United States Department of the Interior

FISH AND WILDLIFE SERVICE
Mountain-Prairie Region

IN REPLY REFER TO:
FWS/R6/ES/NE
FWS NE: 2018-329

MAILING ADDRESS:
Post Office Box 25486
Denver Federal Center
Denver, Colorado 80225-0486

STREET LOCATION:
134 Union Boulevard
Lakewood, Colorado 80228-1807

August 27, 2018

TO: Regional Director, Great Plains Region, U.S. Bureau of Reclamation

FROM: Assistant Regional Director - Ecological Services, Mountain Prairie Region, U.S. Fish and Wildlife Service

SUBJECT: Transmittal of the U.S. Fish and Wildlife Service's Final Supplemental Biological Opinion to the Bureau of Reclamation on the Effects to Threatened and Endangered Species Resulting from a Proposed 13-year Extension to the Platte River Recovery Implementation Program in Colorado, Wyoming and Nebraska.

This document transmits the United States Fish and Wildlife Service's (Service) Final Supplemental Biological Opinion (Supplement) regarding potential impacts on federally listed threatened and endangered species resulting from the proposed 13-year extension to the First Increment (Program Extension) of the Platte River Recovery Implementation Program. This Supplement addresses effects to the following federally protected species that may be affected by funding and implementation of the Program Extension: the federally endangered pallid sturgeon *(Scaphirhynchus albus)*; Interior least tern *(Sternula antillarum)*; and whooping crane *(Grus americana)*; and federally threatened piping plover *(Charadrius melodus)* and western prairie fringed orchid *(Platanthera praeclara)*. This consultation document has been prepared pursuant to section 7 of the Endangered Species Act of 1973, as amended (Act) (16 United States Code [U.S.C.] § 1531 et seq.) and 50 Code of Federal Regulations [C.F.R] § 402 of our interagency regulations governing section 7 of the Act.

Section 7(a)(2) of the Act requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any federally listed species nor destroy or adversely modify critical habitat. The direct and indirect effects, as well as the effects from any interrelated and interdependent actions, and cumulative effects, are considered in this Supplement to determine if the proposed project is likely to jeopardize the aforementioned federally listed species.

The Bureau reviewed the draft Supplement, considered comments from the Governance Committee of the Program, and subsequently transmitted those comments to the Service. The

Service has addressed those comments to the best of our ability and believe we have been able to address the concerns.

The Service appreciates the cooperation extended by the Bureau in the preparation of this Supplement. If further assistance or information is required, or if you wish to discuss the contents of the Supplement in further detail, please contact me at michael_thabault@fws.gov (303-236-4210) or Mr. Matt Rabbe at matt_rabbe@fws.gov; (308-382-6468, extension 205).

Enclosure

cc: Jason Farnsworth, Executive Director, Headwaters Corporation
Brock Merrill, Platte River Program Coordinator, Bureau of Reclamation
Platte River Recovery Implementation Program Governance Committee

Biological Opinion

Endangered Species Act
Section 7 Consultation

U.S. Fish and Wildlife Service

Platte River Recovery Implementation Program
Final Supplemental Biological Opinion

Agency: Bureau of Reclamation

Consultation Conducted By:
U.S. Fish and Wildlife Service
Nebraska Ecological Services Field Office

August 27, 2018

8/27/18

Michael Thabault, Assistant Regional Director
Mountain-Prairie Region, Ecological Services

Date

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

GLOSSARY

Action Area - Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

AF – Acre Feet

AHR – Associated Habitat Reach, defined as the area of the central Platte River, within three miles of the outer most channel, from Lexington to Chapman, Nebraska, and the lower Platte River, below the confluence of the Elkhorn River.

AMP – Adaptive Management Plan, Attachment to the Program Document

ANWR – Aransas National Wildlife Refuge

AWBP – Aransas Wood Buffalo Population of the whooping crane

BA – Biological Assessment

CFR – Code of Federal Regulation

CFS – Cubic Feet per Second

CLMU - Central Lowlands Management Unit, pallid sturgeon management unit

CNPPID – Central Nebraska Public Power and Irrigation District

CPMU – Coastal Plain Management Unit, pallid sturgeon management unit

DPS - Distinct Population Segment

EA - Environmental Assessment

EIS – Environmental Impact Statement

EMP – Eastern Migratory Population

EMPSI –Environmental Management and Planning Solutions, Inc.

ESA – Endangered Species Act

F - Fahrenheit

FERC – Federal Energy Regulatory Commission

First Increment – The 13-year period for the Platte River Recovery Implementation Program described in the Program Document from 2007-2019, authorized by legislation through September 30, 2020

FONSI – Finding of No Significant Impact

FSM - Flow Sediment Mechanical Management Strategy as described in the Adaptive Management Plan of the Program Document

GPMU – Great Plains Management Unit, pallid sturgeon management unit

GPS – Global Positioning System

IHMU - Interior Highlands Management Unit, pallid sturgeon management unit

IMRP – Integrated Monitoring and Research Plan

Interior – U.S. Department of Interior

IPCC - Intergovernmental Panel on Climate Change

IPPC - International Piping Plover Census

MAF – Million Acre Feet

MALAA – May Affect, Likely to Adversely Affect

MBTA - Migratory Bird Treaty Act

MCM – Mechanical Creation and Maintenance Management Strategy, as described in the Adaptive Management Plan of the Program Document

MOA - Memorandum of Agreement

MOU - Memorandum of Understanding

MRRP – Missouri River Recovery Program

NDEQ – Nebraska Department of Environmental Quality

NDNR - Nebraska Department of Natural Resources

NEPA – National Environmental Policy Act

NLAA – May Affect, Not Likely to Adversely Affect

NPPD - Nebraska Public Power District

NGP - Northern Great Plains population piping plovers

NGPC - Nebraska Game and Parks Commission

2006 Opinion – Platte River Recovery Implementation Biological Opinion (2006)

Program - Platte River Recovery Implementation Program

Program Extension – 13-year extension (2020-2032 [or until legislative funding and authorization expire]) to the Platte River Recovery Implementation Program First Increment

Reclamation – U.S. Department of the Interior, Bureau of Reclamation

RM – river mile

ROD – Record of Decision

RPM – Reasonable and prudent measure in the incidental take statement

SDHF – Short Duration High Flow

Service (or USFWS) – U.S. Fish and Wildlife Service

Supplement- Platte River Recovery Implementation Program Supplemental Biological Opinion

Telemetry Project – Cooperative (USGS, USFWS, CWS, Crane Trust, Program) tracking project using telemetry (GPS) equipment to track the AWBP of whooping cranes

USACE - U.S. Army Corps of Engineers

USFWS (or Service) – U.S. Fish and Wildlife Service

USGS - U.S. Geological Survey

WBNP – Wood Buffalo Nation Park

WCTP - Whooping Crane Tracking Project

I. INTRODUCTION

The Platte River basin has undergone extensive water resource development resulting in substantial alterations to the ecosystem. The trends and conditions of Platte River habitat and ecosystem processes, and the status of the populations of four federally listed species led the U.S. Fish and Wildlife Service (Service) to conclude that the survival and future recovery of these species could not be ensured without significant changes made to improve current environmental conditions. The continued existence and recovery of the whooping crane (*Grus americana*), Interior least tern (*Sternula antillarum*), northern Great Plains population of the piping plover (*Charadrius melodus*), and pallid sturgeon (*Scaphirynchus albus*) [collectively referred to as the "target species"], depended on protecting and restoring the central and lower Platte River ecosystem. This ultimately led to the development and implementation of the Platte River Recovery Implementation Program (Program) which has resulted in substantial efforts aimed at reversing the historic trends.

For more than two decades, discussions regarding the establishment of a comprehensive, basin-wide recovery and research program had occurred among the numerous and diverse parties involved with water use and management in the Platte River basin. The parties generally agreed that the objectives of the various groups could best be met through the implementation of a basin-wide, cooperative recovery and research program. The framework for the development of such a program was provided through a Memorandum of Agreement (1994) and Cooperative Agreement (1997), which were signed by the Governors of the three Platte River basin states, Colorado, Nebraska, and Wyoming, and the Secretary of the Department of the Interior (Interior) on June 10, 1994, and July 1, 1997, respectively. Subsequent negotiations among the parties resulted in the Program, which began implementation in January 1, 2007. The Program participants agreed that it would be implemented in an incremental fashion with the first 13 years being included in the First Increment, ending December 31, 2019, in absence of further action. In 2007, legislation was enacted providing for funding and authorization through September 30, 2020. While successful implementation has occurred as envisioned, more time and resources are needed to fulfill the goals and objectives of the First Increment. A list of ten milestones was used as the basis for Endangered Species Act (ESA) compliance during the First Increment and progress toward completing these milestones is provided below:

Table I-1. Program ESA Compliance Milestones (Draft EA)

Milestone	Program Status (as of November 2017)
1. The Pathfinder Modification Project will be operational and physically and legally capable of providing water to the Program by no later than the end of Year 4 of the First Increment.	Achieved
2. Colorado will complete construction of the Tamarack I and commence full operations by the end of Year 4 of the First Increment.	Achieved

Milestone	Program Status (as of November 2017)
3. Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD) will implement an environmental account[1] for storage reservoirs on the Platte system in Nebraska as provided in Federal Energy Regulatory Commission (FERC) licenses 1417 and 1835.	Achieved
4. The reconnaissance-level water action plan, as may be amended by the Governance Committee, will be implemented and capable of providing at least an average of 50,000 acre-feet per year of shortage reduction to target flows,[2] or for other Program purposes, by no later than the end of the First Increment.[3]	Not achievable by end of 2019
5. The land plan, as may be amended by the Governance Committee, will be implemented to protect and, where appropriate, restore 10,000 acres of habitat by no later than the end of the First Increment.	Achieved
6. The integrated monitoring and research plan (IMRP), as may be amended by the Governance Committee, will be implemented beginning Year 1 of the Program.	Achieved
7. The Wyoming depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved
8. The Colorado depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved
9. The Nebraska depletions plan, as may be amended with the approval of the December 7, 2005 Milestones Document 2 Governance Committee, will be operated during the First Increment of the Program.	Not Achievable by end of 2019[4]
10. The federal depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved

The Federal Action addressed by this Supplemental Biological Opinion (Supplement) is defined as participation by Interior, through Reclamation and the Service, in funding and implementing the Program during the 13-year First Increment extension (Program Extension), and continued operation of existing and certain new Federal water-related activities, including Reclamation and Service projects in the Platte River basin upstream of the Loup River confluence. A 13-year extension was selected after consideration of how long it would take to acquire the remaining water needed to meet the milestones (at least 5 years), continue scientific investigations necessary to assess the effect of Program water and land management activities once fully implemented, and negotiate a long-term

[1]The environmental account is a term used for a "block of water" set aside in Lake McConaughy to supplement flows in the Platter River. Water is added to the environmental account and stored in Lake McConaughy until the water is needed downstream. Water released from the account is tracked and protected by Nebraska water law so that the water may provide beneficial instream flows for endangered species.

[2]Target flows (also referred to as Service target flows) are Platte River flows of certain volumes during certain times of the year. Service personnel identified them to improve habitat conditions for the target species in the central Platte River.

[3]As a water goal, the Program commits to reduce basin-wide target flow shortages by an average of 130,000 to 150,000 acre-feet per year. This is in lieu of the Service's requirement to replace 417,000 acre-feet of shortages to the target flows that it determines.

[4]The State of Nebraska is responsible for achieving this milestone.

strategy for endangered species recovery in the Platte River basin beyond the end of the Program Extension. The long-term goal of the Program is to improve and maintain the associated habitats of the four target species in the central and lower reaches of the Platte River by implementing certain aspects of the Service's recovery plans that relate to their Platte River associated habitats. The Program provides habitat-related benefits for the target species and helps offset the adverse impacts to the Platte River ecosystem from the continued operation of existing and certain new water-related activities that occur in the basins upstream of the Loup River confluence located near Columbus, Nebraska[5]. Continued Program implementation provides ESA compliance for such projects for an additional 13 years during the Program Extension. Elements of the Program Extension that changed from the First Increment are described in detail in Appendix B. The Program also aids in protecting designated critical habitat for the whooping crane and helps prevent the need to list additional Platte River basin associated species pursuant to the ESA.

The purpose of this Supplement is to determine whether the Federal action is likely to jeopardize the existence of federally listed threatened and endangered species and/or adversely modify designated critical habitat in the action area.[6] The action area is the Platte River basin upstream of the confluence with the Loup River in Nebraska and the mainstem of the Platte River downstream of the Loup River confluence. This Supplement evaluates the effects on all federally listed species and designated critical habitats in the action area from full implementation of the Program during the Program Extension. This Supplement also continues to provide ESA compliance for continuation of existing and certain new water-related activities which elect to participate in the Program. This includes Bureau of Reclamation (Reclamation) and Service water projects on the North Platte and South Platte rivers (i.e., the North Platte, Glendo, Kendrick, Kortes, and Colorado-Big Thompson projects) to the extent they affect the target species or other federally listed species and their critical habitat in the Platte River.

[5] Water-related activities in the Loup River basin and other drainages that affect the Platte River only downstream of Columbus, Nebraska are outside the scope of this biological opinion.
[6] For reasons explained in the *Consultation History* section, the scope of ESA compliance for effects of continued operations of Reclamation and Service projects on non-target species is limited to the central and lower Platte River.

II. CONSULTATION HISTORY

The Service's Nebraska Ecological Services Field Office (Field Office) in Wood River, Nebraska conducted the consultation with Reclamation for the Program Extension. The following contains a summary of pertinent topics related to: a) informal consultations or formal consultations on the action or past related actions; b) documentation of the initiation date of formal consultation; c) a chronology of subsequent requests for additional data and extensions; and d) other applicable past or current meeting summaries, consultation letters, and other communications related to the Program Extension. For a full description of the consultation history and timeline, see Appendix C.

Program History

Since 1978, the Service had consistently found, through formal section 7 consultations with other Federal agencies, that actions resulting in depletions to flows in the Platte River system were likely to jeopardize the continued existence of the federally listed whooping crane, Interior least tern, piping plover, pallid sturgeon, and federally designated critical habitat for the whooping crane. The Service's conclusions on the effects of depletions to the Platte River are well documented in a number of biological opinions resulting from these formal section 7 consultations[7]. In 1997, development of a basin-wide recovery Program was required as a Reasonable and Prudent alternative to avoid jeopardy within the biological Opinion of the Federal Energy Regulatory Commission Kingsley Dam re-licensing (USFWS, 1997). Over the next ten years, the Program was negotiated; Implementation began on January 1, 2007 after issuance of the Platte River Recovery Implementation Program Biological Opinion (2006 Opinion), issued to Reclamation. Program implementation is currently ongoing. Legislation enacted in 2007 provided funding and authorization through September 30, 2020.

Effect Determinations

The water management and land management components of the proposed Program are expected to continue providing benefits as well as adversely affecting listed species in the central and lower reaches of the Platte River. When both beneficial and adverse impacts are likely, the overall project effect determination is "may affect, likely to adversely affect." Reclamation found adverse effects to the following federally listed endangered or threatened species in the central and lower reaches of the Platte River: the federally endangered whooping crane (*Grus americana*) and its designated critical habitat, interior least tern (*Sternula antillarum*), and pallid sturgeon (*Scaphirhynchus albus*), and the federally threatened northern Great Plains population of the piping plover (*Charadrius melodus*), and western prairie fringed orchid *(Platanthera praeclara)*.

The bald eagle *(Haliaeetus leucocephalus*), federally listed at the time the 2006 Opinion was written, was delisted in 2007. It is no longer subject to the ESA, but is still protected under the Bald and Golden Eagle Act. The remaining effect determinations for the species listed in the 2006 Opinion (USFWS, 2006) remain valid and have not changed;

[7] For a comprehensive history of Platte River consultations and biological opinions prior to the June 16, 2006, Platte River Biological Opinion (Opinion), see pg. 13 of the Opinion (USFWS, 2006).

the scope of Program actions and the manner in which they could potentially affect them remain the same.

No Effect

The Draft EA determined that implementing the Proposed Action would not affect the black-footed ferret or the Canada lynx because these species are not known to occur in the area of analysis. Both species are found in isolated populations that are outside of areas potentially considered for water leasing.

The Draft EA also determined that implementing the Proposed Action would not affect the North Park phacelia because no actions are anticipated to occur in the North Platte River headwaters where this species is found. It also determined that implementing the Proposed Action would not affect the gray wolf because actions are not anticipated to result in loss of habitat for this species or its prey. Additionally, this species is extremely rare and transient in nature. Potential occurrences in the study area would be infrequent.

Implementing the Proposed Action would not affect the Eskimo curlew because this species is believed to be extirpated from the area of analysis.

May Affect, not Likely to Adversely Affect

<u>American burying beetle</u>:

Implementing the Proposed Action could affect the American burying beetle through water leasing actions, as described in the 2006 Final EIS. Program water leasing actions are considered likely to benefit the American burying beetle. However, land management actions have the potential to adversely affect the beetle if they are located where beetle habitat occurs. Given the location and type of Program land projects completed to date (none in American burying beetle habitat), we consider these effects extremely unlikely to occur. If adverse effects are determined to potentially occur from future Program projects currently unknown at this time, ESA Section 7 consultation with the Service would be undertaken; therefore, the Proposed Action may affect, but is not likely to adversely affect, the American burying beetle.

<u>Northern long-eared bat</u>:

Under the Proposed Action, land management activities and other actions, including tree clearing, removing in-channel vegetation, disking, channel widening, and prescribed burning on grasslands, have the potential to adversely affect the northern long-eared bat along the central Platte River AHR. Tree removal may pose the greatest risk to this species because the northern long-eared bat uses trees along the central Platte River for summer roosting habitat. Under the final 4(d) rule, incidental take from tree removal activities is not prohibited unless it results from removing a known occupied maternity roost tree(s) or from tree removal activities within 150 feet of a known occupied maternity roost tree from June 1 through July 31 or within 0.25 miles of a hibernaculum.

On April 2, 2015, the Northern long-eared bat (*Myotis septentrionalis*) was federally listed as threatened due to declines caused by the spread of white-nosed syndrome. Its range extends into portions of the action area and the white nose-syndrome buffer[8] contains portions of the central Platte River. Shortly after listing, the Endangered and Threatened Wildlife and Plants; 4(d) Rule for the Northern Long-Eared Bat was issued, (Service 2016). Consistent with that rule, Reclamation, acting as the lead federal agency on behalf of the Program, re-initiated informal consultation with the Service. Because the Program committed to protect known occupied maternity roost trees by avoiding tree removal during the pup rearing season (June 1-July31), a determination of “may affect, not likely to adversely affect” was made and the Service issued a concurrence letter (FWS-NE: 2016-279, August 31, 2016), concluding consultation. The actions considered in this Supplement are an extension of those ongoing actions for which we already consulted on and we do not anticipate any additional effects during the extension; therefore, this determination remains valid for the Program Extension as well.

<u>Rufa red knot</u>:
On January 12, 2015, the Rufa red knot was federally listed as threatened under the ESA. Although the species range extends into the Platte River basin, it is a rare and infrequent migrant that is extremely unlikely to be present in the area of analysis based on historical records and would potentially occur in the area of analysis only during spring and fall migrations. We conclude it is not likely to be adversely affected by components of the Program.

<u>Colorado butterfly plant and Preble’s meadow jumping mouse</u>:
The likelihood of Program water leasing activities occurring within the range of these species is insignificant or discountable. The general locations water leasing is most likely do not overlap with their habitat. We conclude Program Activities are not likely to adversely affect the Colorado butterfly plant and Preble’s meadow jumping mouse. However, there remains some uncertainty as the exact location of Program water leasing activities cannot be predicted at this time; the site-specific locations of of these projects are not known at this time. ESA Section 7 consultation with the Service would be undertaken if implementation of the Proposed Action would result in adverse effects for these species or result in damage or adverse modification of critical habitat.

<u>Ute ladies’-tresses orchid</u>:
The Probability of Program activities adversely affecting this species is discountable or insignificant, based on the lack of habitat availability along the Platte River, and 2-year limits on water leasing. We conclude the Program is not likely to adversely affect the Ute ladies’-tresses orchid.

<u>Wyoming toad</u>:
The Program has committed to avoid adverse effects to this species’ habitat by avoiding any activities in or near potential habitat where it may occur or be affected. We conclude the Program is not likely to adversely affect the Wyoming toad.

Table II-1. List of species and critical habitat in the action area, their status, Reclamation’s determination of the effects of the proposed action, and the supporting rationale.

