Summary of the Hydropower Impacts Relative to the Present Condition	5-196
5-87	Governance Committee Scenario 1 Alternative Recreational Impacts - Changes From the Present Condition	5-215
5-88	Alternative 3 - Governance Committee 2 Recreational Impacts - Changes From the Present Condition	5-220
5-89	Alternative 4 - Water Emphasis Recreational Impacts - Changes From the Present Condition	5-222
5-90	Wet Meadow Recreational Impacts - Changes From the Present Condition	5-224
5-91	Water Leasing Recreational Impacts - Changes From the Present Condition	5-225
5-92	Effect of Alternatives on Boat Ramp Access	5-227
5-93	Platte River Economic Regions and County Groupings	5-228
5-94	Changes in Consumptive Use of Irrigation Water by Alternative	5-230
5-95	Irrigated Crop Acres, 10-Year Average (1988-1997)	5-232
5-96	Predicted Changes in Irrigated Acres by Alternative and Economic Region (No Substitution of Dryland Farming for Irrigated Assumed)	5-234
5-97	Predicted Changes in Irrigated Acres by Alternative (Assumes Substitution of Dryland Farming for Irrigation)	5-235
5-98	Predicted Changes in Agricultural Revenues by Alternative and Economic Region (\$1,000) (No Substitution of Dryland Farming for Irrigation Assumed)	5-236
5-99	Predicted Changes in Agricultural Revenues by Alternative and Economic Region (\$1,000) (Assumes Substitution of Dryland Farming for Irrigation)	5-238
5-100	Habitat Acquisition and Management Program Summary of Changes to Agricultural Area and Revenues by Alternative	5-239
5-101	Direct Economic Effects by Alternative	5-242
5-102	Average Annual Total Regional Economic Impacts	5-246
5-103	Primary Project Costs	5-247
5-104	Summary of Groundwater Level Changes 500 Feet and 1,000 Feet From the River	5-252
5-105	Summary of Cultural Resource Impacts	5-256
5-106	Number of Developed Land Parcels in the 1998 and 1982 EIS GIS database	5-257
5-107	Summary of Cultural Resource Impacts	5-268
5-108	Number of Developed Land Parcels in the 1998 and 1982 Environmental Impact Statement Geographic Information System Database	5-276
6-1	Scoping Meetings Held in Colorado, Nebraska, and Wyoming	6-2

FIGURES

		<i>Page</i>
1-1	Platte tri-basin map with each subbasin colored	follows 1-4
1-2	The four target species listed as endangered or threatened in the Platte River Basin under the Endangered Species Act	1-5
1-3	Program planning and NEPA process	1-22
2-1	Central Platte map with critical habitat for whooping cranes and piping plovers, and Central and Lower Platte Habitat Areas	follows 2-2
2-2	Whooping crane use of channel areas of various widths versus availability of channel areas of varying width	2-8
2-3	Schematic of typical wet meadow complex along the Central Platte River	2-11
2-4	The Platte River opposite Platte City (near present-day Cozad, Nebraska), October 1866	2-13
2-5	North Platte Subbasin	follows 2-14
2-6	South Platte Subbasin	follows 2-14
2-7	Central Platte Subbasin	follows 2-14
2-8	Cumulative usable storage in the reservoirs in the Basin	2-16
2-9	Median mean daily flow in the Platte River at Duncan, Nebraska, in 1895-1909 versus 1975-1998	2-23
2-10	Magnitude and timing of peak mean daily flows at Overton, Nebraska	2-25
2-11	Mean annual sediment loads over time and distance along the Platte River	2-32
2-12	Central Platte schematic displaying average annual flow	2-33
2-13	Property survey map of Dawson County, Nebraska, in 1904, showing river widths of approximately 1 mile	2-36
2-14	Widths of the Central Platte River at six time periods	2-37
2-15	Central Platte River channel near Overton, Nebraska, in 1860, 1889, and 1904	2-38
2-16	Central Platte River channel near Overton, Nebraska, in 1938, 1951, and 1998	2-38
2-17	The stage (water surface elevation) of riverflows in the North Platte River at North Platte, Nebraska, has been increasing over time for the same volume of flow	2-41
2-18	Land cover changes within the Central Platte River near Kearney, Nebraska	2-45
3-1	The Present Condition median riverflows at Grand Island, Nebraska, and flows under the Governance Committee Alternative, compared to Service Species and annual pulse flow targets	3-17
3-2	Water elements map for Governance Committee Alternative	follows 3-22
3-3	Addressing scientific uncertainty as part of a cooperative Program	3-24
3-4	Illustration of land cover type changes resulting from habitat restoration	3-36
3-5	A schematic drawing of an area along the river that was previously wet meadow, but now is drier shrubs and woodlands	3-37
3-6	Flexibility in land management	3-39
3-7	Options for increasing the Program's capacity to move water to the habitat area	3-40
3-8	Potential methods for increasing program capacity to create short-duration high flows near bankfull in the Central Platte Habitat Area	3-41
3-9	Methods for increasing open view and offsetting erosion in the channel	3-46