[8] https://www.fws.gov/midwest/endangered/mammals/nleb/pdf/WNSZone.pdf

Target Species	Status	Effect Determination	Rationale
Least tern (*Sternula antillarum athalassos*)	Endangered	May Affect, Likely to Adversely affect	Beneficial and adverse effects to species are likely from one or more elements of the Program, including water and land management activities
Pallid sturgeon (*Scaphirynchus albus*)	Endangered	May Affect, Likely to Adversely affect	
Piping plover (*Charadrius melodus*)	Threatened	May Affect, Likely to Adversely affect	
Whooping crane (*Grus americana*)	Endangered	May Affect, Likely to Adversely affect	
Other Listed Species			
Western prairie fringed orchid (*Platanthera praeclara)*	Threatened	May Affect, Likely to Adversely affect	Beneficial and adverse effects to species are likely from one or more elements of the Program, including water and land management activities
Northern long-eared Bat	Threatened	May Affect, Not Likely to Adversely affect	4(d) rule, Program agreed to implement conservation recommendations, thereby minimizing adverse effects
Rufa red knot	Threatened	May Affect, Not Likely to Adversely affect	Although the species range extends into the Platte River basin, it is a rare and infrequent migrant that rarely uses the Platte River and is not expected to be affected by components of the Program
Preble's meadow jumping mouse (*Zapus hudsonius preblei*)	Threatened	May Affect, Not Likely to Adversely affect	The likelihood of Program water leasing activities occurring within the range of these species is insignificant or discountable
Colorado butterfly plant (*Gaura neomexicanus* spp. *coloradensis*)	Threatened	May Affect, Not Likely to Adversely affect	
Ute ladies' tresses (*Spiranthes diluvialis*)	Threatened	May Affect, Not Likely to Adversely affect	Probability of Program activities adversely affecting this species is discountable or insignificant, based on habitat availability, and 2-year limits on water leasing
American burying beetle (*Nicrophorus americanus*)	Endangered	May Affect, Not Likely to Adversely affect	Likely effects from water leasing anticipated to be wholly beneficial; Program land projects not anticipated to occur on, or affect the species or its habitat
Wyoming toad (*Bufo baxteri*)	Endangered	May Affect, Not Likely to Adversely affect	Program continues commitment to avoid adverse effects to this species' habitat
Black-footed ferret (*Mustela nigripes*)	Endangered	No effect	Although the species occur within the Platte River basin, habitat utilized by these species is not expected to be affected by components of the Program because water leasing will not occur in the vicinity of or have any adverse effects on their habitat
Canada lynx (*Lynx canadensis*)	Threatened	No Effect	
North Park phacelia (*Phacelia formosula*)	Endangered	No effect	
Western boreal toad (*Bufo boreas boreas*)	Candidate	No effect	
			Believed extirpated from Nebraska due

Eskimo curlew (*Numenius borealis*)	Endangered	No effect	to lack of confirmed (accepted) sightings since 1926.
Critical Habitat			
Whooping crane critical habitat	Designated	Likely to adversely affect	Beneficial and adverse effects to the primary constituent elements are anticipated from one or more elements of the Program
Preble's meadow jumping mouse critical habitat	Designated	Not likely to adversely affect	Areas where critical habitat exists do not overlap with priority areas for water leasing. The likelihood of Program water leasing activities occurring within designated critical habitat is insignificant or discountable
Colorado butterfly plant critical habitat	Designated	Not Likely to adversely affect	

III. SCOPE OF THE BIOLOGICAL OPINION

This programmatic, 7(a)(2) consultation is somewhat unusual due to the complexity and incremental nature of the Program. This Supplement serves several functions. These functions include:

a. Determining whether the Federal action, as defined in the following chapter, will likely jeopardize the continued existence of federally listed species in the Platte River basin, or destroy or adversely modify their critical habitats. This consultation covers: a) implementation of the Program for an additional 13 years (Program Extension); and b) continued operation of existing and certain new Federal water-related activities including, but not limited to, Reclamation and Service projects that are (or may become) dependent on the Program for ESA compliance during the Program Extension for their effects on the target species and other listed species that rely on central and lower Platte River habitats.

b. Defining what aspects of the Program are, and are not within the scope of this consultation. This includes determining if the Program Extension can reasonably be expected to provide ESA compliance for effects to the target species and other listed species and critical habitat in the central and lower Platte River from existing water-related activities and new water-related activities that are covered by the Federal and States' new depletion plans.

IIIA. Program Effects on Threatened or Endangered Species

Section 7(a)(2) of the ESA requires that Federal agencies satisfy two standards in carrying out their programs. They must ensure that the activities that they authorize, fund, or carryout are not likely to: a) jeopardize the continued existence of any listed species; or b) result in destruction or adverse modification of designated critical habitat.

In determining whether the Federal action is likely to jeopardize the continued existence of any listed species or adversely modify any critical habitat, the Service examines the effects of the Program in combination with the aggregate effects of all factors that have led to the current status of the species and their habitat. These factors include the status of the species, the environmental baseline, and the cumulative effects of other anticipated state and private actions in the action area.

The action area for this consultation is unchanged from its definition in the 2006 Opinion (USFWS, 2006). It is the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence.

This Supplement provides an updated list of the species and the effects of the Program on those species. The list is largely unchanged and described in detail above.

IIIB. Endangered Species Act Compliance

The intent of the Program is to continue to offset the adverse effects of water resources development in the Platte River basin sufficient to provide ESA compliance during the Program Extension. The intent is also for continued operation of existing water-related activities and new federal, state, and private water-related activities that are or will be covered by the state or Federal new depletions plans. This Supplement provides continued ESA compliance for the Federal action for: a) the effects of the Program on all listed species in the action area; and b) the effects of the continued operations of existing and certain new water-related activities that have or will elect to participate in the Program, including Service and Reclamation projects on the North Platte and South Platte rivers, as they affect the target species and critical habitat in the action area and other federally listed species associated with the central and lower Platte River. The effects from continued operation of certain Reclamation projects on other (non-target) listed species and critical habitats outside of the central and lower reaches of the Platte River were not within the scope of the 2006 Opinion nor are they for this Supplement.

IIIC. Section 7 Consultation Procedures during Program Implementation of the Program

Similar to the 2006 Opinion, ESA compliance for "existing water related activities[9]" continues to be provided for effects to target species and critical habitat in the action area and other federally listed species associated with the central and lower Platte River. They are not subject to further section 7 consultation (e.g., renewal of Reclamation water service contracts).

Some Program components have been fully evaluated and have undergone additional site-specific consultation while the effects of other Program components have not yet been described in the detail necessary to evaluate their site-specific effects. For example, a list of various past, present, or future water leasing, water supply and conservation projects are generally described within the Water Action Plan of the Program Document and are routinely updated. After specific project details become known and the project is selected for implementation (e.g. may include, but is not limited to, broad-scale recharge, etc.), ESA Section 7 consultation has been conducted. Separate Section 7 consultations will continue to be conducted on the direct physical effects of each such project as they

[9] The term "water-related activities" means activities and aspects of activities which (1) occur in the Platte River basin upstream of the confluence of the Loup River with the Platte River; and (2) may affect Platte River flow quantity or timing, including, but not limited to, water diversion, storage and use activities, and land use activities. Changes in temperature and sediment transport will be considered impacts of a "water related activity" to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of "water related activities" do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing. "Existing water related activities" include surface water or hydrologically connected groundwater activities implemented on or before July 1, 1997. "New water-related activities" include new surface water or hydrologically connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, which may affect the quantity or timing of water reaching the associated habitats and which are implemented after July 1, 1997.

move from the reconnaissance to the feasibility phase in planning throughout the remainder of the first increment and the extension.

Similarly, consultation for site-specific impacts from land acquisition and management of Program lands has occurred (e.g. FWS-NE: 2010-115). For other activities on Program lands where the location and/or operations are yet to be determined, future consultation will be required. Because impacts from these future (yet to be determined) activities to federally listed species and designated critical habitats cannot be evaluated at this time, take is not exempted. The impacts of these Program-related activities will continue to be reviewed by the Service prior to their implementation, pursuant to section 7 and 9 of the ESA, at which time take can be accurately estimated and exempted. Future consultations on these Program activities will tier from the 2006 Opinion and this Supplement and will be conducted, as needed, when those activities are specifically identified and proposed.

Issuance of this Supplement and the continuing implementation of the Program does not eliminate the need for other Federal agencies to consult with the Service on the effects of existing and future water resource development projects on federally listed species and designated critical habitats in the Platte River basin. With the Program in effect, section 7 consultations involving certain “new water-related activities” of Reclamation and the Service, other Federal agency activities with a federal-nexus (both existing and certain new water-related activities), and their effects on listed species and designated critical habitat in the central and lower Platte River, will continue to proceed in a streamlined manner and “tier” from the 2006 Opinion and this Supplement. For those projects that are within the scope of these biological opinions, ESA compliance will continue to apply only to water-related activities as they affect the target species and their critical habitat in the action area and other listed species in the central and lower Platte River in Nebraska.

Beginning in 1994, a subset of new and existing water-related projects includes several projects that have undergone formal interagency section 7 consultation for annual depletions greater than 25 acre-feet. These projects elected to participate in the Program as part of the reasonable and prudent alternative to avoid jeopardy. Since that time, these projects have all elected to participate in the Program and have assumed any obligations required of them as a Program participant.

Each state and Federal new depletions plan (Attachment 5, Sections 7 through 10 of the Program documents) describes the means by which new Platte River basin water-related activities, both those subject to and those not subject to section 7, have or will be addressed during Program implementation. These depletions plans continue to assist in determining whether proposed activities and future consultations fall within the scope of the 2006 Opinion and Supplement.

Additionally, neither the Federal nor States’ new depletion plans cover Federal or private water conservation activities implemented on agricultural lands in the Platte River basin, which may result in new depletions. It is the responsibility of Federal agencies to initiate section 7 consultations with the Service, as needed, for such federal actions. Consistent with the Program Federal Depletions Plan, each state has worked with the DOI and cooperating federal agencies to secure water annually, if needed, to offset new federal depletions within the state in a manner consistent with the respective state's Depletion Plan. As was done in the First Increment, federal depletions associated with historic (pre-1997) federal water uses in the Platte River basin will continue to be considered automatically covered by the Program, consistent with the Program's intent to cover historic uses and in recognition of the substantial federal monetary contributions being made toward first increment implementation.

The following updates are provided regarding new federal water uses in the Platte River basin during the first increment:

Colorado: Memoranda of Agreement (MOAs) and Memoranda of Understanding (MOUs) with interested federal agencies were developed for new federal depletions in Colorado to describe a process and offsetting mechanisms for federal projects electing to participate in the Program. These effectively and efficiently fulfill their purpose of facilitating streamlined consultation within Colorado where all federal depletions under Program implementation have occurred.

Wyoming: A federal depletion has not occurred in Wyoming under the Program. It is unknown if it will be necessary for any future federal depletions in Wyoming.

Nebraska: A federal depletion has not occurred in Nebraska under the Program. It is unknown if it will be necessary for any future federal depletions in Nebraska.

Participation in the Program continues to be voluntary. Federal actions proposed by non-participating entities in the Program will require individual ESA compliance. Non-participating projects without a federal nexus will need to avoid violations of the section 9 prohibitions of ESA. While all Program participants and entities who are responsible for actions identified in these biological opinions have agreed to implement the recovery action, nothing contained in the biological opinion alters or amends the voluntary and discretionary nature of the Program as described in the Program Document. If the proposed Program Extension either is not implemented or is subsequently terminated, then this Supplement becomes invalid and the affected federal agencies are responsible for reinitiating section 7 consultations on their individual federal actions.

Similarly, the Supplement is dependent on the implementation of Program activities throughout the Program Extension. ESA compliance provided by this biological opinion is only valid for all water-related activities participating in the Program if all Program signatories and entities that are responsible for actions identified in this biological opinion carry out their obligations agreed to under the Program, and extension thereof.

IV. DESCRIPTION OF THE PROPOSED ACTION

The proposed action addressed by this Supplement is: a) the participation by Interior, through Reclamation and the Service, in funding and implementing a 13-year extension to the previously authorized Program from January 1, 2020 through December 31, 2032 (or until such time that legislative funding and authorization expire); and b) the continued operation of existing and certain new water-related activities that elect to participate in the Program during the first increment and Program Extension. The Program Extension, when implemented, is intended to satisfy Reclamation's and the Service's ESA requirements for the continued operation of existing water-related activities and provide a process for continuing ESA compliance for certain new water-related activities during the Program Extension and to the extent described above. Participation in the Program and implementation of the recovery actions discussed in this Supplement address Reclamation's and the Service's application of section 7(a)(1) and 7(a)(2) of the ESA.

The action area includes the Platte River basin upstream of the confluence with the Loup River in Nebraska, and the mainstem of the Platte River downstream of the Loup River confluence. The evaluation includes effects on all federally listed species and designated critical habitats in the action area from full implementation of the Program for an additional 13 years (January 1, 2020-December 31, 2032 [or until such time that legislative funding and authorization expire]) beyond that which was authorized for the First Increment. Also, included are the effects from the continued operations of Reclamation, Service, and other water-related activities on the target species and their critical habitat in the action area and other federally listed species in the central and lower reaches of the Platte River.

This description of the proposed action within the 2006 Opinion remains largely unchanged for this Supplement except that Program funding and implementation will continue for an additional 13 years from that described in the 2006 Opinion. The Program elements, goals, structure and milestones utilized in the First Increment are adopted by reference for the Program Extension and are not described in detail, unless noted otherwise. This Supplement is based on the description of the Program provided in the Program Document and its attachments (2005), the Draft EA, dated February 28, 2018 (*Appendix A*) and the information contained in the Addendum to the Final Program Document, dated June 7, 2017 (*Appendix B*).

Elements of the Program Extension that changed from the description in the Program Document are described in detail in *Appendix B*. A summary and update of key elements described in the Program Document including any changes or deviations are described below. The Description of the Program Extension is provided as a summary below and does not alter or amend the provisions in the Program Document where it is inconsistent with the Program Document (2005) and *Appendix B*.

IVA. Description of the Program Extension in the Draft Environmental Assessment

The federal action described and evaluated in *Appendix A* is a 13-year extension to the First Increment (Program Extension) as described in the Platte River Recovery Implementation Program Final Environmental Impact Statement (Reclamation and Service, 2006). The proposed Program Extension activities are further described in *Appendix B*.

The purpose of the Program Extension is described in *Appendix A* as follows: 1) continue implementing projects that provide additional water to reduce shortages to Service target flows; 2) continue land management activities necessary to provide habitat for the target species; and 3) continue integrated monitoring, research, and adaptive management to assess the progress of the Program and to inform future management decisions. These actions are intended to help conserve and recover the four target species associated with the central and lower reaches of the Platte River.

The need for a Program Extension is to provide the Program the ability to complete the remaining milestones not achieved during the First Increment and continue ongoing implementation and recovery progress made to date. These milestones continue to be the basis for ESA compliance. While the Program achieved many of its stated goals and First Increment milestones, unexpected delays in acquiring water capable of reducing target flows by 130,000-150,000 af/yr. resulted in the need for additional time. Additionally, many scientific uncertainties remain related to the target species and how to best manage water and land in the associated habitat reach to benefit them. Additional investigations throughout the Program Extension are needed to reduce uncertainty and make progress toward a sustainable long-term solution for endangered species and the Platte River ecosystem they depend upon. By fulfilling these requirements and providing habitat-related benefits to the target species, the Program is to help offset the adverse impacts to the target species and the Platte River ecosystem from existing and new water-related projects upstream of the Loup River confluence at Columbus, Nebraska, and thereby provide ESA compliance for such projects throughout the Program Extension as well as the remainder of the first increment. The Program is also needed to improve and protect designated critical habitat for the whooping crane and help prevent the need to list additional Platte River basin associated species pursuant to ESA.

The Program also includes the intent of the parties (and project proponents, should they choose to participate) for the Program to provide ESA compliance for effects on the target species and federally designated critical habitat in the central and lower Platte River during the First Increment and Program Extension from flow depletions caused by existing and new water-related activities, as defined previously. The remedial measures provided by the Program via the Water Plan and Land Plan are intended to offset the adverse impacts of existing water-related activities as defined in the 2006 Opinion, while the state and federal new depletions plans are designed to prevent or offset adverse impacts from new water-related activities. Successful land acquisition, restoration and management were accomplished in the First Increment and will continue in the Program Extension. The Program will expand upon the existing portfolio of land owned and managed. The specific locations and management of each land parcel, the types of restoration and management, and, hence, their overall effect on key habitat characteristics is unknown; Program land acquisition must be accomplished via a willing-buyer-willing-seller arrangement. However, results of these efforts are expected to be similar to those produced in the First Increment.

This Supplement evaluates the impacts in *Appendix A* resulting from a continuation of the Governance Committee Alternative (Reclamation and Service, 2006), which provides a reasonable approach to Program implementation, to determine whether or not the Program is likely to jeopardize the continued existence of any of the target species, or adversely modify designated critical habitat in the Federal action area.

IVB. Interdependent and Interrelated Actions

In determining the effects of a Federal action, the Service must analyze the effects of activities which are interrelated and interdependent with the Federal action. Interrelated actions are part of a larger action and depend on the larger action for their justification. Interdependent actions have no independent utility apart from the action under consideration (50 CFR § 402.02). The effects of interrelated and interdependent actions are combined with the effects of the Federal action subject to consultation.

Included as interrelated with the Federal action are non-Federal projects such as existing and certain new non-Federal water-related activities (i.e., those with no Federal nexus). These non-Federal water-related projects are dependent on the Program and therefore are analyzed in this Supplement.

IVC. Program Document Updates

The Program purposes, goals, elements and objectives, which were used to guide implementation during the First Increment, remain largely unchanged (with exceptions noted below in italics). These include the following elements:

a) long and short-term objectives and goals;

b) a first increment Program Extension of 13 years;

c) a funding commitment and commitment by the states and DOI to cooperate on implementing the Program- cost share, exit strategy as well as federal funding and authorization remain unchanged for the Extension;

d) milestones for completion of Program elements;

e) an integrated monitoring and research program to monitor habitats and species' use of the action area to determine the effect of Program measures and the needs of pallid sturgeon outside the action area, and to provide information necessary to support an effective adaptive management process;

f) specific remedial measures to offset the adverse effects of existing water-related activities in the Platte River basin, including:
    1) a land component consisting of protection and restoration *of existing lands totaling in excess of 10,000 acres of habitat during the First Increment,*

plus an additional 1,500 acres of land acquired, protected, managed, and restored where appropriate;

2) a water action plan, as may be amended, consisting of a variety of activities to reduce shortages to target flows by at least 130,000 af. The Program is also committed to scientific investigations needed to confirm at least 130,000 af are necessary. *The Program would invest the resources available to achieve at least 120,000 af as quickly as possible and invest in the science necessary to determine if the additional 10,000 af is justified. If justified, the Program is committed to finding the additional resources necessary to achieve the additional 10,000 af*.

g) depletion plans developed by the states and federal government to control and offset future depletions from new water-related activities; and

h) continuation of the existing organizational structure.

For the purpose of this consultation, the Program Document updated with *Appendix B* will continue to serve as the guide for implementing the Program Extension. Regulatory certainty under ESA will continue as previously described for the First Increment in the 2006 Opinion (USFWS, 2006) and the milestones will serve as the guidelines for ESA compliance. The Service will continue working with the Program to provide bi-annual reporting as a means to track Program accomplishments and progress toward milestones as well as formally conveying concerns or shortcomings.

IVD. Updates related to Attachments to the Program Document

Implementation of the First Increment has provided a wealth of supplemental information or updates useful for continuing to implement components of the Program Document. Supplemental information pertinent to the Finance Document, the Milestones Document, the Adaptive Management and Integrated Monitoring and Research Plan, the Land Plan, and Water Action Plan are described in detail in *Appendix D*.

V. STATUS OF THE SPECIES/CRITICAL HABITAT

VA. Whooping Crane Biological Status

Unless otherwise indicated, information on the whooping crane status is drawn from the Whooping Crane Recovery Plan (USFWS 2007) and the 5-year Review (USFWS 2011).

Figure V-1. Whooping Crane.

VA1. Species and Critical Habitat Description

<u>Species Description</u>:
The whooping crane is the rarest of the world's 15 crane species. As the tallest North American bird, males approach 5 feet tall when standing erect. Whooping Cranes are sexually monomorphic with males generally being larger than females and vocalizations are sexually distinct. Adult plumage is snowy white except for black wing tips, and varying amounts and position of dark red, black or grayish feathers on the crown, nape and malar region (side of the head from the bill to the angle of the jaw). The bill is a dark gray and legs are mostly black. The juvenile plumage is a reddish cinnamon color, beginning to transition to adult plumage at approximately 120 days with yearlings typically achieving full adult plumage late in their second summer.

<u>Current Legal Status and Critical Habitat</u>:
The whooping crane remains federally designated as endangered. Designated critical habitat occurs at five locations in the U.S. (four migration, one wintering), including the approximately 55 mile stretch (3 miles wide, Lexington to Denman) along the central Platte River in the Program AHR.

<u>Former and Current Range</u>:
The whooping cranes former range was described in detail in the 2006 Opinion. The current distribution of whooping cranes has changed since the 2006 Opinion. Four geographically distinct populations exist in the wild; the only natural population at Aransas National Wildlife Refuge (ANWR), a reintroduced experimental non-migratory population in central Florida, an experimental population that migrates between Wisconsin and Florida (Eastern Migratory Population or EMP), and a non-migratory

flock in Louisiana. None of the reintroduced populations are self-sustaining, and the Whooping Crane Recovery Team recommended abandoning efforts to place more non-migratory whooping cranes in Florida and this flock is expected to become extirpated in the future. In February, 2011, a non-migratory flock was re-introduced at White Lake, Louisiana where they historically nested as late as the 1930s. Figure V-2 below depicts the current range of the 4 existing populations.

Figure V-2. Distribution of the Whooping Crane in 2014 (Urbanek and Lewis, 2015). Populations shown are Aransas/Wood Buffalo population (AWBP), Louisiana population (LP), Eastern Migratory population (EMP), and Florida (FP). Formerly this species was more widespread in the prairie wetlands of the north-central United States and southern Canada. (Source: 2006 Opinion)

VA2. Life History

<u>Migration</u>:

Numerous scientific investigations and research have been conducted related to migration of the AWBP of whooping cranes and our understanding of whooping crane migration continues to evolve. Annually, the Service updates the Cooperative Whooping Crane Tracking Project Database [WCTP](USFWS, 2018) maintained within the Nebraska Ecological Services Field Office. The database contains information gathered from confirmed public sightings of whooping cranes including location, habitat and behavior of migrating whooping cranes. It provided the baseline for the majority of our current scientific understanding of whooping crane ecology during migration. It continues to constitute as the primary source of long-term scientific data related to whooping crane migration stopover locations due to its extensive number of unique and different individuals spanning over 12 or more generations, 7 decades, and multiple cycles of drought, wet, warming, cooling, etc.

Between 2009 and 2014, a radio-tracking telemetry study (Telemetry Project) captured 68 whooping cranes (58 provided data) and affixed platform transmitting terminals with global position system (GPS) capabilities (Pearse et al, 2018). This study began tracking whooping cranes in 2011 continuing through present (less than five cranes are still transmitting data). Adults and juveniles were affixed with radio-collars which provided an instantaneous GPS location approximately four times/day for up to five years. The project was designed to provide answers to questions related to whooping crane migration ecology. The Telemetry Project has provided new information on the location and use of habitat in migration by whooping cranes. Pearse et. al. (2015) used preliminary telemetry data to investigate stopover site use intensity and delineated 20-square-kilometer grid cells that were either unoccupied, had low intensity, core intensity or extended-use core intensity. The investigation is planned to be updated and provides useful information on landscape level habitat features used by whooping cranes throughout migration.

Traditional stopover habitats such as the Platte River and the other high-use areas remain critical to the species survival; this is amplified by ongoing anthropogenic impacts including conversion of wetlands and grasslands to agriculture as well as other development. This is in addition to landscape and habitat-scale changes in response to a shifting climate patterns (Butler et al., 2017) with increasing variability. Pearse, et al., (2018) used a combination of data from the Telemetry Project and WCTP to compare and identify long-term changes in the migration corridor. The analyses indicates the migration corridor is narrowing and shifting east (primarily due to a reduction in use of the western half of the corridor) in portions of Nebraska, South Dakota and North Dakota.

Cause and Location of Mortality:
Stehn and Haralson-Strobel (2014) updated known causes of whooping crane mortality from the 50 carcasses recovered during the period of 1950-2010. At that time, power lines (20 percent), and shooting (20 percent) accounted for the greatest causes of known mortality among the AWBP of whooping cranes (24 percent of documented mortalities had unknown cause). While this may not necessarily indicate 40 percent mortality in the AWBP is due to shooting and collision with power lines, it is apparent that these two causes of death are important mortality factors based on carcasses recovered to date (Davis, 2018). Additionally, they used maximum annual winter counts combined with estimated mortality (including carcass detection and those disappearing from the population), reproduction and survival from April-November from 1950-2010 to investigate when and where mortality was occurring. Of the 546 estimated fledged cranes lost during this time, 19.8 percent occurred during the 5-6 months whooping cranes spent wintering at ANWR. Flights in summer at WBNP indicated that summer losses were infrequent suggesting the majority of the other 80 percent of mortality was

occurring during migration though it is probable mortality is underestimated on the nesting grounds due to inaccessibility. Lewis et al. (1992) reported similar (81 percent mortality north of wintering grounds). A look at all recovered carcasses indicates 55 percent (26/50) occurred during migration (Stehn and Haralson-Strobel, 2014).

Given the lack of information regarding morality of whooping cranes in migration (when, where and how), the Telemetry Project was designed to investigate this. Through 2015, a total of 17 whooping crane carcasses were recovered from radio-collared whooping cranes (Harrell, 2016). This data indicated the majority (85 percent) of whooping crane mortality was occurring outside of migration presenting an alternative line of evidence related to whooping crane mortality. Carcass recovery was difficult and inconsistent; ideally, carcasses should be recovered almost immediately after detection that a transmitter was not working. The spatial representation of mortality for this study may also be biased (compared to Stehn and Haralson-Strobel, 2014), due to: 1) small sample size (50 carcasses recovered versus 17); 2) narrow temporal scale (6 years of data versus 60 years) increasing influence of abnormal conditions or circumstances surrounding those years, which included severe drought at ANWR which is known to cause high mortality (mild to extreme drought in nearly all winters during the Telemetry Project); 3) carcass recovery varies significantly from place to place depending upon access to sites (i.e. ANWR has higher access, carcass detection, and recovery) and available resources for carcass recovery (may affect both datasets in different and unpredictable ways); and 4) disproportionate age based structure and spatial representation of marked whooping cranes which led to a majority of the mortality coming from whooping cranes three years old or younger.

Similarly, limitations and bias are inherent in the Stehn and Haralson-Strobel (2014) analyses as well. One such limitation exists in the survey methodology where whooping crane mortality during turnover periods (e.g. after winter survey count but before migration, or while whooping cranes are spread throughout their range) may have been incorrectly categorized by location of mortality. Limitations and bias are inherent in both data sets. As more telemetry data is collected over a longer time period, our understanding of these relationships will increase and uncertainty related to sample size and temporal scale will be reduced. Given the existing information, the best available dataset for migrating whooping cranes is a combination of the telemetry and historic data. For this reason, we conclude that estimates of mortality distribution (e.g. during migration, winter, or summer) are likely somewhere in between estimates provided by Stehn and Haralson-Strobel (2014) and that from the Telemetry Project (Harrell, 2016). We conclude that the distribution of mortality was likely under-estimated in summer and over-estimated during migration to some extent within Stehn and Haralson-Strobel (2014). However, we also conclude that the existing body of evidence (consideration of the 50 carcasses recovered prior to the Telemetry Project) still suggests mortality may occur at disproportionately higher rates during migration season, though not likely at rates previously reported in Stehn and Haralson-Strobel, 2014 (60-80 percent). Recent research (Butler, et al., 2014) suggests migratory and breeding mortality may influence population growth and recruitment more than winter mortality. A very low number of carcasses (n=4) recovered from the Telemetry Project allowed for positive identification of cause of mortality, preventing any meaningful conclusions from the data related to primary causes of death among the population as a whole.

VA3. Population Dynamics

The overall whooping crane population, more specifically, the AWBP of whooping cranes have continued experiencing positive growth since Program inception. Whooping crane abundance outside of the AWBP are highly dependent upon anthropogenic factors, with their population numbers being influenced by unnatural reproduction, propagation and supplementation of non-self-sustaining experimental populations (captive breeding, captive rearing, etc.)

Population Size:
The AWBP of whooping cranes is estimated to be approximately 505 based on the results of the survey from 2017-2018 winter survey at Aransas National Wildlife Refuge (Butler and Harrell, 2018). However, the Service has revised its survey protocol three times in the past eight years complicating comparisons from year to year. The most recent estimate is remarkably higher (53.5 percent) than the estimate from only two years ago. The species had been following a approximately 4.5 percent growth rate for approximately 60 years prior to these changes in the methods used to estimate the population. Confidence intervals (CI) from 2017 had almost no overlap (95 percent upper CI 2016 same as 95 percent lower CI 2017 [n=371]). In 2018, the additional significant jump in population was attributed to timing of the survey (suggesting previous years were not capturing the entire population). No explanation was provided for the significant departure from the long-term population growth rate or when that departure happened. While a high degree of uncertainty surrounds the estimate and methodology changes, it remains the only population estimate. Regarding the experimental populations, in July 2017, the EMP contained 97 individuals, while the non-migratory Louisiana flock contained 53 individuals (Harrel, 2017). Given that 161 whooping cranes were in captivity in 2015 and the remaining non-migratory Florida population numbered 8 (anticipated being less now), combined, the overall whooping crane population may be approaching approximately 800.

Population Variability: Population studies indicate a 10-year survivorship cycle of unknown cause. From April 2008 to March 2009, an unprecedented 21.4 percent of the flock (53 cranes) died within a 12-month period. These mortalities appear to be part of that 10-year cycle. The population dip from 2011-2012 also appears to be substantial but is more likely the result of a change in survey methodology away from an annual "census" obtained through aerial surveys to a systematic abundance survey. The corresponding population decrease of 29 whooping cranes from the 2010-2011 population of 283 should be interpreted cautiously as should the recent 53 percent population increase reported from 329 to 505 individuals between 2016 and 2018, numerous changes in survey methods. Figure V-3 depicts the whooping crane population over the period of record.

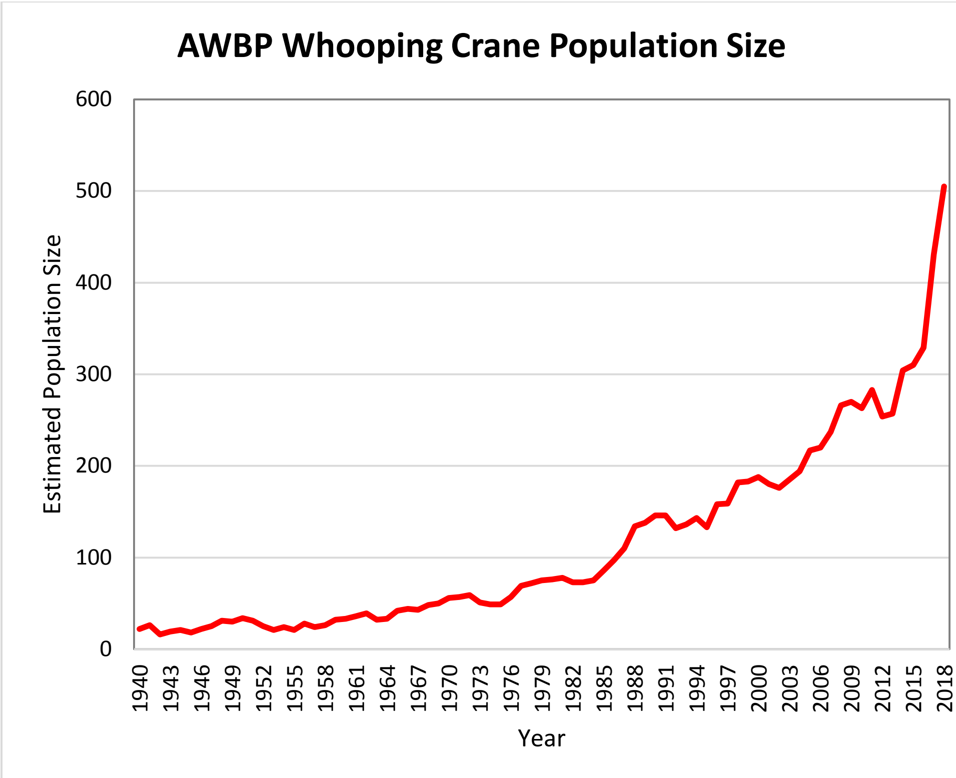


Figure V-3. Estimated population over time of the Aransas Wood Buffalo Population of whooping cranes. Reproduced from a combination of the Service Whooping Crane 5-year review, 2011, Butler et al. 2014, and recent USFWS annual population updates from Aransas National Wildlife Refuge (2012-2018).

If current population estimates are accurate, the species is likely experiencing rapid rates of growth consistent with an exponential growth curve as opposed to the static approximately 4 percent long-term growth rate previously described (2006 Opinion) for the species population trend. The 2006 Opinion also reported 22-24 years as the maximum age expectancy in the wild- this appears to be underestimated as a banded whooping crane estimated to be approximately 30 years old was photographed and documented in Texas in the spring of 2017 (Rabbe, 2017).

<u>Population Stability</u>:
The AWBP has been increasing but has not become genetically stable due to two thirds of the genetic material being lost as a result of the population bottle neck that occurred in 1941. A genetically stable captive population has been established and has met the objective laid out in the recovery plan which suggests the current captive population could sustain 90 percent of the genetic material of the species for 100 years at its current size. The remaining three distinct populations have not yielded another wild, self-sustaining population. The Florida non-migratory population is decreasing and is expected to become extirpated after efforts to continue supplementing the population with further releases have been abandoned. The EMP has made some progress but the population remains stable, in large part, due to human intervention. Regular releases into the population and assistance in production (hatching, rearing) are ongoing in an effort to

increase natural reproduction and survival to a level that could sustain a stable or increasing population. Natural reproduction and survival of young has been limited. The Louisiana non-migratory population is still in the early stages of being established; releases into the population are increasing annually and this flock is believed to offer the greatest chance for success. However, the stability of all three experimental populations is entirely dependent upon human intervention.

Genetic Viability:
As the population has increased (doubled since 2006), the threat of extinction due to stochastic events has diminished and the loss of genetic diversity has slowed. The result is an increase in genetic viability and species security, though the recovery plan indicates approximately 1000 individuals are needed before genetic loss resulting from the population bottleneck is reversed.

VA4. Status and Distribution

Reasons for Listing, New or Continuing Threats:
Reasons for listing whooping cranes as endangered under ESA are described in detail in the 2006 Opinion. In general, threats included human settlement, impacts to freshwater inflows on wintering grounds in Texas, shootings, disturbance, disease and predation, life history and ecology, climate, loss of genetic diversity, and mortality from human development (i.e. structures such as power lines, etc.). All of these factors continue to threaten whooping cranes. More recently, wind turbines have emerged as a new threat and continue to be evaluated.
Increases and changes in global climate variability continue to threaten whooping cranes. Butler et al. (2017) suggest whooping crane recruitment and population growth may fall below long-term averages during all solar cycles when atmospheric CO2 concentration increase, as expected, to 500 ppm by 2050. Species recovery during a typical solar cycle with 500 ppm may require eight times longer than conditions without climate change and the chance of population decline increases to 31 percent. Climate change has been linked to increasing the occurrence and severity of drought or storms; altering hydrology within rivers, wetlands and estuaries; and changing the timing and range of temperatures. Previously, coastal storms were considered a primary threat. Tropical storms are of greatest concern when whooping cranes are present. In October, 2017, a category five hurricane passed directly over ANWR less than a month before whooping cranes arrived; this appeared to have had little lasting effect on whooping crane habitat or survival.

Range-wide Trend:
The whooping crane population has continued to grow since Program inception. The only natural, wild, self-sustaining population (AWBP), has sustained an approximately 4.6 percent long-term growth rate until the large 53 percent change in population estimate reported in the last two years. The range wide population trends for the rest of the whooping crane population (3 experimental populations and captive populations) continue to increase or decrease proportionate to human input. The EMP has remained stable and efforts to guide migration using a small aircraft are no longer occurring. The Florida non-migratory population has continued decreasing and will likely become extirpated; in 2011, re-introduction efforts were officially abandoned. Near the same

time (2011), efforts began to establish a new non-migratory flock at White Lake, Louisiana. Overall, the majority of the population growth has occurred in the AWBP.

VA5. Analysis of the Species/Critical Habitat Likely to be Affected

The Program Extension is likely to have both beneficial and adverse effects on the whooping crane and its designated critical habitat along the Platte River. These affects will be further examined in the remainder of this biological opinion.

VB. Interior Least Tern Biological Status

Figure V-4. Interior least tern.

Unless otherwise indicated, information on the Interior least tern (referred to as least tern throughout this document) is drawn from the 5-year Review (USFWS, 2014) the Recovery Plan (USFWS, 1990) or the 2006 Opinion (USFWS, 2006).

VB1. Species and Critical Habitat Description

Species Description: The least tern grows to a length of 8 to 9 in with a wingspan of 10 to 21 in. Plumage and coloration is similar for both sexes and all ages. Banding records indicate least terns may live up to 20 years; however, the average life span is probably less. Least terns are long-lived, with records of recapture more than 20 years old. Most begin breeding at 2 or 3 years of age and breed annually throughout their lives. Least terns are the inland reproductive population of the least tern that nests on or adjacent to the major rivers of the Great Plains and the Lower Mississippi Valley (Figure V-5). They are strong fliers, migrating as far as 2,000 miles between their summer nesting habitats and wintering habitats in South America (Thompson et al. 1997).

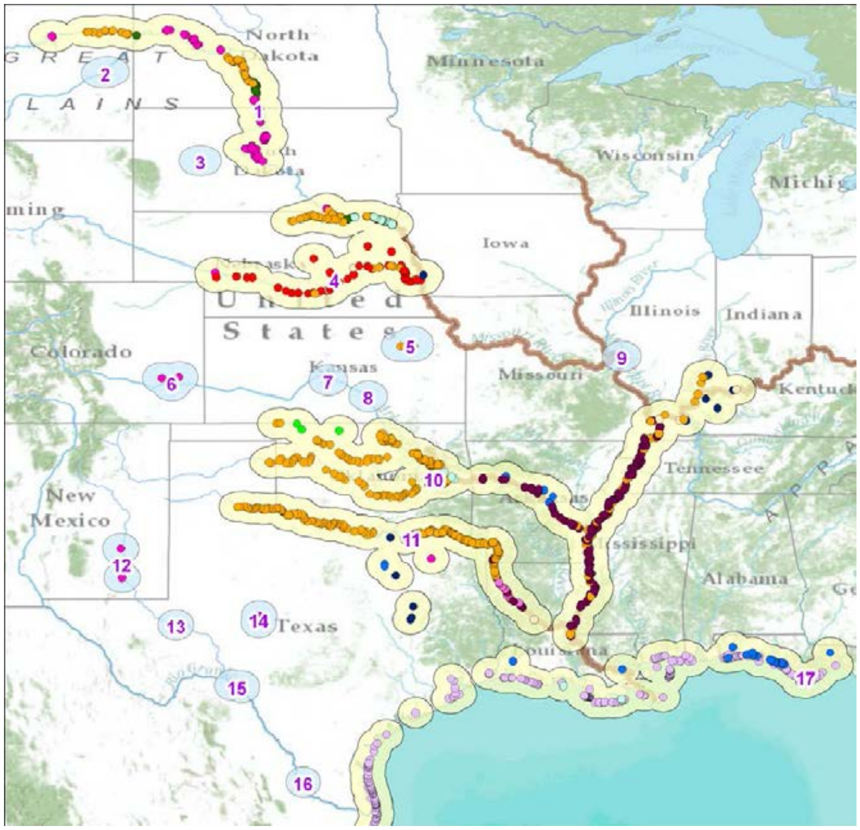


Figure V-5. Current range of Interior and coastal populations of the least tern including the 4 major geographical breeding populations of the Interior least tern. Numbers represent discrete breeding subpopulations, based upon dispersal distances. Reproduced from Service Interior least tern 5-year review, 2014, originally in Lott (2012).

Current Legal Status and Critical Habitat: The least tern remains designated as federally endangered and has been since listing in 1985. Critical habitat for the least tern has not been federally designated. In 2013, the U.S. Fish and Wildlife Service conducted a 5-year review for the least tern (USFWS, 2014). Within this review, range-wide population surveys conducted in 2005 (Lott, 2006) as well as partial counts conducted post-2005 demonstrated an increase in abundance, number of breeding sites, and range of the least tern, exceeding recovery objectives. The review indicated that the species demonstrated resiliency to threats, adequate implementation of beneficial management practices is in place, and that the species is sufficiently protected as a migratory bird under existing regulatory mechanisms. As a result, the reviewers concluded the population of least terns is recovered and were recommended to be delisted upon completing a list of actions including development of a post-delisting plan. This effort is currently ongoing and it is anticipated that upon completion, least terns will be delisted.

VB2. Life History

A detailed description of the least tern's life history was included in the 2006 Opinion. Pertinent scientific research related to its life history conducted since 2007 and key findings are described below:

Nesting Habitat: Vegetation-free sand or gravel islands are preferred for nesting. Sand banks, point bars, and beaches may also be utilized. Natural nesting habitat features are maintained and influenced by magnitude and timing of riverine flood events. However, flooding was historically, and remains a primary cause of nest failure in both unregulated and regulated river channels (e.g., Szell and Woodrey 2003, Sidle et al. 1992). This has led to divergent hypotheses related to the historic tern and plover reproductive success on riverine systems where habitat is created and maintained by natural peak flows (Farnsworth, et al., 2017, Alexander et al., 2017). While historic use and reproductive success on rivers such as the central Platte River is uncertain, we believe the species was adapted to the timing and natural variability of systems containing riverine nesting habitat and were capable of sustaining reproductive success despite high nest failure in some years. Lott et al. 2013, suggests least terns are well adapted to annual variability in local habitat availability, quality, and quantity due to their long lives, ability to re-nest, and dispersal capability. Least terns prefer nesting areas remote from trees or other vegetation that may hide or support predators (Lott et al. 2013). They will also nest on anthropogenic sites near water bodies with appropriate fish species and abundance, including industrial sites, dredged-material deposition sites (such as sand and gravel mining sites on the Platte); sand pits, created habitats (Stucker 2012), and rooftops, suggesting the species is highly adaptable. On sandpits adjacent to the central Platte River, Baasch et al. (2017a), found that least terns selected for nesting habitats: 1) greater than 150 meters from predator perches such as trees, 2) consisting of islands or sand substrates with elevations above the waterline greater than three meters, and 3) with greater distances to water.

Food and Foraging: Least terns forage on a variety of prey fish species <3 inches. Baasch et al. (2017b) investigated the relationship between flow and productivity (reproductive success) of least terns on the central Platte River. Existing data was used to perform retrospective analyses that assessed the influence of flows on forage fish abundance and any resulting effect on productivity. Though indirect, the existing data suggested all but the lowest flows were sufficient and it was unlikely that flow was limiting least tern productivity. Food or foraging is not believed to be limiting in the central Platte River under most conditions.

Migration and Winter Habitat:

Fall migrants are believed to generally follow major river basins to their confluence with the Mississippi River and then south to the Gulf of Mexico. However, late-summer observations of least terns greater than 93 mi from major river drainages suggest that some birds migrate cross-country (Thompson et al. 1997). Once least terns reach the Gulf Coast, they cannot be distinguished from other least tern populations en-route to, or within their winter habitats (i.e., Gulf of Mexico, Caribbean islands, Central and South

America), therefore the limited recent or updated information on migration and winter habitat is inclusive of other populations (i.e., Caribbean, Gulf Coast, East Coast). Least tern winter habitats are primarily observed along marine coasts, in bays and estuaries, and at the mouths of rivers. Lott (2006) conceptualized the least tern as having a large meta-population (a group of spatially separated populations of the same species that interact at some level), which might also include least terns on the Gulf Coast.