FIGURES

	<i>Page</i>	
3-10	Cross-section of the river on Cottonwood Ranch, illustrating the types of channel restoration activities described in this scenario	3-49
3-11	Water elements map for Water Leasing Alternative	follows 3-50
3-12	Water elements map for Wet Meadow Alternative	follows 3-52
3-13	Water elements map for Water Emphasis Alternative	follows 3-56
4-1	Central Platte schematic displaying average annual flow	4-7
4-2	Changes in groundwater levels in the Platte Valley, Nebraska, from predevelopment to 2000	4-27
4-3	Present Condition. Cumulative sand transport and cumulative sand deposition, after 13 years of simulation, are plotted versus river mile	4-35
4-4	Present Condition. Cumulative sand transport and cumulative sand deposition, after 61 years of simulation, are plotted versus river mile	4-36
4-5	Present Condition. Longitudinal profile of the Platte River channel bottom after 61 years and the changes in channel bottom elevation are plotted versus river mile	4-36
4-6	Predicted water surface elevation at river mile 210 over the 61-year period of simulation	4-38
4-7	Predicted water surface elevation at a cross section located at river mile 194 over the entire 61 years of simulation	4-39
4-8	Width of total of water after 13 and 16 years is plotted versus river mile	4-41
4-9	Total dissolved solids of the North Platte Basin from upstream from Seminoe Reservoir, Wyoming, to upstream of Lake McConaughy, Nebraska	4-45
4-10	Specific conductance data for the South Platte River at Julesburg for the period of record 1951-1995	4-52
4-11	Comparison between the mean monthly specific conductance for the historic record and the Present Condition as represented by the supplemented historic record	4-54
4-12	Historic and Present Condition turbidity distributions	4-59
4-13	Selenium concentrations (micrograms per liter) from sampled wells in the Phelps and Kearney Counties' segment of the groundwater mound and potential conjunctive use areas	4-61
4-14	GIS bridge segment map	follows 4-62
4-15	Distribution of wide channels in the Central Platte River Habitat Area Under the Present Condition	4-72
4-16	Whooping crane habitat as a function of riverflow, as modeled by the Biology Workgroup	4-73
4-17	Amount (acres) and distribution of bottomland grassland along the Central Platte River	4-77
4-18	Percent sandhill crane observations from 13 bridge segments between Lexington and Chapman, Nebraska, 1980-1999	4-120

FIGURES

	<i>Page</i>
4-19 Relationships between total channel wetted width (A), wetted width with depths greater than 12 inches (B), wetted width within a depth range of 3-9 inches (C), and discharge at habitat site 4A-3	4-122
4-20 Walleye reproduction potential under the Present Condition	4-169
4-21 White bass reproduction potential under the Present Condition	4-170
4-22 Smallmouth bass reproduction potential under the Present Condition	4-171
4-23 Channel catfish reproduction potential under the Present Condition	4-171
4-24 Gizzard shad reproduction potential under the Present Condition	4-172
4-25 Gizzard shad overwintering potential under the Present Condition	4-173
4-26 Summer water levels in Lake McConaughy	4-174
4-27 Map of Platte River economic impact regions	4-189
4-28 Platte River Basin employment trends	4-200
4-29 Platte River Basin income trends	4-201
4-30 Platte River Basin sales, by sector, 1992	4-202
5-1 Average end-of-month storage in the North Platte Basin under all alternatives	5-8
5-2 Average monthly environmental deliveries (kaf) from the North Platte Basin above Lake McConaughy	5-15
5-3 Estimated increase in May streamflow in the South Platte River at Julesburg resulting from water leasing, with the 48 years ranked highest to lowest	5-22
5-4 Estimated increase in June streamflow in the South Platte River at Julesburg resulting from water leasing, with the 48 years ranked highest to lowest	5-23
5-5 Average end-of-month storage at Lake McConaughy under all alternatives	5-25
5-6 North Platte River flows at Keystone, Nebraska, under all alternatives	5-29
5-7 North Platte River flows at North Platte, Nebraska, under all alternatives	5-30
5-8 South Platte River flows at Julesburg, Colorado, under all alternatives	5-31
5-9 Platte River flows below the Tri-County Diversion Dam under all alternatives	5-32
5-10 Platte River flows at Overton, Nebraska, under all alternatives	5-34
5-11 Platte River flows at Odessa, Nebraska, under all alternatives	5-35
5-12 Platte River flows at Grand Island, Nebraska, under all alternatives	5-35
5-13 Effect of the alternatives on highest annual flows in Central Platte Habitat Area	5-37
5-14 Effect of the alternatives on the full range of flows in the Central Platte Habitat Area	5-37
5-15 Years out of 48 that have flows at Overton, Nebraska, in the specified flow range	5-45
5-16 Average Platte River daily flows at Overton, Nebraska, for the Present Condition and Governance Committee Alternative, Scenarios 1 and 2, compared to species and annual pulse flow targets for a “normal” year	5-47