Predation:

Least tern eggs, chicks, and adults are susceptible to a wide variety of avian and terrestrial predators. Predation is a high natural source of mortality, specifically to eggs and chicks (Aron, 2012). Location of nesting colonies also has a significant influence on the degree of predation. Reproductive success has been higher on island colonies versus land-connected sandbar colonies on the Mississippi River (e.g., Smith and Renken 1993; Szell and Woodrey 2003), and in river colonies versus terrestrial sand pit colonies in the lower Platte River (Brown et al. 2012). Strategies to reduce predation include creating or maintaining habitat located away from predator perches such as trees and using predator trapping and exclusion fencing. On the central Platte, limited in-channel data attributed to specific mortality types precludes meaningful comparisons but predation on off-channel sites does not appear to preventing successful reproduction at acceptable levels.

VB3. Population Dynamics

Population Size: In 2005, the first and only range wide population survey was conducted and indicated a minimum population of over 17,500, forming 489 colonies in 68 distinct geographic sites (Lott, 2006). This still serves as the best and most recent population estimate.

Population Variability: There is strong evidence that least tern productivity varies dramatically by year and among sites within years; however, this variability is considered to be natural for the species. As previously discussed, least terns are well adapted to annual variability in local habitat availability, quality, and quantity due to their long lives, ability to re-nest, and dispersal capability (e.g., Thompson et al. 1997, Lott et al. 2013).

Population Stability: Dispersal of individuals between populations is an important factor in the persistence of unstable peripheral populations. While poorly documented, it appears to be an important factor in the maintenance of peripheral populations such as the upper Missouri River (Lott et al. 2013). Despite severe alteration of channels and flow regimes, regulation era floods have remained effective at maintaining bare sandbar nesting habitat on many river segments and when combined with development and use of anthropogenic off-channel sites, least tern populations have been stable or expanding since they were listed as endangered in 1985 (Lott et al., 2013). The listed population of the least tern has demonstrated a positive population trend, increasing by almost an order of magnitude since listing.

During the First Increment, tern and plover habitat creation and maintenance has also been occurring on the Missouri River as part of recovery actions of the Missouri River Recovery Program (MRRP). Substantial resources and efforts have resulted in increased habitat availability and utilization by terns and plovers during some years. While variable, these regional fluctuations of habitat on the Missouri River have and will continue to affect the distribution of tern and plovers within the meta-population as well as in the action area. Interactions between the different riverine systems and their influence on meta-population dynamics are not well understood, though they are documented to occur among individuals within and between years. Ultimately habitat on the Missouri and Platte River systems likely function together, further reducing the sensitivity to fluctuations of habitat or stochastic weather related effects occurring at any one location. The U.S. Army Corps of Engineers (USACE) is proposing to implement an adaptive management plan that will be geared towards offsetting the effects of the Missouri River, Bank Stabilization and Navigation Project and Kansas River Operations on terns and plovers. This includes an initial suite of management actions, research, and monitoring implemented over the 15 years following signing of the MRRMP-EIS Record of Decision (ROD). Actions include mechanical sand habitat creation, vegetation management, predator management, flow management, as well as monitoring and research on MRRP lands. As part of the adaptive management process, additional actions which were not part of the proposed action may be warranted and feasible for implementation.

VB4. Status and Distribution

Reasons for listing: The primary threats identified for least terns in the listing rule and the recovery plan were the destruction of habitat and curtailment of range due to channel engineering practices on large rivers of the Interior Basin (i.e., damming, channelization, and channel stabilization), and low numbers of surviving birds throughout the range (USFWS, 1990).

These factors were identified and considered in context with the known historical range and abundance of least tern in 1985, and a lack of evidence of the bird in potential range, including most of the lower Mississippi, lower Missouri, and lower Red, Ouachita, and White rivers, as well as on significant portions of the Ohio, Platte, and Arkansas rivers. Trends of habitat degradation were expected to continue throughout most of the least tern's fragmented range.

While river channel engineering, including reservoirs, channelization, channel training structures, and bank stabilization, continue to be factors affecting the least tern, reported numbers of nesting least tern have expanded from greater than 2,000 to approximately 18,000 individuals, and the range has increased significantly. Currently, multiple colonies are known to occur in all major drainages where the species historically nested, and available monitoring data indicate most of these drainage populations are stable or increasing.

Rangewide Trend: The listed population of the least tern has demonstrated a positive population trend, increasing by almost an order of magnitude since listing and the range has expanded. Population trends (i.e., decreasing, stable, increasing number of least terns/year) can also be used to quantify the success of habitat management and protection over time. Available monitoring data are highly variable between, and even within subpopulations and colonies, an extensive monitoring record (25+ years in some areas) provides inferences to population trends and supports the positive rangewide population trend. Table V-1 below provides rangewide population trends since listing.

Efforts by the Program, MRRP and others within the Missouri basin as well as similar directed efforts in other basins to date have collectively improved the overall status of the species since issuance of the 2006 Opinion.

Table V-1. Least tern drainage population targets and counts, 1985 to present.

Drainage (1990 Recovery Target)	1985 Listing Data	1990 Recovery Plan (1988 Data)	1994/95 (Kirsch & Sidle 1999)	2005 (Lott 2006)	2010 Partial	2011 Partial	2012 Partial
TOTAL (7,000)	**1,970**	**5,099**	**7,430***	**17,591***	**21,855**	**15,403**	**13,855**
Missouri River System							
State Targets							
Montana (50)		32	**70***	**50***			
North Dakota (250)		180	214	225			
South Dakota (680)		385	399	649			
Nebraska (1520)		990	1,166	1,038			
States Without Recovery Targets							
Iowa		22		33			
Kansas				45			
River Targets							
Missouri River (400)		**556***	**640***	**904***	**660***	273	**742***
Cheyenne River (80)		27	24	4			5
Niobrara River (200)		**200***	**217***	**289***	**257***	194	161
Loup River (170)		155	121	87	47	58	60
Platte River (750)		635	567	**556**	374	460	665
Rivers Without Recovery Targets							
Yellowstone		36	24	16			
Kansas				45			26
Elkhorn River			21	74		10	
River Segment Targets							
River below Gavins Pt (400)		297	200	**476***	159	0	208
Lake Oahe (100)		61	114	89	46	39	**100***
River below Ft. Randall (80)		?	21	76	10	0	**87***
Missouri River System (2,100)							
Total	**740**	**1,609**	**1,590**	**2,044**	**1,338**	**995**	**1,659**
Mississippi and Ohio River Population Target (2,500)							
Mississippi River **(2,500)**	350-450	2,356	**4,283***	**10,960***	**18,419***	**12,315***	**10,150***
Ohio River	10		15	172	70	50	40
Other							
Wabash River	NA		12	99	150	280	185

Total	**460**	**2,356**	**4,310***	**11,231***	**18,572***	**12,577***	**10,315***
Arkansas River System							
Population Targets							

Drainage (1990 Recovery Target)	**1985 Listing Data**	**1990 Recovery Plan (1988 Data)**	**1994/95 (Kirsch & Sidle 1999)**	**2005 (Lott 2006)**	**2010 Partial**	**2011 Partial**	**2012 Partial**
Arkansas River (**400**)	30	319	**505***	**931***			
AR (**150**)			104	**319***	**417***	**504***	**523***
OK (**250**)		210	**401***	**600**	**693***	**561***	**541**
Cimarron (**400**)	150	132	280	**428***			
Canadian (**300**)	80	62	152	**590***	Incl in OK	Incl in OK	Incl in OK
Beaver/North Canadian (**100**)		38	24	6			
Salt Plains NWR (**300**)	180-300	210	161	90	65	23	28
Quivira NWR (**100**)	50	54	53	40			
Other							
Adobe Creek		10					
3 Upper AR Valley Res				44	26		
Arkansas River System (1,600)							
Total	**610**	**825**	**1,175**	**2,129***	**1,201**	**1,088**	**1,092**
Red River System (300)							
Upper Red, TX-OK				394			NA
Lower Red, AR				1,376	744	743	643
Red River, LA				51			146
Total	**<80**	**16**	**22**	**1,821***	**744***	**743***	**789***
Trinity							
North Dallas rooftops				58	NA	NA	NA
South Dallas WWT & pits			20	28			
Richland-Chambers Res.				5			
Big Brown Mine				38			
Jewet Mine				50			
Total				**179**	NA	NA	NA
Rio Grande/Pecos River System (500)							

Bitter Lake NWR	20	6	9	28			
Brantley Lake NM				11			
Imperial Res.				14			
Lake Casa Blanca		50	28				
Falcon Res.	60	222	238				
Amistad Res.		14	18	85			
Total	**80**	**292**	**313**	**138 (Partial)**	NA	NA	NA
Other							
Cooper Lake, TX				49			
Total			**20**	**228**	NA	NA	NA
	1985	**1990**	**1995**	**2005**	**2010 Partial**	**2011 Partial**	**2012 Partial**
RANGE-WIDE TOTAL (7,000)	**1,970**	**5,099**	**7,430***	**17,591***	**21,855***	**15,403***	**13,855***

Numbers for 1985 are extracted from USFWS 1985a, Final Rule; 1988 data are from the Recovery Plan (USFWS 1990); 1995 data from Kirsch and Sidle (1999); 2005 data are taken from Lott (2006); 2010-2012 are compiled from a variety of sources (see Numerical Criteria, paragraph 3, above). Geographic recovery segments from the Recovery Plan can be identified by numerical recovery targets enclosed in parentheses; * indicates achievement of annual numerical recovery targets; italics indicates new population or population segments identified since 1985. (Reproduced from USFWS 5-year review, 2014)

VB5. Analysis of the Species/Habitat Likely to be Affected

Critical habitat for least terns is not federally designated and does not occur in the action area. Least tern habitat is likely to be both adversely and beneficially affected by the proposed action. These effects will be further evaluated and described in the remaining sections of this Supplement.

VC. Piping Plover Biological Status

Figure V-6. Piping Plover.

Unless otherwise indicated, information on the piping plover status is drawn from the 5-year Review, the Recovery Plan (1998) or the recently updated Draft Recovery Plan (2015).

VC1. Species and Critical Habitat Description

The piping plover is a small [about 16.5 to 17.5 cm (6.5 to 7 inches long); 46 to 64 grams (1.5 to 2 ounces)] migratory shorebird with a short, stout bill, pale underparts and orange legs. During the breeding season, it also has a black band across the forehead, a single black neckband, and the bill is orange with a black tip. The piping plover was named for its melodic high-pitched call from which the scientific name is derived (USFWS 1988).

The piping plover was listed on January 10, 1986, under provisions of the ESA of 1973, as amended (Service 1985). Piping plovers breed in three geographic regions of North America: beaches of the Atlantic Coast from North Carolina to Newfoundland; shorelines of the Great Lakes; and, along alkaline wetlands and major rivers and reservoirs of the Northern Great Plains (NGP, Figure V-7; Service 2017). The three breeding populations are recognized and treated separately in the final rule listing the piping plover across its range: the Atlantic and Northern Great Plains (NGP) piping plover are each classified as threatened and the Great Lakes piping plover as endangered (Service 1985). The Platte River is within the range of the piping plover's Northern Great Plains population (NGP).

Critical habitat was federally designated for the NGP on September 11, 2002, (67 FR 57638). Nineteen critical habitat units originally contained approximately 183,422 acres of prairie alkali wetlands, inland and reservoir lakes, and portions of four rivers totaling approximately 1,207.5 river miles in Montana, Nebraska, South Dakota, North Dakota, and Minnesota. In October 2005, the critical habitat designation for the piping plover was partially vacated and remanded for redesignation by the U.S. District Court for the District of Nebraska. Since that time, there has been no effort by the Service to redesignate all vacated critical habitat within Nebraska. All other critical habitat designated for the NGP of piping plovers remains intact.

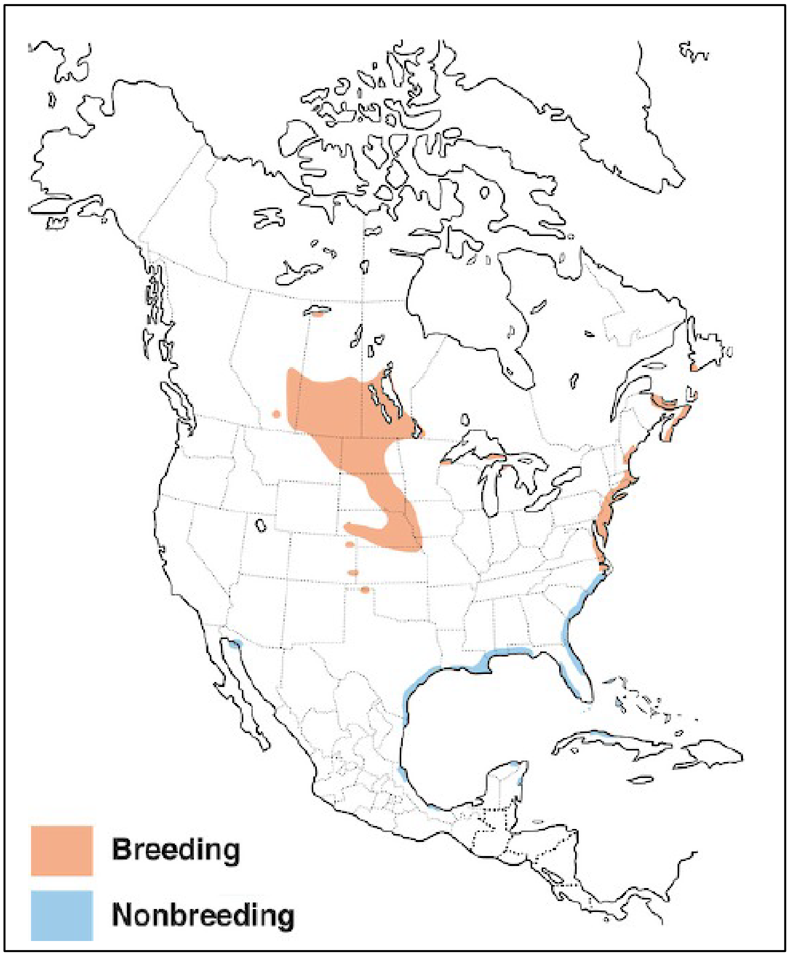


Figure V-7. Piping plover range map. Source: Birds of North America Online http://bna.birds.cornell.edu/bna maintained by the Cornell Lab of Ornithology.

VC2. Life History

Piping plovers begin to arrive on the breeding grounds in the first half of April, with courtship, followed by nesting, beginning in mid-to-late April (Catlin and Fraser 2006; Catlin and Fraser 2007; Felio et al. 2009; Felio et al. 2010a; Felio et al. 2010b; Shaffer et al. 2013). The male creates a shallow depression on the ground which both adults line with small pebbles and both sexes share incubation duties.

Hatching begins in late May to early June, generally peaking in June and early July (Catlin 2009). The young leave the nest within hours of hatching and begin to forage almost immediately (Wilcox 1959, Haig 1992). Chicks may be brooded by adults for up to 21 days post hatch (Haig and Oring 1988; Haig 1992; Maxson 2000) and become independent 25 to 35 days after hatching; they are capable of sustained flight soon after fledging (Knetter et al. 2001; Catlin et al. 2013). Piping plovers readily renest if earlier nests fail (Whyte 1985; Haig 1987). They generally only raise one brood a season, although they have been documented to raise two broods on rare occasions (Bottitta et al. 1997). Piping plovers begin to leave the breeding grounds as early as mid-July, with adults leaving first and juveniles last (Elliott-Smith et al. 2004).

Piping plovers forage on various macroinvertebrates at the soil surface and may consume prey species based on availability (Shaffer and Laporte 1994), although one study of fecal material on the Northern Great Plains suggests that birds selected for beetles (Coleoptera) over flies (Diptera) (Le Fer 2006). A study comparing prey base on the alkaline lakes, a reservoir (Lake Sakakawea, North Dakota) with sandbars below Garrison Dam, North Dakota (a cold water release dam), and Gavins Point Dam, South Dakota (a warm water release dam) determined that the prey biomass was lowest below the cold water release dam (Le Fer 2006).

VC3. Population Dynamics

Populations on all three portions of the range have increased since listing. The Atlantic Coast population has increased from approximately 790 pairs in 1986 to 1,941 in 2016 (Service 2017). Likewise, the Great Lakes population has increased from an estimated 12 pairs in 1984 to 76 unique nesting pairs in 2017 (Cuthbert and Saunders 2017). Unlike on the Great Lakes and Atlantic Coast where breeding piping plovers are censused annually, counts of NGP piping plovers occur only once every five years during the International Piping Plover census. The results of this census indicate that NGP piping plovers are the most numerous among the three, with an estimated 2,953 individuals in 1991 (1,981 in the U.S. excluding Canada) and an estimated 4,662 individuals in 2006 (2,959 in the U.S. excluding Canada, Ferland and Haig 2002; Elliott-Smith et al. 2009). The breeding census fell to 2,249 on the NGP in 2011 due to extreme flooding on the Missouri River and high water levels elsewhere in this geographic area (Elliott-Smith et al. 2015). Results from the 2016 census are not yet available. As mentioned previously within the least tern biological status section (VB3), interactions among individuals within and between years occurs on the Platte and Missouri River and efforts within both these basins collectively affect each other and the meta-population as a whole.

The criteria of the Service's *Draft Revised Recovery Plan for the Northern Great Plains Piping Plover* (Service 2016) call for stable or increasing numbers of nesting birds and sufficient habitats spread throughout the range of the population. This includes the following regions
(Figure V-8):

- Southern Rivers (Missouri River system from Fort Randall Dam, South Dakota to Ponca, Nebraska, the Niobrara River, the Loup River system and the Platte River system),
- Northern Rivers (Missouri River system from Fort Peck Lake, Montana to Pierre, South Dakota),
- U.S. Alkaline Lakes,
- Prairie Canada.

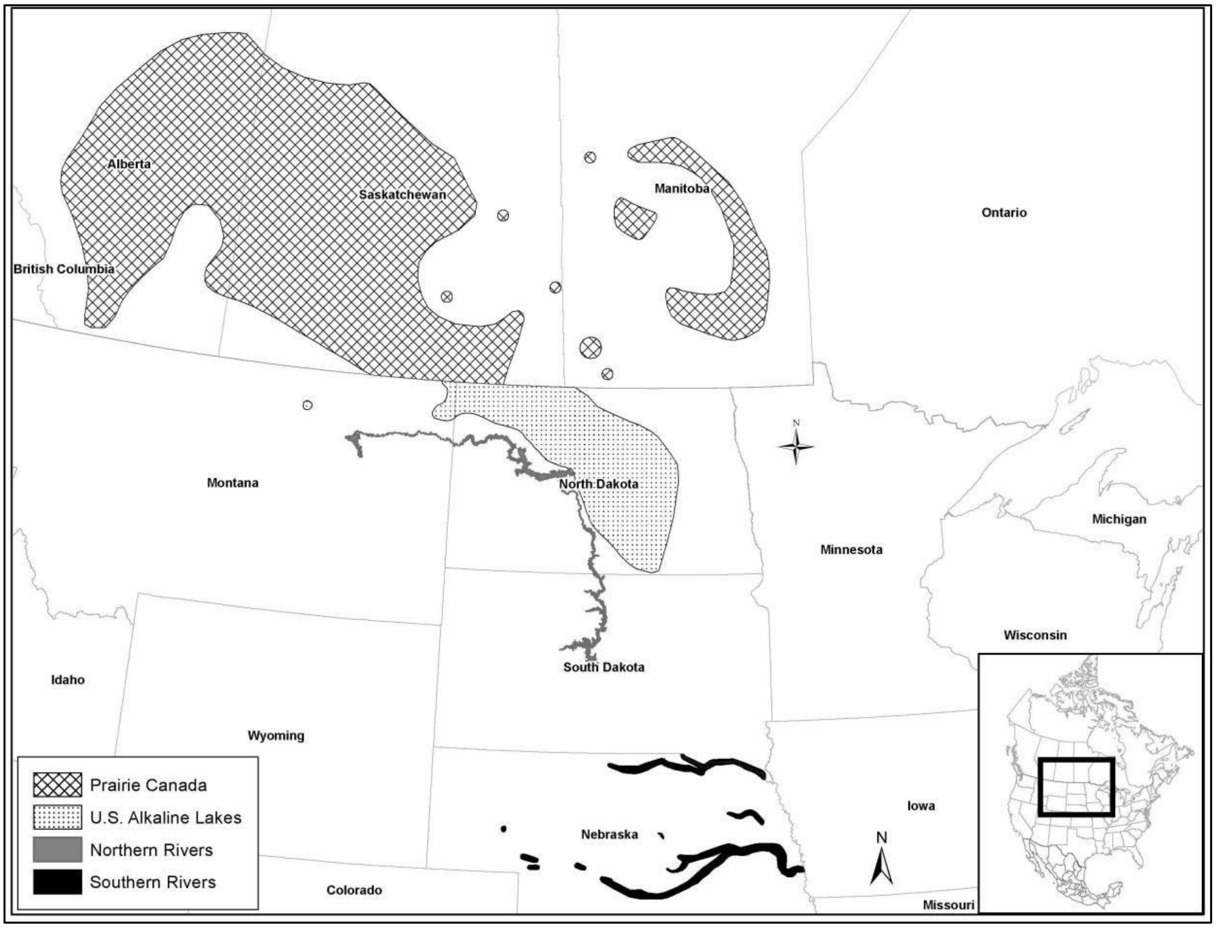


Figure V-8. Four recovery regions for the Northern Great Plains piping plover population breeding range. Adapted from Service 2016).

VC4. Status and Distribution

The Program is located within the Southern Rivers Recovery Region which is composed of the following river systems: Niobrara River, Loup River, and Platte River systems in Nebraska and the Missouri River system from Fort Randall Dam, South Dakota to Ponca, Nebraska. Piping plover habitats within the Southern Rivers Recovery Region include reservoir, river, and off-river habitats such as sand and gravel operations and dredge piles. Because of active management, the Southern Rivers Recovery Region is the only region that has an extinction probability below 5 percent (Service 2016). The population in the Southern Rivers Recovery Region is sustained through a varied combination of management actions: 1) annual vegetation management on river and off-river habitats; 2) predator exclosures [i.e., cages]; 3) fencing and/or signs to deter humans and/or predators; and 4) predator trapping (Brown et al. 2017, Farnsworth et al. 2017; Catlin et al. 2016; Zeigler et al. 2017; Zorn and Wilson 2017).

The U.S. Alkaline Lakes Recovery Region includes areas where piping plovers nest on alkaline (naturally salty) lakes in North Dakota, and Montana. The Prairie Canada Recovery Region includes alkaline and freshwater lakes and reservoirs in Alberta, Saskatchewan, Manitoba, and Ontario (Environment Canada 2006; Service 2016). Some breeding areas in the U.S. Alkaline Lakes Recovery Region that are near the Missouri River support relatively stable numbers of piping plovers and are typically exposed to environmental influences that are distinct from those that affect birds nesting on the Missouri River (Figure V-8). This helps to buffer the numbers of piping plovers nesting on the Missouri River in the Northern Rivers Recovery Region. The greater stability of populations in the U.S. Alkaline Lakes Recovery Region is due in part to asynchrony among the factors that influence the numbers of piping plovers that nest across this region. Populations on the Missouri River are typically “highly synchronous” (Roche et al. 2016). Piping plovers move among alkaline lake habitats and between alkaline lakes and the Missouri River, especially around Lake Sakakawea, further contributing the persistence of the Missouri River population (Roche et al. 2016). Although atypical, in some years important environmental drivers are in sync between the two habitat types as occurred in 2011 when water levels were high and nesting was low in both habitat types (Roche et al. 2016).

The productivity of piping plovers in parts of the U.S. Alkaline Lakes Recovery Region affects positively the numbers that nest in the Northern Rivers Recovery Region, but the ability of habitats on the alkali lakes to function as nesting habitat is vulnerable to certain threats. Consolidation drainage of wetlands and climate change may reduce habitat availability on alkali lakes (McCauley et al. 2016). Consolidation drainage removes water from some wetlands and concentrates it in undrained wetland basins, resulting in higher water levels in the latter that reduce or eliminate nesting and foraging habitat for piping plovers. Climate change, if it results in warmer and wetter conditions in the range of the NGP piping plover, could also raise water levels in wetlands and reduce habitat availability on alkali lakes (McCauley et al. 2016). These threats emphasize the importance of maintaining viable subpopulations among all regions currently inhabited by NGP piping plovers, including Missouri River habitats.

There is a small numbers of breeding populations not associated with a recovery region. The 2006 International Census identified 33 birds in Colorado, Iowa, Kansas, and Minnesota (Elliott-Smith et al. 2009).

VC5. Analysis of the Species/Critical Habitat Likely to be Affected

The NGP draft revised recovery plan’s overall objective is to restore and maintain a viable population of piping plovers by 2035. To fulfill the recovery objective, the recovery plan identifies population and habitat criteria that must be maintained for four management units/sub-populations within the species breeding range. The Service has reviewed the recovery plan and identified the following recovery tasks for the Southern

Rivers Recovery Region that are linked to Program management actions. The below recovery tasks were extracted from page 63 through 68 of the recovery plan. The linkages between Program actions and recovery tasks will be described in greater detail in the piping plover environmental baseline and effects sections.

1B Habitat Protection, Management, Restoration, and Creation

- **1.1B** Protect habitat on the breeding grounds to support piping plovers at recovery level goals (Priority 1a)
    - **1.1.1B** Purchase easements or land in fee-title to protect piping plover habitat and the nearby watershed (Priority 1a)
    - **1.1.2B** Measure habitat on the breeding grounds (Priority 1b)
    - **1.1.6B** Provide additional habitat in areas where habitat is limiting (Priority 1a)
- **1.2B** River system management: Ensure that river management mimics the natural system and furnishes sufficient high-quality nesting habitat to be available at a level to support piping plovers at recovery goals (Priority 1a)
    - **1.2.1B** Design and implement the hydrograph in managed river systems so that sandbars are created and scoured by natural processes. On the Missouri River, this will likely include transporting sediment past dams (Priority 1a)
    - **1.2.3B** Where feasible, remove bankline protection such as rip-rap and hard points so that in-channel features can be created and eroded by natural processes (Priority 2)
    - **1.2.4B** Create habitat mechanically and remove vegetation from sandbars on river systems to provide nesting habitat for plovers (Priority 2)
- **1.4B** Work with commercial aggregate (also known as sand and gravel) mining companies to operate mines to avoid adversely affecting piping plovers during operations (Priority 3)
    - **1.4.1B** Monitor long-term habitat availability and reproductive output over time on commercial aggregate mines (Priority 3)
- **1.5B** Implement steps to reduce unsustainable levels of predation risk over the long term through ecosystem restoration (Priority 1a)
    - **1.5.2B** Continue predator exclosure use on nests as a short-term palliative measure (Priority 2)
    - **1.5.10B** Implement predation control efforts as needed so that nesting and brood-rearing activities can occur successfully (Priority 3)
    - **1.5.11B** Investigate if predator removal efforts are effective (Priority 3)
- **1.7B** Identify and control plant species, with an emphasis on invasives, that may make habitat unsuitable (Priority 2)
    - **1.7.2B** Identify and eradicate non-native plant species that may overtake plover habitat (Priority 1a)

2B Public Outreach to Minimize Human Disturbance and Promote Favorable Land Management

- **2.1B** Develop and implement comprehensive plans, reflective of local conditions, to manage and avoid conflicts and to address the social and public relations challenges resulting from restrictions placed on human activities and interests such as recreation, residency, economic development and commerce. Actions should be focused on areas where management actions intended to protect Piping Plovers may interfere with human activities (Priority 1a)

2.1.1B Engage area stakeholders and provide opportunities for them to participate in policy development and decision making regarding shared, private or public resource (Priority 1b)

2.1.4B Implement seasonal or partial area closures as needed to protect nesting birds from human disturbance (Priority 1a)

Note:

- *Priority 1a* - An action that must be taken to prevent extinction or to prevent the species from declining irreversibly in the foreseeable future.
- *Priority 1b* - An action that by itself will not prevent extinction, but is needed to carry out a Priority 1a action.
- *Priority 2* - An action that must be taken to prevent a significant decline in species population/habitat quality, or some other significant negative impact short of extinction.
- *Priority 3* - All other actions necessary to provide for full recovery of the species.

VD. Pallid Sturgeon Biological Status

Figure V-9. Pallid Sturgeon.

VD1. Species Description

The pallid sturgeon is a large river fish that can reach six feet (ft) in length, weigh up to 80 pounds and can live 50 years and perhaps much longer. For thousands of years it has lived, fed, and bred in the Missouri and Mississippi River basins. They are a bottom-oriented, large river obligate fish. They are similar in appearance to the more common shovelnose sturgeon. Both species inhabit portions of the Missouri and Mississippi river basins. Although similar in appearance, Porreca et al. (2017) found subtle physiological and morphological differences between shovelnose and pallid sturgeon that affected their ecological success.

The pallid sturgeon was listed as endangered under the ESA of 1973 (as amended (16 U.S.C. §1536)) on September 6, 1990. Threats identified at that time were habitat alteration, commercial harvest, environmental contaminants and other factors (Jordan et al. 2016).

No critical habitat for this species has been designated under the Act.

VD2. Life History

Life cycle:

Spawning: Between March and July reproductive adult sturgeon swim upstream in search of a suitable areas to spawn, carry out spawning and return downriver. Based on wild fish, estimated age at first reproduction is 9 to 20 years for females and approximately 7 to 9 years for males (USACE 2017; Keenlyne and Jenkins 1993; Steffensen et al. 2010).

Fisheries biologists speculate that the environmental cues for this movement are the rising and peaking river hydrograph, water temperature, and photoperiod (Jordan et al. 2016). Spawning areas tend to be where firm river bottom substrates occur in deeper water with relatively fast turbulent water flow (without the correct conditions spawning success is reduced). In May during spawning season, pallid sturgeon moved away from sand-dominated substrates to gravel (Koch et al. 2012). Temperatures during spawning are between approximately 61-64 °F (Fahrenheit) (Delonay et al. 2016). Water temperatures influence growth and maturity; colder temperatures in natural environments delay sexual maturity in females by 3 years to around age 9 years (USACE 2017; Webb and Doroshov 2011). Spawning takes place when the female sturgeon releases eggs into the river current and nearby males immediately fertilize the eggs by releasing milt directly into the flowing current of the river containing the eggs. The largest upper Missouri River fish can produce as many as 150,000 to 170,000 eggs, whereas smaller bodied females in the southern extent of the range may only produce 43,000 to 58,000 eggs. Female pallid sturgeon appear to spawn every two or three years (USACE 2017; Service 2014) and males one to three years (Jordan et al. 2016).

Embryos and Free embryos: Embryos are the stage from the time of fertilization to hatching which is typically 5 to 8 days depending on temperature (Jacobson et al. 2016b). The incubation period for pallid sturgeon eggs is about two days but exact period is determined by water temperature (Delonay et al. 2016). The warmer the water temperature the shorter the time it takes for the embryos to hatch. In laboratory studies, Kappenman et al. (2013) determined that acceptable temperature range for incubation was 54 to 75 °F with the optimal range for survival at 63 to 64 °F.

Free embryos are the period from hatching until the larval fish begins feeding (Delonay et al. 2016; Jacobson et al. 2016b). At hatching, free embryos have a yolk sac attached to their stomach which provides food for approximately the first week (depending on water temperature). After hatching, the free embryos enter the water column and float downstream (Kynard et al. 2007; Braaten et al. 2008). Free embryos drift downstream for 9 to 17 days and in that time can drift long distances depending on water velocity and channel diversity or lack thereof. Duration of drift period is determined by water temperature and rate of development (Delonay et al. 2016). Braaten et al. (2008) found that larval pallid sturgeon could drift 152 to 330 miles depending on water velocity. During this time, the free embryo is predominantly pelagic with very weak swimming ability. Once the free embryos completely absorb their yolk sac, they start to feed on tiny aquatic animals. At this point in their development they are typically referred to as larvae. As free embryos develop into larvae, downstream dispersal ceases as they settle into habitats, and they begin to forage on the bottom.

<u>Exogenously feeding larvae and age-0</u>: This stage occurs when the fish begins to feed until it develops a full complement of rays in all fins (Delonay et al. 2016; Jacobson et al. 2016b). The location of where they begin to search for food is determined by spawning location, temperature, and flow (Delonay et al. 2016). About 20 to 30 days after hatching, sturgeon larvae are considered “Age- 0” and look like miniature adult fish.

<u>Juvenile</u>: The young sturgeon are referred to as juveniles (generally 30 inches fork length) after about a year, until they reach sexual maturity at approximately age 9 (Delonay et al. 2016, Jacobson et al. 2016b). During the juvenile stage, pallid sturgeon shift their diet from insects to fish (Gerrity et al. 2006). Temperatures for optimal feeding and growth were 77 to 82° F (Chipps et al. 2008). Survival rates for juvenile pallid sturgeon are similar across portions of the Missouri River and range from approximately 0.4 to 0.5 for age-1 annual survival and are > 0.8 for > age- 1 juveniles (Rotella 2015; Steffensen and Mestl 2016).

<u>Reproductive Strategy</u>:
The sturgeon has evolved a breeding strategy where the reproducing adult commits no parental care to eggs or offspring. This results in a naturally high mortality of the early life stages (embryo, free embryo and larvae). Under normal conditions, this strategy is successful and can tolerate a high level of mortality, because the large spawning adults produce as many as 170,000 eggs and can be reproductive for decades. Thus as long as the regular opportunity exists for spawning, and an opportunity for larval drift to allow for transformation of a free embryo into larvae, the success rate for a particular single embryo or free embryo or larvae can be extremely low and still support a population capable of long term survival. The key to reproductive success is having the capability to migrate to desired spawning areas and then downstream dispersal of progeny. This breeding strategy is thwarted when its migration routes are completely blocked and also degrades the sturgeon’s long term viability.

VD3. Population Dynamics

<u>Historic distribution</u>:

The historic distribution as identified in the recovery plan (Service 2014) of the pallid sturgeon includes the Missouri and Lower Yellowstone rivers in Montana downstream to the Missouri- Mississippi confluence and the Mississippi River possibly from near Keokuk, Iowa downstream to the Gulf of Mexico, including the Atchafalaya River. Pallid sturgeon also have been documented in the lower reaches of some of the larger tributaries to the Missouri, Mississippi, and Yellowstone rivers including the Tongue, Milk, Niobrara, Platte, Kansas, Big Sioux, St. Francis, Grand, and Big Sunflower rivers. The total length of the sturgeon's range historically was about 3,154 river miles.

<u>Present Distribution</u>:

The present distribution as described in the recovery plan (Service 2014) indicates that wild pallid sturgeon have been documented in the Missouri River between Fort Benton and the headwaters of Fort Peck Reservoir, Montana; downstream from Fort Peck Dam, Montana to the headwaters of Lake Sakakawea, North Dakota; downstream from Garrison Dam, North Dakota to the headwaters of Lake Oahe, South Dakota; from Oahe Dam downstream to within Lake Sharpe, South Dakota; between Fort Randall and Gavins Point Dams, South Dakota and Nebraska; downstream from Gavins Point Dam to St. Louis, Missouri; in the lower Milk and Yellowstone rivers, Montana and North Dakota; the lower James and Big Sioux River, South Dakota; the lower Platte and Niobrara Rivers, Nebraska; and the lower Kansas River, Kansas. The contemporary downstream extent of sturgeon ends near New Orleans, Louisiana; the middle and lower Mississippi River, and the Atchafalaya River, Louisiana (Jordan et al. 2016). Additionally, the species has been documented in the lower Arkansas River (Kuntz and Schramm 2012), the lower Obion River, Tennessee (Killgore et al. 2007), as well as navigation pools 1 and 2, downstream from Lock and Dam 3, in the Red River, Louisiana (Slack et al. 2012).

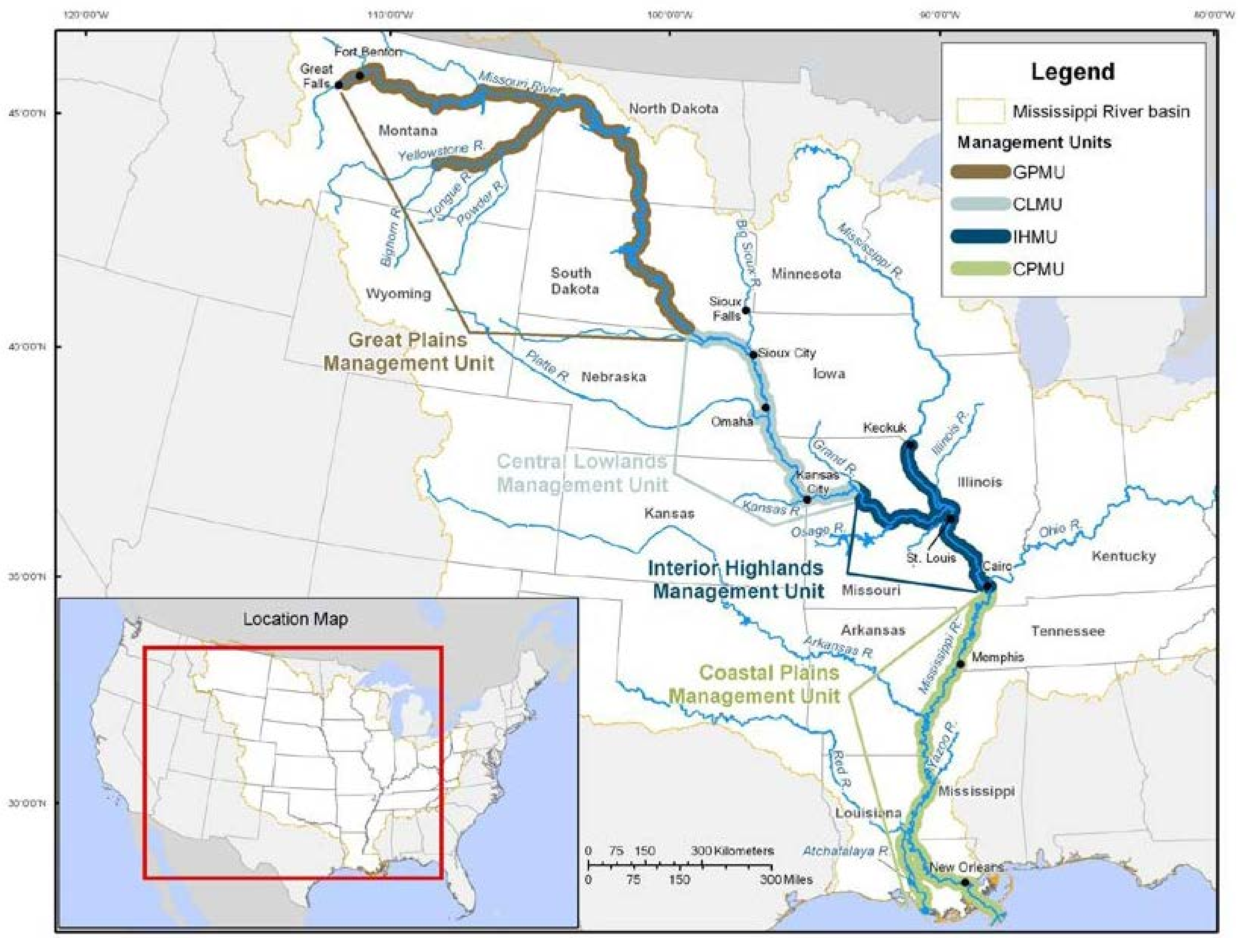


Figure V-10. Map depicting Pallid Sturgeon management units (from Service 2014).

VD4. Status and Distribution

The management units identified in the revised Pallid Sturgeon Recovery Plan (Service 2014) are described below (Figure V-11). Management units represent management subsets of the listed species with site specific recovery goals and management actions. These management units are based on: 1) genetic data; 2) morphological differences; 3) biogeography of other fish species and speciation associated with physiographic provinces; 4) common threats; and 5) the potential need and ability to implement differing management actions to address varying threats within a management unit. As genetic and stock structure data are further refined, these management units may be correspondingly adjusted (Service 2014).

The Great Plains Management Unit (GPMU) is defined as the Great Falls of the Missouri River, Montana to Fort Randall Dam, South Dakota. This unit includes important tributaries like the Yellowstone River, as well as the Marias and Milk rivers. The upper boundary is at the Great Falls of the Missouri River as this is a natural barrier above which sturgeon could not migrate historically. The lower boundary was defined as Fort

Randall Dam to ensure consistent management practices on an inter-reservoir reach of the Missouri River.

The Central Lowlands Management Unit (CLMU) is defined as the Missouri River from Fort Randall Dam, South Dakota to the Grand River confluence with the Missouri River in Missouri and includes important tributaries like the lower Platte and lower Kansas rivers.

The Interior Highlands Management Unit (IHMU) is defined as the Missouri River from the confluence of the Grand River to the confluence of the Mississippi River, as well as the Mississippi River from Keokuk, Iowa to the confluence of the Ohio and Mississippi rivers.

The Coastal Plain Management Unit (CPMU) is defined as the Mississippi River from the confluence of the Ohio River downstream to the Gulf of Mexico including the Atchafalaya River distributary system.