FIGURES

		<i>Page</i>
5-17	Example of how a river cross section could be modified by the clearing and leveling of a river island	5-55
5-18	Average open view widths at managed locations at year 13 under each alternative compared with the Present Condition	5-67
5-19	Comparison of the mean monthly specific conductance of the South Platte River at the Julesburg, Colorado, gauge for the Present Condition with that of the action alternatives	5-77
5-20	Estimated sediment load of the North Platte and South Platte Rivers near the city of North Platte, and in the Platte River at Lexington and Chapman, Nebraska, for each of six alternatives	5-97
5-21	Comparison of least tern timing of nest initiation for the Present Condition and all alternatives	5-114
5-22	Comparison of least tern nesting opportunity (lack of inundation) for the Present Condition and all alternatives	5-115
5-23	Comparison of least tern (managed 1 year) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-116
5-24	Comparison of least tern (unmanaged 1 year) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-117
5-25	Comparison of least tern (managed 3 years) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-118
5-26	Comparison of least tern (unmanaged 3 years) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-119
5-27	Comparison of piping plover timing of nest initiation for the Present Condition and all alternatives	5-125
5-28	Comparison of piping plover nesting opportunity (lack in inundation) for the Present Condition and all alternatives	5-126
5-29	Comparison of piping plover (managed 1 year) sandbar (nest) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-127
5-30	Comparison of piping plover (unmanaged 1 year) sandbar (nest) elevation potential (availability of nest sites) for the Present Condition and all alternatives	5-128
5-31	Comparison of piping plover (managed 3 years) sandbar (nest) potential (availability of nest sites) for the Present Condition and all alternatives	5-129

FIGURES

Page

5-32	Comparison of piping plover (unmanaged 3 years) sandbar (nest) elevation potential (availability of nest sites for the Present Condition and all alternatives	5-130
5-33	Impacts on walleye reproduction under all alternatives	5-201
5-34	Impacts on flows affecting white bass reproduction under all alternatives	5-202
5-35	Impacts on flows affecting smallmouth bass reproduction under all alternatives	5-203
5-36	Impacts on flows affecting channel catfish under all alternatives	5-204
5-37	Impacts on flows affecting gizzard shad reproduction under all alternatives	5-205
5-38	Impacts on reservoir water surface elevation affecting gizzard shad overwintering under all alternatives	5-206
5-39	Comparison of Lake McConaughy April water surface elevations for the Present Condition and the various alternatives	5-207
5-40	Affects on flows that cue spawning for catfish and shovelnose sturgeon under Present Condition and all alternatives	5-209
5-41	Changes in consumptive use of irrigation water by alternative and economic region	5-233
5-42	Predicted changes in irrigated acres by alternative and economic region (no substitution of dryland farming for irrigation assumed)	5-236
5-43	Predicted changes in irrigated acres by alternative and economic region (assumes substitution of dryland farming for irrigation)	5-237
5-44	Predicted changes in agricultural revenues by alternative and economic region (no substitution of dryland farming for irrigation assumed)	5-238
5-45	Predicted changes in agricultural revenues by alternative and economic region (no substitution of dryland farming for irrigation assumed)	5-240
5-46	Range of impacts to gross agricultural revenues by alternative (\$1,000) Platte River Basin - total	5-241