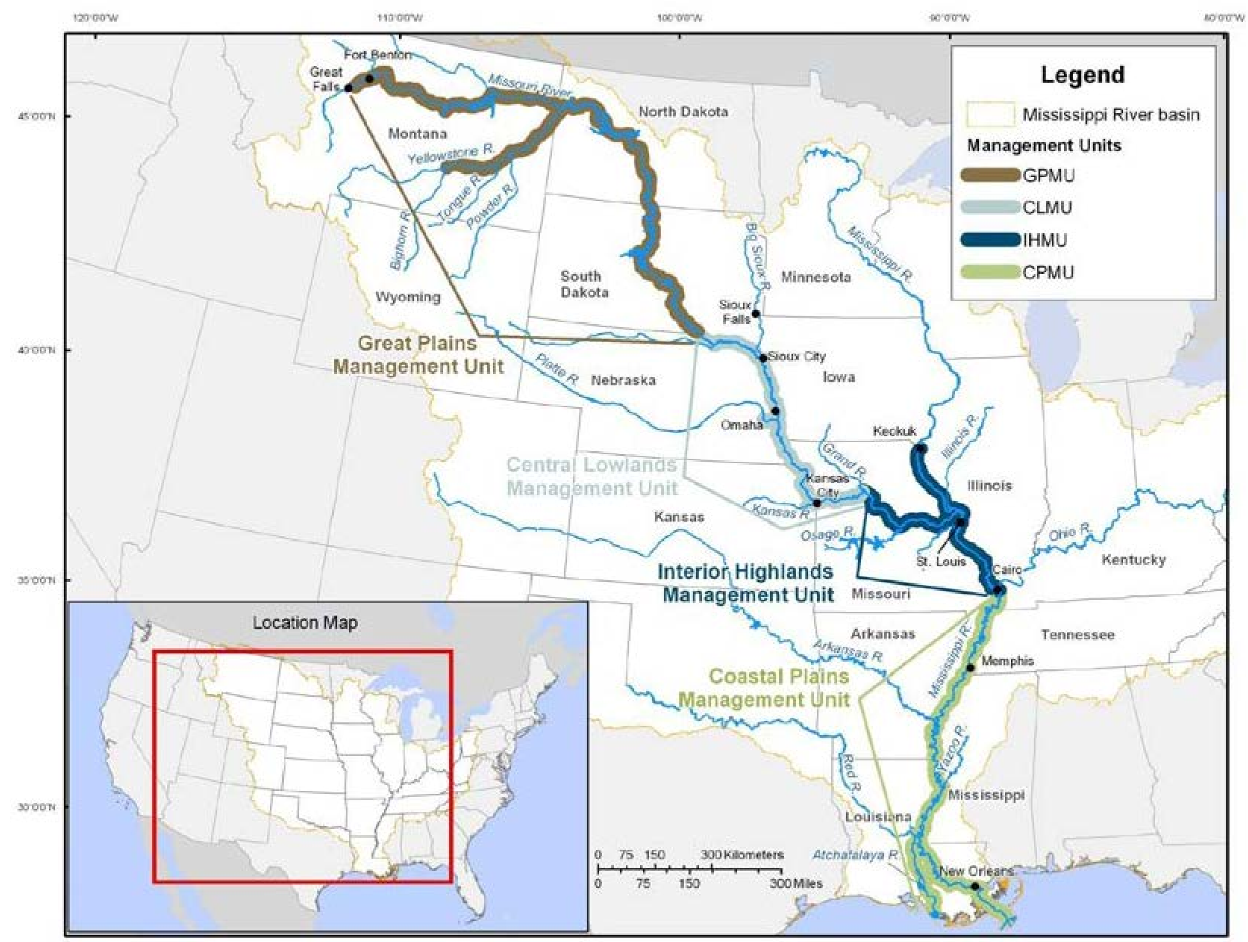


Figure V-11. Map depicting Pallid Sturgeon management units (from Service 2014, p.49).

GPMU

This population is isolated by dams and reservoirs and recruitment is currently not evident in this unit, however, reproduction has been documented. This unit is affected by the management of dams that alter water temperatures, flow regimes, and sediment transport. Artificial propagation and stocking is currently maintaining this population. In July 2018, USACE issued a request for proposals for construction of the fish bypass channel and replacement weir. The USACE expects to award a contract for the work and have the project complete by the summer of 2021. The goal of the fish passage project at the Intake Diversion Dam, if completed, is to provide additional habitat upstream of the dam for spawning to support successful recruitment (Jordan et al. 2016).

CLMU

This unit is affected by upstream dams resulting in altered water temperatures, flow regimes, and sediment transport. Dams and reservoirs block upstream and downstream movements. Channelization as a result of the Bank Stabilization and Navigation Program has substantially reduced riverine and floodplain habitat. The effects of the dams and channelization are ongoing. Artificial propagation and stocking is currently maintaining this population (Jordan et al. 2016). Hatchery–reared pallid sturgeon can survive in the highly modified lower Missouri River (Steffensen et al. 2016). Reproduction has been documented in this unit.

IHMU

The effects from the upstream dams are diminished in this unit. Some of the ongoing threats in this unit include entrainment, contaminants, hybridization, and navigation (Jordan et al. 2016). There is evidence of natural recruitment (Delonay 2009), however, few pallid sturgeon larvae are being produced in the Middle Mississippi (Boley and Heist 2011). Garvey et al. (2009) summarized the status of the pallid sturgeon in the Middle Mississippi River and indicated that reduced reproductive capacity due to limited rearing and nursery habitat and loss of reproductively mature adults was a likely threat to population recovery. Garvey et al. (2009) generated an estimate of 1,600 to 4,900 adult pallid sturgeon for the middle Mississippi River (i.e., mouth of the Missouri River downstream to the Ohio River confluence). Similarly, Hintz et al. (2016) estimated a population size of 1,516 (95 percent CI of 710–3,463) adult pallid sturgeon in the IHMU below the Missouri River confluence (USACE 2017). Estimate of total abundance of age 3+ pallid sturgeon in the Middle Mississippi River were at least 2.6 - 8.5 fish per river kms^{-1} (Friedenberg et al. 2017).

CPMU

Limited conservation stocking efforts have occurred in the past in the Mississippi River but due to evidence of natural recruitment, stocking has been discontinued (Service 2014). This unit contains the most intact available habitat for the pallid sturgeon throughout its range. The population contains multiple age cohorts and low mortality rates. Some of the ongoing threats in this unit include entrainment, hybridization, contaminants, and non-native species (Jordan et al. 2016). Land procurement, habitat conservation and restoration, sturgeon surveys, population quantification, modeling and monitoring, and habitat use studies are ongoing conservation efforts in this management unit. Limited population estimates are available for this management unit. Friedenberg et al. 2017 did determine an estimate of total abundance of age 3+ pallid sturgeon in the Lower Mississippi River for at least 3.0 - 9.8 fish per river kms^{-1}.

VD5. Analysis of the Species/Habitat Likely to be Affected

Critical habitat for pallid sturgeon is not federally designated and does not occur in the action area. As defined in the species recovery plan, the primary strategy for recovery of sturgeon is to:

1. conserve the range of genetic and morphological diversity of the species across its historical range;
2. fully quantify population demographics and status within each management unit;
3. improve population size and viability within each management unit;
4. reduce threats having the greatest impact on the species within each management unit; and
5. use artificial propagation to prevent local extirpation within management units where recruitment failure is occurring.

The recovery plan prescribes actions needed to successfully implement the recovery strategy (hereby referred to as recovery tasks). The Service has reviewed the recovery plan and identified the following recovery tasks that could be linked to effects of the Program. The below recovery tasks were extracted from page 58 through 74 of the recovery plan.

Recovery Objective 1.1.3 - Create Physical Habitat And Restore Riverine Function

(1) Protect, enhance, and restore habitat diversity and connectivity

- (b) Reconnect perched or disconnected side channels.

Recovery Objective 1.1.4 - Provide And Protect Instream Flows

(1) Develop an instream flow plan for riverine reaches important to pallid sturgeon recovery.

- (a) Assess tributary water allocations to determine depletion effects on habitat formation and maintenance.
- (b) Determine what flows are necessary to meet pallid sturgeon life history requirements.
    - (i) Consider precipitation pattern models and climate change forecasts when developing flow requirements.
- (c) Implement flow protection strategies based on instream flow plan.

(2) Evaluate dam discharges during spring, summer, and fall (both main-stem and tributaries) to protect instream flows.

- (a) Manipulate reservoir releases if needed to protect or restore flows for recovery of pallid sturgeon.

VE. Western Prairie Fringed Orchid Biological Status

Unless otherwise indicated, information on the western prairie fringed orchid status is drawn from the Western Prairie Fringed Orchid Recovery Plan (USFWS 1996) and the 5-year Review (USFWS 2009).

Figure V-12. Western prairie fringed orchid.
Photo credit: J. Challey/U.S. Forest Service

VE1. Species Description

For a complete description of the species, see pp. 1-2 of the species recovery plan and the 5 year review (U.S. Fish and Wildlife Service 1996, 2009).

The western prairie fringed orchid is a smooth, erect, 2- to 4-foot tall perennial species of terrestrial and palustrine communities in the North American tallgrass prairie biome. The two to five elongated leaves are hairless and thick. The open, spike-like inflorescence bears up to two dozen showy, 1-inch wide, white flowers (U.S. Fish and Wildlife Service 1996).

VE2. Life History

Reproduction & Mycorrhizal Associations:

The growing season of the western prairie fringed orchid starts in mid-April in the southern part of its range and late-May in the northern part of its range. As a result, it blooms in mid-June in the southern portion of the range and late-July in the northern portion. Western prairie fringed orchid reproduces primarily by seed and is dependent on a several species of sphinx moths for pollination. Germination of seeds and subsequent plant development is dependent on association with specific mycobionts (symbiotic fungi) (Sharma 2002). Orchids “face almost certain extinction in the wild if their mycorrhizal symbionts (mycobionts) were to disappear” (Zettler et al. 2003). Western prairie fringed orchid is likely dependent on certain fungal species that are typical of its tallgrass prairie and wet meadow habitats (Sharma 2002). And there may be stronger association between the fungal species and the habitats of western prairie fringed orchid than there is specifically between the fungi and the species (Zettler et al. 2003).

Habitat:

The habitat of western prairie fringed orchid is generally described as unplowed, calcareous prairies, sedge meadows, and mesic to wet-mesic prairies (U.S. Fish and Wildlife Service 1996). The species' habitats are often described as "subirrigated" and soil moisture is a critical determinant of growth, flowering, and distribution. At Sheyenne National Grassland in North Dakota, soil moisture in the top centimeters (cm) was higher in swales with western prairie fringed orchid than in those where the species could not be found; maximum root depth was 16 cm and roots of 60 percent of plants were entirely within 10 cm of the soil surface (Wolken 1995, Wolken et al. 2001). Drought depresses the number of western prairie fringed orchid plants appearing aboveground and increases the proportion of emergent plants that do not flower (Sather 2006, Ashley 2001). Viable seeds that persist from years before drought may be important for post-drought recovery of western prairie fringed orchid populations (Hof et al. 2002).

Flooding during years of high precipitation can also have significant impacts on plant survival, development, and reproduction. Flooding decreases survival of all affected western prairie fringed orchid plants (Sieg and Wolken 1999), but flowering plants are more likely than vegetative plants to survive (Sieg and Wolken 1999). The hollow stems of flowering plants may conduct oxygen to roots and their greater height increases the odds that at least part of the plant remains above water and is able to photosynthesize. Plants are more likely to persist if they continue at least some photosynthesis during floods, as opposed to relying entirely on energy reserves (Sieg and Wolken 1999:199). Even among flowering plants, taller plants are more likely to survive flooding (Sieg and Wolken 1999).

Habitat Management:

The persistence of western prairie fringed orchid is dependent on periodic disturbance by fire, mowing, or grazing. Counts of flowering plants have generally declined in habitats left idle (Kiefer et al. 2013). Fall hay treatment has been observed to support the greatest increase in the number of flowering plants, and trends were intermediate for the burn treatments with moderate increases and decreases in the spring- and fall-burn treatments, respectively (Kiefer et al. 2013).

The density of flowering plants appears to be sensitive to the timing of spring burns. Late-May fires in Kittson County, Minnesota, for example, destroyed above-ground parts of western prairie fringed orchid plants for the entire growing season (Minnesota Department of Natural Resources 2000) and were implicated in the complete absence of plants at Blue Mounds State Park and Burnham Wildlife Management Area in Minnesota in 1986 and 1999, respectively. Adverse effects of late-May fires in Minnesota may last for two growing seasons, but minimal effects observed at some sites suggest that their impacts may vary due to differences in soil moisture and fuel loads (Sather 2000). Spring burns carried out as part of the experimental management study (see above) were typically conducted at a time when effects to developing plants would be avoided or minimized. Therefore, the study's results do not reflect long-term impacts of fires that would be conducted at later stages of plant development.

VE3. Population Dynamics

Populations are highly variable due to erratic flowering patterns and dormancy periods of the species. Western prairie fringed orchid occur in small populations that are likely populated by close relatives due to being separated by large distances (tens to hundreds of kilometers), and vulnerable to genetic isolation (Ross et al 2015). The generation time of the species is uncertain but estimates are up to 12 to 15 years (Sather 2005, Bowles 1983). Flowering plants in Sheyenne National Grassland, North Dakota lived for three years or less (Sieg and Ring 1995) suggesting that once maturity is reached, the species may not live long above ground. More long term monitoring is needed to determine if the species can have longer lifespans.

VE4. Status and Distribution

Current Legal Status and Critical Habitat:

The western prairie fringed orchid remains federally designated as threatened (USFWS 1989). Critical habitat has not been federally designated for this species.

Former and Current Range:

The historical range of the western prairie fringed orchid extends from southern Manitoba to northeastern Oklahoma. Extant populations of the orchid are known to occur in Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota (and Manitoba). It is believed to be extirpated from South Dakota and Oklahoma. Populations of the western prairie fringed orchid were known to occur along the wet mesic prairies and sedge meadows along the floodplain of the Platte River and subirrigated meadows and wet prairies of the Sandhills in north-central Nebraska (USFWS 1996). The Western prairie fringed orchid recovery plan states that the Hall County population (Mormon Island Crane Meadows) should be maintained by protective management, including maintenance of an appropriate hydrologic regime (1996). This population is likely now extirpated.

Flowering plant counts may provide a minimal population estimate. Each year western prairie fringed orchid populations are likely comprised of four general categories of plants – seedlings that have not yet developed above-ground stems; non-flowering plants with above-ground stems; 'dormant' plants that appeared above-ground in prior years, but remain below-ground during the census year; and, flowering plants. During wet periods a high proportion of plants that produce above-ground parts may flower – about 97 percent (n = 5,518) of plants observed at Sheyenne National Grasslands were in flower (Alexander 2006). In some years, however, vegetative plants may comprise more than 70 percent of all above-ground plants (Sieg and King 1995).

The Western Prairie Fringed Orchid Recovery Plan (U.S. Fish and Wildlife Service 1996) based recovery on the status of populations within each ecoregional section occupied by the species (Bailey et al. 1994). Therefore, we describe progress toward meeting the recovery criterion in the context of revised ecoregional sections map (Figure V-13, Table V-2). Based on this analysis, 90 percent or more of the plants in sections 222M, 251A, and 251C have been protected and the protection criterion has nearly been met in section 222N with 85 percent of plants under protective ownership. Protection actions are still needed to meet the recovery criteria, however, in the remaining five sections. Two sections, 251C and 251E, each contain only one recorded extant population.

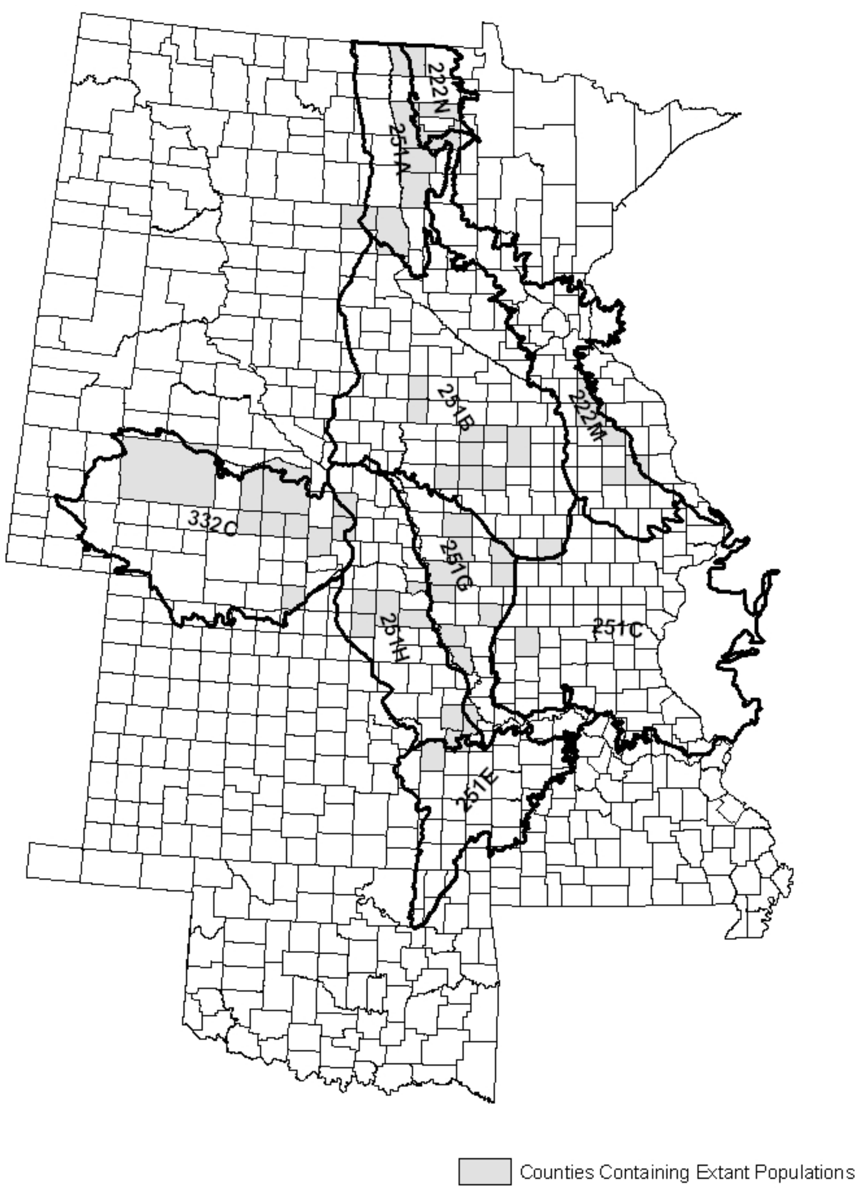


Figure V-13. Revised ecological sections (McNab et al. 2007) that contain extant populations of western prairie fringed orchid.

Range-wide Trend:

Table V-2. Abundance of western prairie fringed orchid plants in each revised ecological section (Figure V-13) and on sites with protections levels 4-9 (USFWS 1996).

Section Name	Section	Total Plants	Total Plants on Sites with Protection Levels 4-9	Percent Plants on Sites with Protection Levels 4-9
Minnesota and Northeast Iowa Morainal-Oak Savannah	222M	125	123	98
Lake Agassiz-Aspen Parklands	222N	11,788	10,064	85
Red River Valley	251A	12,768	11,770	92
North Central Glaciated Plains	251B	1,127	714	63
Central Dissected Till Plains	251C	51	51	100
Osage Plains	251E	14	0	0
Missouri Loess Hills	251G	938	515	55
Nebraska Rolling Hills	251H	158	71	45
Nebraska Sand Hills	332C	2,171	769	35
Total		29,140	24,077	83

*Numbers are based on high counts of flowering plants for sites known or presumed to be extant (at least one plant observed after 1982 and not otherwise known to have been extirpated) and were calculated based on data in the Service's files on September 23, 2008. Note that further investigation may be necessary to determine if sites are also protected from hydrologic alterations and from impacts of pesticides and herbicides.

Recovery of western prairie fringed orchid is also dependent on appropriate management and viability of populations may be affected by factors other than physical protection. The recovery plan contains guidance with regard to managing western prairie fringed orchid populations, but does not contain any clear criteria for assessing viability of populations. As recognized in the recent western prairie fringed orchid five-year review, the Service needs to develop viability criteria for western prairie fringed orchid.

Reasons for listing, new or continuing threats: Reasons for listing the western prairie fringed orchid as threatened under ESA are described in detail in the 2006 Opinion and the 5-year Review. In general, threats include altered hydrology, the conversion of habitat to croplands, overgrazing, invasive species, intensive hay mowing, dewatering/drainage, fire suppression, and climate change. These factors are considered ongoing threats to the western prairie fringed orchid.

VE5. Analysis of the Species/Habitat Likely to be Affected

Critical habitat for western prairie fringed orchid is not federally designated and does not occur in the action area. The western prairie fringed orchid is likely to be both adversely and beneficially affected by the proposed action. These effects were evaluated in the 2006 Opinion and are described in the environmental baseline section of this biological opinion.

VI. ENVIRONMENTAL BASELINE

This section contains an updated analysis of the effects of past and ongoing human and natural factors leading to the current status of the target species, their habitats (including federally designated critical habitat), and ecosystem in the action area. The environmental baseline includes the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions which are contemporaneous with the consultation in process (50 CFR 402.2). The environmental baseline used for these analyses is the present condition resulting from past effects of Program activities and existing water-related activities included in previous consultations for the Platte River. A list of consultations and effects of actions consulted on prior to the first increment are contained in the 2006 Opinion (USFWS, 2006). The environmental baseline for the Program Extension includes the effects from implementing the Program in the First Increment. This includes the effects of existing and new water-related activities described in the 2006 Opinion. Future, new water-related activities will require further consultation once their effects are known (see Description of the Action) but programmatic coverage was and will continue to be granted through the Program using a tiered-consultation approach consistent with the first increment. While these future new water-related activities occur during the Program Extension, their effects were evaluated in the 2006 Opinion and are a part of this environmental baseline. The 2006 Opinion outlined the process by which those effects will be offset by the states' and federal depletions plans (e.g. Wyoming, Colorado, Nebraska, and Federal Depletions Plans). In 2007, consultation for effects on whooping cranes as a result of hydrocycling conducted by CNPPID was completed. These effects are also included within this environmental baseline (USFWS, 2007). The description of this environmental baseline used for analyzing effects to the listed species will include discussion of changes (resulting in adverse or beneficial effects) to the conditions of the Platte River ecosystem since issuance of the 2006 Opinion, through 11 years of implementing the First Increment. This environmental baseline provides a benchmark for comparing the magnitude of Program adverse or beneficial effects to listed species or designated critical habitats. They are evaluated by comparing changes affecting the species', their habitats and the Platte River ecosystem, caused by the Program Extension (e.g. those components that differ from the Program First Increment and may result in effects not previously evaluated in the 2006 Opinion).

The Program Extension has some notable components that are different from those effects anticipated in the first increment which will be further evaluated within the effects section. The Program did not complete the anticipated water goal of reducing shortages to target flows by 130,000-150,000 acre-foot (af)/year within the first increment. As a result, anticipated adverse and beneficial effects resulting from completion of the water goal were not entirely realized during the first increment. The Program currently provides approximately 90,000 af/year of reductions in shortages to target flows. Additional water projects in the planning or design phase are expected to provide an additional 40,000 af/year. The Program is committed to achieving the minimum water milestone of 130,000 af/year in annual reductions in shortages to target flows. The

Program recognizes there may be fiscal constraints to achieving these milestones and scientific investigations may be needed to confirm the need for reducing shortages to target flows by 130,000 af/year. As such, the Program has committed to invest the resources available to achieve at least 120,000 af/year as quickly as possible while conducting scientific investigations to determine if the additional 10,000 af/year is justified (*Appendix B*). The Program is committed to finding the additional resources necessary to achieve that additional 10,000 acre-feet if justified by the science. While the implementation strategy has evolved, the Program water milestones remain unchanged for the Program Extension and the Program is still committed to achieving those milestones. Therefore, this environmental baseline assumes completion of the remaining water milestones in the Program Extension and those associated effects as previously consulted on in the 2006 Opinion. We do not anticipate any new effects related to water management actions undertaken during the Program Extension not previously considered in the 2006 Opinion. The inability to achieve the water milestones resulted in difficulty assessing the ecosystem and species' responses to the changes in water management. However, it is likely that delays in achieving the water milestones led to continued target flow shortages during times when shortages to target flows could have been reduced or avoided. Reductions to shortages in summer, spring and fall target flows during times when least terns and piping plovers (summer) and whooping cranes (spring and fall) are or could have been present may have prevented some of the anticipated benefits from being realized. While behind schedule, the remaining water milestones are anticipated to be achieved early in the Program Extension. At that time, the entire suite of adverse and beneficial effects described in the 2006 Opinion are expected to be realized.

The Governance Committee agreed to acquire an interest in at least an additional 1,500 acres of complex habitat with the intent of establishing a new habitat complex. The existing suite of land acquisition, restoration and management are part of this environmental baseline in so far as their actions have been implemented. However, the effects of the Program Extension related to new habitat acquisition, restoration and management or future land management and restoration on existing lands have not been evaluated. As such, our effects analyses for the Program Extension will include all future land acquisition, restoration, and management. Additional Program monitoring and research will occur in the Program Extension and effects related to these activities were only considered for the First Increment. Effects on listed species resulting from monitoring and research conducted during the Program Extension on existing or future lands will be evaluated in the effects section of this Supplement.

VIA. Platte River System Environmental Baseline

VA1. Importance of the Platte River Ecosystem

The central Platte River provides important habitat for fish and wildlife resources of national and international significance. The Platte River is best known for its value as migratory bird stopover habitat in the Central Flyway of North America. While the federally listed species are the focus of this Supplement, the Platte River remains a unique and critically important resource for spring staging to over 80 percent of all sandhill cranes (90 percent of the migratory mid-continent population). It is also used by millions of shorebirds, waterfowl and a diverse and abundant assemblage of fish communities throughout the year (many of which are declining throughout the rest of their range). It contains year-round habitat for numerous plants, mammals, invertebrates, shellfish, amphibians, and reptiles which are uniquely adapted for the Platte River ecosystem. Specialized habitats occurring along the Platte River include wet meadows, backwaters, sloughs, side channels, shorelines and deepwater habitat along the edge of sandbars, riverbanks and islands, as well as cottonwood gallery forests.

VA2. Platte River Ecosystem Functions

Conservation of the ecosystems upon which federally listed threatened or endangered species depend remains a tenet of the ESA and supported inter-Departmental policy (e.g., Interagency Cooperative Policy for the Ecosystem Approach to the Endangered Species Act; 50 CFR 17, FR 59 (126):34274). The rehabilitation of ecosystem integrity through enhancing and maintaining ecosystem processes and functions is particularly crucial when multiple listed species are present, as is the case along the Platte River. While the importance of providing ecosystem functions and services remains a priority, uncertainty related to improving and maintaining these critical processes remains. These ecosystem functions were the basis for development of instream flow recommendations which were ultimately adopted as part of the Service target flows which serve as a benchmark for measuring Program progress on improving flows in the Platte River during relevant times. To date, these target flows remain unchanged; however, given the amount of time and availability of new scientific information since target flows were developed, it is anticipated that the target flows will be investigated and potentially modified by the Service based on the best available science. Recent scientific data and a review of flows within the First Increment suggest peak flows play a critical role in creation and maintenance of preferred habitat conditions. Using the best available science to develop flow management strategies will also facilitate maintenance of ecosystem functions and services in the Platte River. Modification of target flows by the Service is not anticipated to adversely affect the species; instead, they would be anticipated to provide defined benefits for the target species and the ecosystem they depend upon. Science collected to date suggests that establishment of a flow regime capable of supporting and benefitting the target species (when present) while improving or protecting channel maintenance flows and other system scale processes (e.g. peak flows, higher summer base flows, etc. [*Appendix A*]) provides habitat preferred by the species.

VA3. Status of the Platte River Ecosystem

The Program began providing remedial measures for the historic and continuing water resource development upon initiation and will continue offsetting the adverse effects of water resource development on the Platte River ecosystem, and the habitats of the target species. The 2006 Opinion describes the impact of historic and ongoing water development on the Platte River ecosystem and how those changes in river conditions affect habitat important to the target species. In general, the altered riverine processes include flow, sediment and topography which are responsible for the form and function of the ecosystem. Below are changes in the status of water development since the 2006 Opinion, and how those changes affect habitat important to the target species.

From 2007-2014, the average annual shortage to target flows at Grand Island was 504,696 af[10] which is higher than the 417,000 af of shortages to target flows estimated for the period leading up to Program implementation. Given the extremely large variation (range approximately 18,000-731,257 af in a year) and the high number of years categorized as having "normal" hydrologic condition designation (no "dry" years occurred and deficits are typically highest in years designated "normal"), it is difficult to meaningfully assess a long-term trend. It is more likely a function of the hydrologic conditions experienced and not reflective of the Programs' ability to offset deficits to target flows. While deficits to targets increased in the first increment, it is anticipated that once fully operational, Program water operations will result in reductions to target flows as previously anticipated. Currently, Program water projects are credited with providing approximately 90,000 af of reductions toward that first increment goal.

The following summary provides information and data on conditions experienced during the First Increment and represents the changes to the environmental baseline in the 2006 Opinion. Mean annual flows, (last estimated from 1970 to 1998 at 1.4 Million Acre Feet [MAF] or 2,110 cubic feet/second [cfs] on average) were lower during the First Increment and averaged 1.33 MAF or 1,834 cfs at the same respective gage (Grand Island). It is difficult to determine what caused those reductions; they could be attributed to natural hydrologic or climatic variation. Other potential anthropogenic sources could be attributed to the observed changes including trans-basin water added to the Platte River from other river basins and consumptive uses of water in the Platte Basin which reduce mean annual flows. Re-timing flows to reduce shortages to target flows can also decrease the mean annual flow in the river due to losses (e.g. evapotranspiration). In 2006, total available storage in the Platte Basin was approximately 7.5 MAF and net consumptive use (i.e. the consumptive use minus trans-basin imports) approximates 2.4 MAF annually (USFWS, 2006). It is uncertain to what extent storage and net consumptive use has increased since 2006 but both are known to have occurred (increased storage and consumptive use) in projects tracked through the Program tiered consultations (*Appendix C*).

Another important metric is the frequency of peak flows. From 1970-2006, the average annual peak flow was 7,815 cfs at the Grand Island, Nebraska gage. During Program implementation, (2007-2016), average annual peak flows were 9,168 cfs. Peak flows observed during the First Increment were higher on average than the preceding period dating back to 1970 and are considered to be above normal with 8 out of 10 years having a peak flow above 7,000 cfs. Abnormally dry conditions were also experienced during the First Increment. Beginning in late spring 2012, two consecutive full growing seasons

[10] For the purposes of ESA compliance and meeting Program objectives related to achieving shortages to target flows, water projects are scored and credited at agreed upon amounts through a stand-alone process and do not fluctuate based on their actual measured contributions toward reducing shortages to target flows. A project is approved, scored and assigned credit by the water scoring sub-committee (subsequently approved by the GC). Similarly, Service use of Environmental Account water for purposes other than reducing shortages to target flows does not negatively affect scoring (i.e,the score of water contributed to the Environmental Account is automatically credited its score regardless of the actual amount it contributes when released).

(2012 and 2013) experienced little or no flow in portions of the channel throughout the central Platte River while much of the region went through a severe drought. Figure VI-1 depicts the Platte River hydrograph and the Service target flows during the first increment.

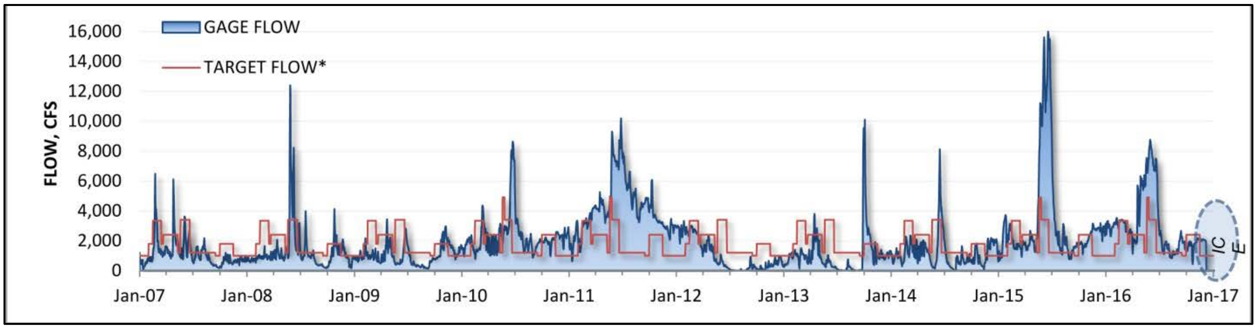


Figure VI-1. Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows (Source: *Appendix A*) [*Target flow based on annual hydrologic condition designation].

An increased frequency of peak flows in addition to mechanical in-channel vegetation spraying and disking since 2006 has led to changes in the Platte River geomorphology. These changes were systematically monitored over time. Annual reports and summaries were completed and provide trends for numerous geomorphologic metrics related to sediment, vegetation, channel form, etc. (Tetra Tech, 2017). Average wetted width (@1200 cfs) has been increasing (Figure VI-2 below) while average channel depth has decreased, generally resulting in a wider, vegetation free, shallower river overall compared to conditions in 2006. Reach-wide unvegetated channel widths (as measured at Program defined anchor points) increased from approximately 500 feet in 2006 to approximately 850 feet in 2016. Invasive species such as common reed (Phragmites australis), that had expanded and encroached upon much of the central and upper Platte River have largely been reduced and controlled under Program implementation. The EDO also performed analyses investigating vegetation and channel width changes using aerial imagery, flown annually as part of Program monitoring. Their results indicate increasing maximum and total un-vegetated channel widths throughout the first increment; both on Program and non-Program lands (see Figure VI-3 and Figure VI-4 below).

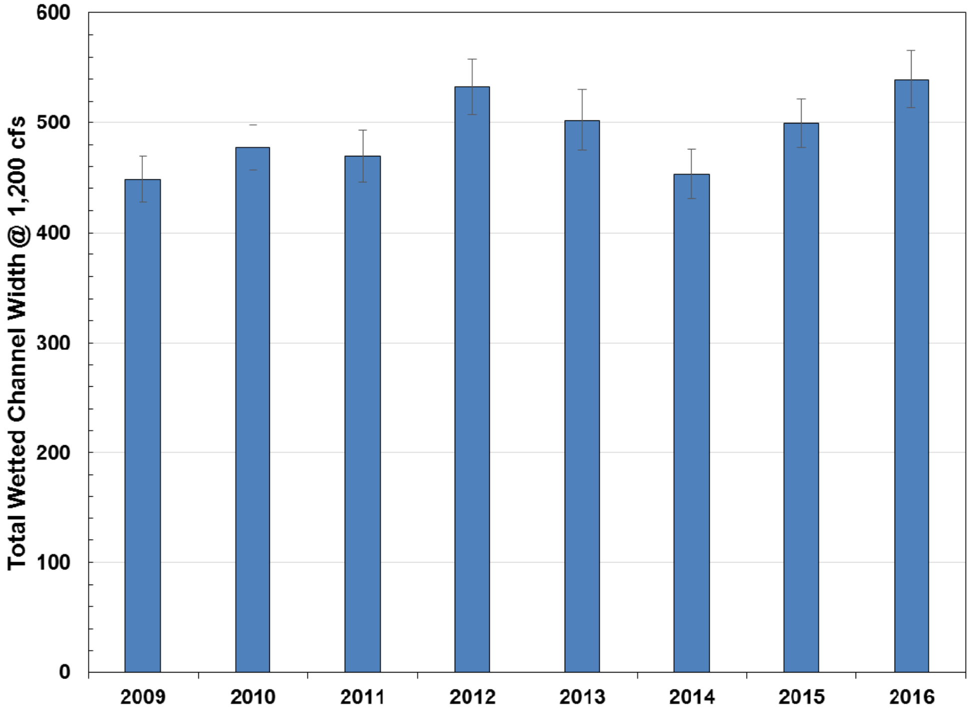


Figure VI-2. Average wetted width at 1,200 cfs by geomorphic reach; based on the pure panel AP. Whiskers represent ±1 standard error on mean value (Tetra Tech, 2017).

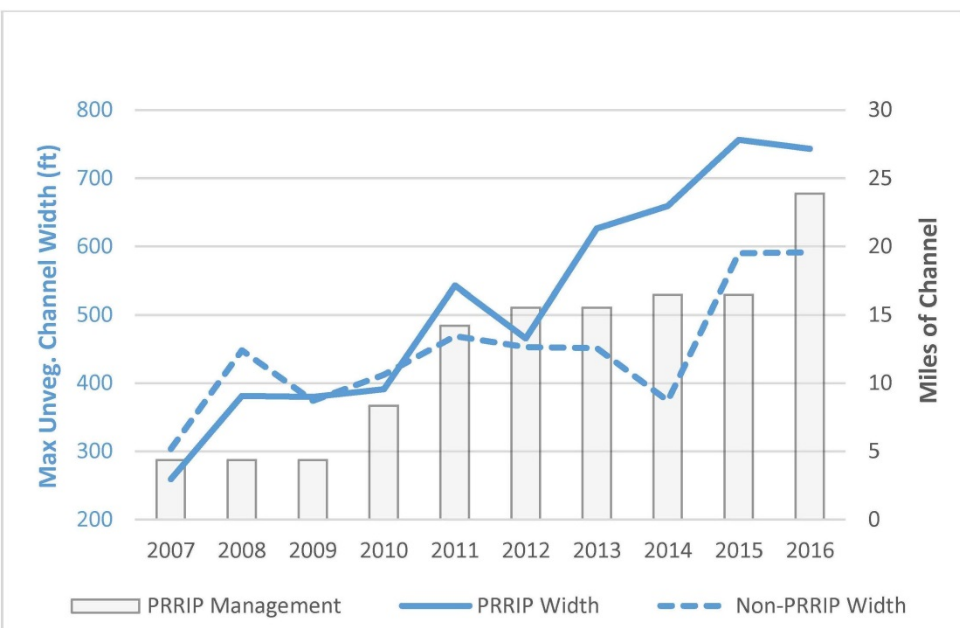


Figure VI-3. Maximum Unvegetated Channel Width during Program Implementation, Program and non-Program river segments and cumulative in-channel management efforts. (*Appendix A*).

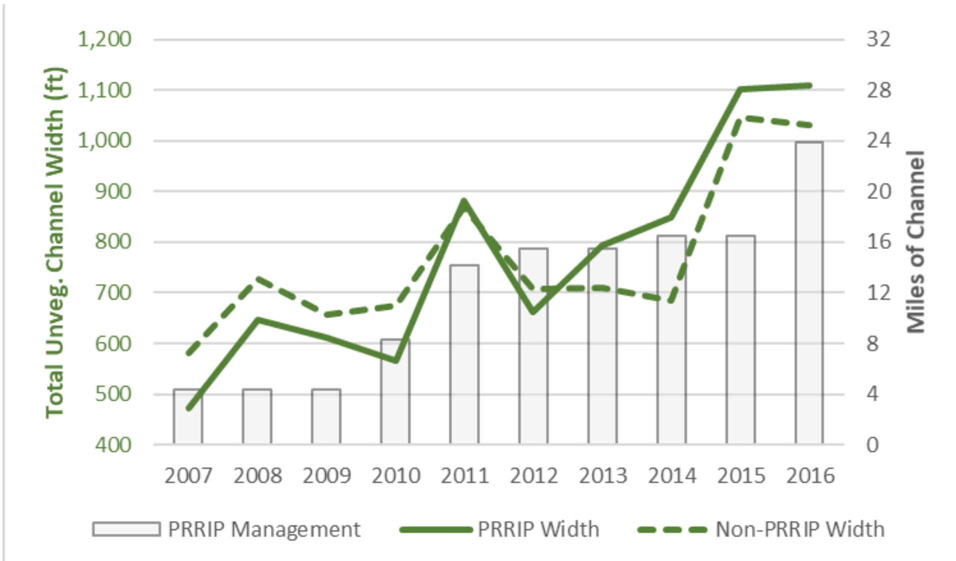


Figure VI-4. Total Unvegetated Channel Width during Program Implementation, Program and non-Program river segments and cumulative in-channel management efforts. (*Appendix A*)

Sediment augmentation has been challenging to implement (e.g. permitting, methods, and location, etc.) and monitor (extreme variability spatially and temporally). Much of the first increment was spent experimenting with methods of augmentation, location and varying amounts at different times. Full scale sediment augmentation rarely, if ever occurred prior to 2016 though partial augmentation occurred during many years. Recently, a long-term sediment augmentation location and methodology capable of providing full-scale augmentation was secured (South channel, Jeffery Island). Implementation of this effort is ongoing and is intended to offset further deficits and degradation. Uncertainty surrounding the methods and effectiveness of augmentation still remain. Generally, over the period of Program monitoring historical trends in aggradation and degradation have persisted, the upstream reaches have been degradational (Lexington to Minden), while downstream reaches have been slightly aggradational (Tetra Tech, 2017). Future efforts are aimed at reducing or eliminating the sediment deficit most prominent in the upstream reaches which extends to a lesser degree (or is absent) past Kearney.

Tetra Tech (2017) also investigated sediment grain sizes (bed material) throughout the first increment and compared them to the Bureau of Reclamation sediment sampling performed in 1989. As was described in 1989, the statistically significant trend of particle grain size decreasing in a downstream direction is still occurring. Overall median grain size of the bed material (D50) across the entire sampling area remained similar over the period of Program collection (since 2009 monitoring began) but remains much courser on average than the median size collected in 1989. This appears to be the result of an increase in the proportion of very course sands and fine gravels (D84 increased from approximately 2.5mm to approximately 4mm) while the proportion of medium and fine sand has not changed (D16 approximately 0.33 for both periods of record) [see Figure VI-5 below]. It is unknown whether sediment augmentation is reducing or eliminating historic trends of increasing particle grain sizes and degradation of the river bed. If eliminated, this could contribute to prevention of further declines in the Platte River ecosystem and associated species habitat conditions resulting from alterations to the sediment load.

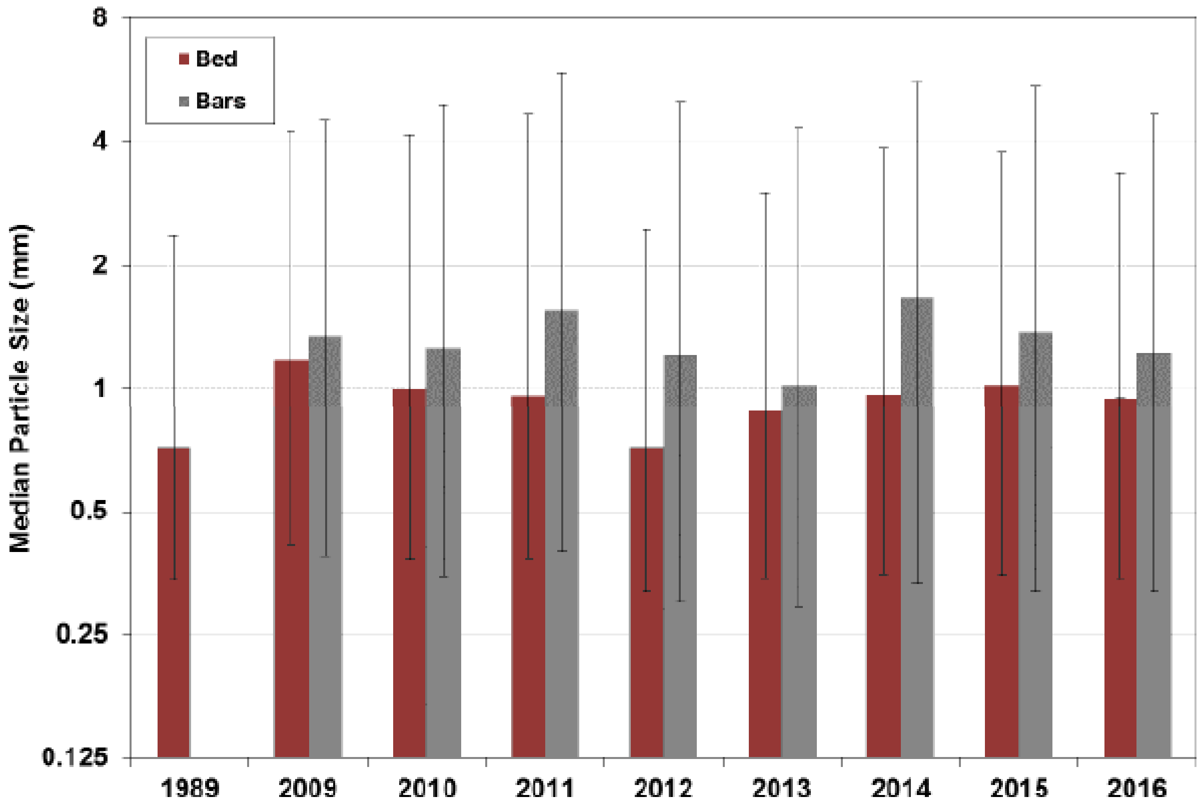


Figure VI-5. Reach averaged median (D50) particle size of samples collected for this monitoring program in 2009 through 2016, and by Reclamation in 1989. Whiskers represent reach-averaged D16 and D84 (Tetra Tech, 2017).

VA4. Summary of Changes in the River Channel Morphology

Peak flow frequency during the First Increment has been above average (relative to conditions experienced during the decades leading up to 2006). Annual peak flows of 7,000 cfs or better occurred in 8 out of 10 years. However, low flows and drought during back to back years (2012-2013) resulted in immediate recolonization of the river by vegetation. The highest peak flow event in 20 years (approximately 16,000 cfs in 2015) combined with Program and other conservation organization efforts aimed at mechanically controlling vegetation, resulted in significant improvements in channel conditions relative to 2006 and an overall reversal in the trends of vegetation encroachment and channel narrowing. Improved channel conditions have persisted under normal hydrologic conditions since 2015 with substantially lower amounts of mechanical treatment. While locally effective, mechanical management remains insufficient in restoring reach-wide habitat conditions or the entire suite of ecosystem processes throughout the central Platte River, placing further emphasis on future development of a successful water management strategy.

Efforts are needed to reduce uncertainty related to instream flow requirements and the necessary riverine processes required for maintaining river conditions capable of supporting the target species at desired levels. While channel conditions have improved and periods of significant quantities of water above target flows have occurred during the First Increment, efforts to reduce periods of shortages to target flows have been met with difficulty. Target flow shortages were calculated for the period of 2007-2014 and averaged 504,696[11] af/yr (*Appendix A*). As mentioned previously, the annual shortages to target flows were highly variable, ranging from 18,197 acre-feet in 2011 to 731,257 acre-feet in 2013 (Program 2017c). Flows from 2015-2017 generally had much lower volumes of shortages to target flows. The low sample size and extreme variability in the annual deficits reflects a high degree of uncertainty surrounding the Program's effect on annual shortages to target flows. Program water projects have contributed toward reducing shortages to target flows during different periods throughout the first increment but their exact real-time contributions are unknown. The first eight years of data may not be reflective of an inability to improve the occurrence of target flows. Instead, they could be the result of the overall hydrologic conditions experienced during the First Increment. An abnormally high number of "normal" hydrologic conditions were experienced while zero "dry" years occurred. "Normal" hydrologic conditions correspond to the largest deficits based on historic data. Continued investigation into the reduction of shortages to target flows is needed in order to fully evaluate the effect of Program actions. Over a longer period of record, we anticipate observed hydrologic conditions reflecting the reductions to target flows credited to Program water projects.

Bed material particle grain size has remained static (or slightly decreasing) during the course of the first increment- median particle size (D50) of 1.2mm in 2009 decreased in 2012 to 0.7mm before progressively moving back to 1mm by 2016. Previously documented trends of larger particle size (relative to 1989) and coarsening being highest in upstream reaches remains. Channel bed degradation has continued in upstream locations (approximately upstream of Gibbon/Minden) and is greatest in the South channel of the Platte River near Jeffery Island. Full scale augmentation aimed at reducing and ultimately eliminating the annual deficit at this location is proposed as a solution for preventing further habitat reductions throughout the upstream locations as a result of a sediment deficit. Further implementation and monitoring is needed to inform what long-term method, quantity, and location of sediment augmentation will be necessary to prevent additional sediment deficits and channel bed degradation.

[11] For the purposes of ESA compliance and meeting Program objectives related to achieving shortages to target flows, water projects are scored and credited at agreed upon amounts through a stand-alone process and do not fluctuate based on their actual measured contributions toward reducing shortages to target flows. A project is approved, scored and assigned credit by the water scoring sub-committee (subsequently approved by the GC). Similarly, Service use of Environmental Account water for purposes other than reducing shortages to target flows does not negatively affect scoring (i.e,the score of water contributed to the Environmental Account is automatically credited its score regardless of the actual amount it contributes when released).

VIB. Whooping Crane Environmental Baseline

VB1. Status of the Species in the Action Area

Whooping crane data collection throughout the migration corridor has varied in intensity and methodology as well as both spatial temporally. The 2006 Opinion included a comprehensive analysis of historic whooping crane use on the Platte River, including some of the earliest and highest number of historic sightings. On the Platte River, data has been collected in three primary ways: 1) radio tracking studies using GPS technology (Telemetry Project); 2) recording, confirming and tracking public observations; and 3) systematic aerial surveys. Each set of data has its limitations and influences from bias, and each has independent strengths and weaknesses. Where available and appropriate, we rely on all 3 sources of data to describe the status of the species in the action area.

The longest spanning and most comprehensive of these is the Service's "Whooping Crane Migration Tracking Project" database (WCTP) [USFWS, 2018], managed and stored within the Nebraska Ecological Services Field Office. The database contains confirmed public sightings of whooping cranes during migration, the earliest of which dates back to the 1940's in the Platte River valley. In total, this database contains over 3,000 observations of different crane groups (group of 1 or multiple cranes traveling together), collectively representing over 10,000 total whooping crane sightings, spanning approximately 15 generations. Early records correspond to the period of time when the population dropped to its lowest levels (Early 1940's). The WCTP database remains the only long-term data set available for whooping crane use locations throughout the migration corridor. Influence of bias is most influential on small scale habitat selection analyses as the distribution of the population directly influences the likelihood of detection and representation in the database. However, within the central Platte River Valley where population increases have generally been consistent and proportionate, the influence of bias is likely consistent over time, allowing for useful trend analyses of overall use by whooping cranes in the area.

The Program has implemented annual monitoring efforts since 2001. This data is a subset of the Service's WC database and contains observation data collected from a systematic monitoring protocol implemented only on the central Platte River using daily aircraft flights to detect and confirm whooping cranes. Data from this effort is useful in evaluating whooping crane habitat and site use selection characteristics while limiting the influence of observer detection bias (detection may spatially vary in WCTP). This effort represented a significant increase in effort based detection within the AHR and provides a baseline from which to evaluate changes in use since 2001.

The third data collection method is radio-tracking telemetry equipment affixed to whooping cranes. This study provides precise GPS locations multiple times per day at consistent intervals and provides the most reliable information during the period of data collection. The first telemetry study was conducted in the late 1970's and early 1980's while a recent effort was undertaken through a cooperative project between USGS, the Service, the Program, the Crane Trust and Canadian Wildlife Service (2010-2017) which built upon the data collection equipment and methods from earlier radio-tracking efforts.

The recent Telemetry Project provides data from 58 whooping cranes over the course of the study (Pearse et al, 2018). Systematically collected location data is recorded every four to six hours and data provides insight into whooping crane use and preferred habitat characteristics throughout their entire migratory corridor.

The whooping crane population has increased by approximately 4 percent per year from 1938 to 2017. Whooping crane use of the action area during migration has increased substantially, particularly during the period of Program Implementation (Table VI-1 and Figure VI-6). Using combined Program and opportunistic data, collected since 2001, use was lowest from 2003-2005 when drought and highly deteriorated habitat conditions resulted in little or no use in the AHR during migration. Use, as measured proportionally to the population, has increased significantly under Program Implementation and in the spring of 2018 a record 138 (likely a minimum) unique whooping cranes were detected by the WCTP and Program monitoring in the AHR (USFWS, 2018). This represents the largest total number of whooping cranes detected and the largest proportion of the population to have ever been detected in the AHR(138 represents over 27.3 percent of 2018 population estimate). Use is highly variable and dependent upon factors outside the suite of influence of the Program or Platte River conditions as a whole. Given seasonal variability in utilization compared to annual hydrologic conditions responsible for driving habitat conditions, we combined data to further evaluate trends on an annual scale. See figure VI-6 below.

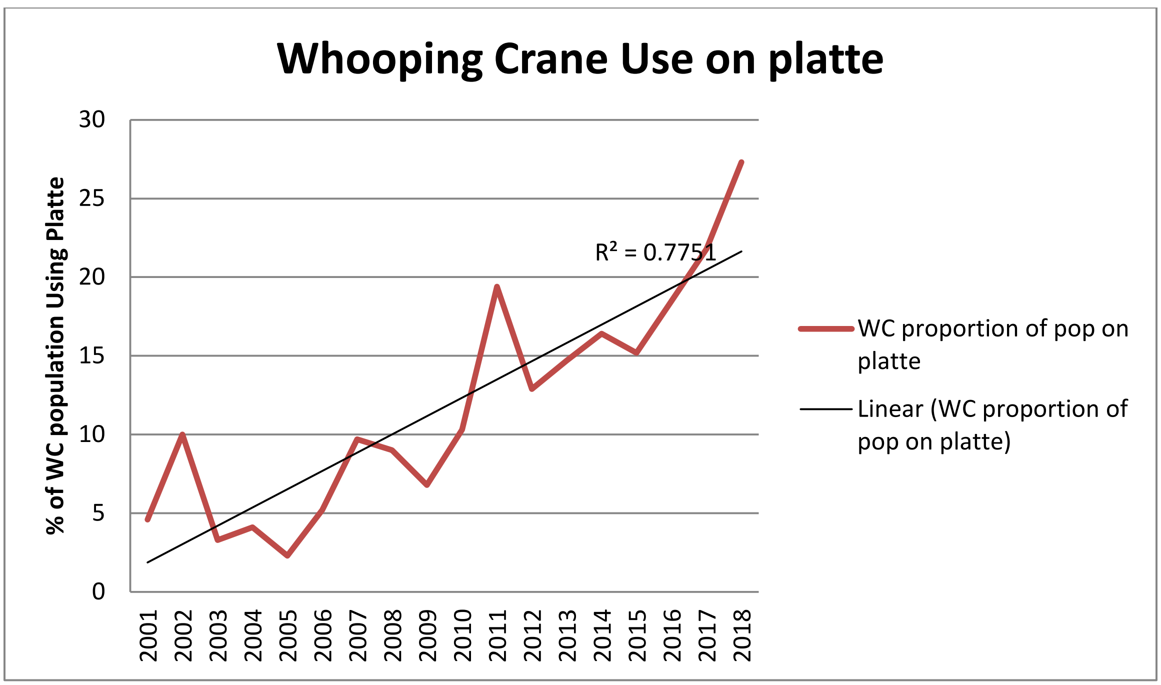


Figure VI-6. Proportion of the Migrating Whooping Crane Population Observed Using the Program's Associated Habitat Reach (Lexington to Chapman) Annually (2001–2017) [USFWS, 2018].

While annual data may double-count individuals if the same individuals were detected during both seasons, it serves as a useful tool in assessing annual trends linked to processes occurring on similar temporal cycles (peak annual flows, long-term drought, etc.) and reduces some of the seasonal variability. As can be seen, increases in annual use by whooping cranes was most evident beginning in 2011, concurrent with the time frame where natural peak flows and Program efforts resulted in improved reach wide in-channel habitat. For three consecutive years, a new record high was set for total (not proportionate) Platte River whooping crane use. Whooping crane use during spring 2018 alone set the new record for total and proportional use on the central Platte River for the entire year. The Platte River continues to provide the most consistent and often highest documented utilization by whooping cranes during migration compared to habitat throughout the migratory corridor in the United States. Its typically perennial water supply offers a buffer against areas where drought can eliminate the availability of suitable habitat during migration. Vegetation encroachment continues to be the biggest threat causing habitat degradation.

Table VI-1. Whooping Crane Use of the Program's Associated Habitat Reach

Year	Number Observed within the AHR during the Spring Migration Season	Number Observed within the AHR during the Fall Migration Season	January Population Size at the Aransas National Wildlife Refuge	Proportion Observed within the AHR during the Spring Migration Season	Proportion Observed within the AHR during the Fall Migration Season
2001	4	4	174	2.30%	2.30%
2002	1	17	174	0.57%	9.24%
2003	4	2	184	2.17%	1.04%
2004	2	6	193	1.04%	2.80%
2005	3	2	214	1.40%	0.95%
2006	8	3	211	3.79%	1.27%
2007	13	10	237	5.49%	3.76%
2008	3	21	266	1.13%	8.50%
2009	5	12	247	2.02%	4.56%
2010	10	17	263	3.80%	6.01%
2011	46	9	283	16.25%	3.31%
2012	26	9	272	9.56%	3.23%
2013	32	9	279	11.47%	2.96%
2014	43	7	304	14.14%	2.26%
2015	13	34[12]	310	4.19%	10.33%
2016	37	24	329	11.25%	5.57%
2017	71	23	431	16.47%	5.34%
2018	138		505	27.34%	

*(Lexington to Chapman) Along the Central Platte River (2001–2017) [Service, 2018]

[12] Includes a 6-bird whooping crane group that was observed just downstream of the Chapman Bridge (i.e., outside the AHR).

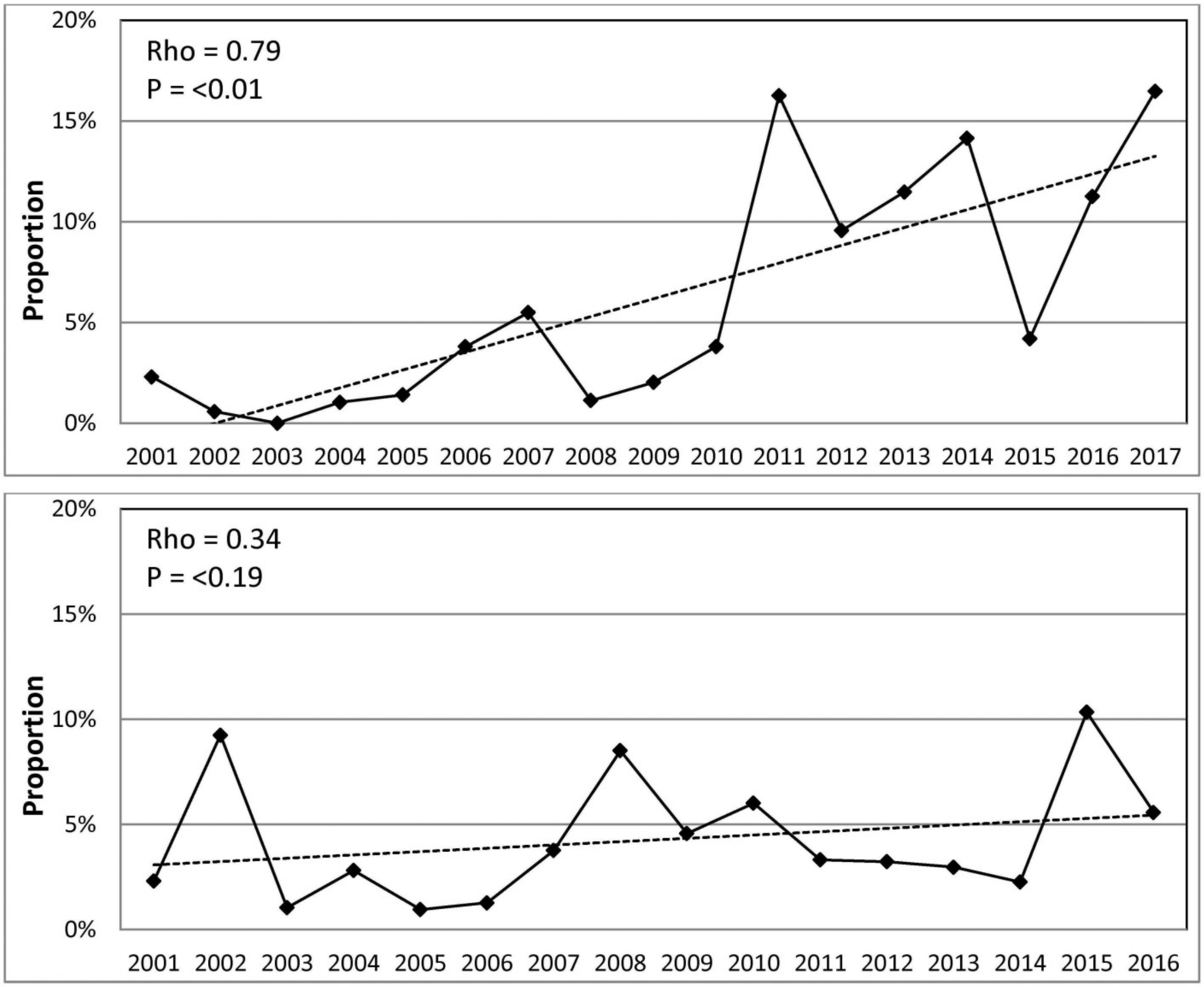


Figure VI-7. Proportion of the Migrating Whooping Crane Population Observed Using the Program's Associated Habitat Reach (Lexington to Chapman) During the Spring (top) and Fall (bottom) Migration Seasons (2001–2017) [*Appendix A*]

VB2. Factors Affecting the Species Environment and Designated Critical Habitat within the Action Area

The 2006 Opinion summarized anticipated effects of implementation of the Program. The list of beneficial effects included: 1) increase/improvement in the amount and distribution of wide channels for roosting in deteriorated (i.e., narrowed) sections of river (see qualification for channel improvements in "adverse effects" section below); 2) increased ability to sustain restored riverine habitats by mechanically adding sediment; 3) increase in the amount of grasslands and wet meadows available for crane foraging; and 4) minor increases in early-spring (mid-February to mid-March) water surface elevations which will assist sediment transport and ice-scouring capabilities for river channel maintenance; 5) increases in late spring (mid-April to June) peak water surface elevations in normal years could improve groundwater levels and related improvements in wetland maintenance during years with normal river flows; and 6) increase in the length of stream bank and adjacent land area protected to minimize disturbance. As described in the Platte River Environmental Baseline section above, the anticipated beneficial effects described here (i.e. increased wide channels, wet meadows, protection, etc.) were largely realized due to successful Program Implementation during the First Increment. The list of adverse effects included: 1) decrease in short-duration peak flows that create overbank flows into meadows and facilitate surface water connections between meadows; 2) decrease in late-spring river elevations and peak flows in the wettest years that would negatively affect groundwater elevations that sustain wetland habitats and crane food sources; and 3) changes to system hydrology further decrease and adversely affect the river's natural sediment transport processes. J-2 Return discharges are considered a primary factor in channel bed erosion and these discharges would increase. Channel maintenance would be increasingly reliant on artificial sediment augmentation to eliminate the deficit and bed degradation. If Program sediment augmentation cannot offset the existing deficits, further channel bed degradation may occur. These effects are included within our environmental baseline of this Supplement.

Designated critical habitat for the whooping crane has not changed. Within the action area, a 90- mile stretch of the Platte River valley from Lexington to Denman, 3 miles wide, was designated as critical habitat. This area is entirely encompassed within the Program AHR and improving habitat conditions within this reach is a primary component of the Program. The Platte River critical habitat area encompasses approximately 101,544 acres of the total 371,667 acres (approximately 27 percent) of the critical habitat designated for whooping cranes within the United States.

As previously described, the environmental baseline for the Program Extension includes effects from water related activities previously consulted on in the Platte River Basin, as well as tiered consultations for new water related activities occurring during the first increment to date (*Appendix E*) and any effects resulting from implementation of the First Increment.

The anticipated beneficial effects of the Program on whooping cranes and their designated critical habitat are both quantitative and qualitative. Program land objectives have resulted in an increase in the amount of land interest owned and protected for whooping cranes and the lands themselves have been restored where appropriate and managed to improved habitat quality. The Program will continue maintaining existing habitat while increasing the amount and quality of whooping crane habitat in the Program Extension. Similarly, Program water objectives, once achieved, will continue building on existing efforts to decrease target flow shortages in the central Platte River. The physical and biological features of whooping crane critical habitat described in the listing regulation that pertain to the Platte River are further evaluated here. These include: a) the availability of wide, open, river channel with shallow sand and gravel bars for nightly roosting, b) the availability of bottomland areas, including wet meadows, providing food, water, and other nutritional requirements, and c) isolation and protection from disturbance. The Program has contributed to increases in wide, open river channel, free of vegetation with adjacent bottomland areas, sufficiently isolated and protected from disturbance, reversing historical trends where decreases in these physical and biological conditions were occurring. Existing conditions on the Platte River, while substantially altered from the pre-development historic conditions, are more capable of supporting the physical, behavioral and ecological migration requirements for whooping cranes compared with conditions prior to Program Implementation. Program Implementation during the First Increment has contributed to increased habitat availability. Increases in the amount and distribution of wider, shallower, vegetation-free sections of the river with greater unforested distances (Figure VI-3 and VI-4, Platte River Environmental Baseline above) has benefited whooping cranes and resulted in increased utilization of habitat in the AHR.

VIC. Interior least tern and Piping Plover Environmental Baseline

VC1. Status of the Species in the Action Area

No nesting records for least tern or piping plover exist in the action area in Wyoming or Colorado. The adult piping plover collected during the Warren expedition in Laramie County, Cheyenne, Wyoming in 1892 remains the only specimen documented in either state.

Within the action area in Nebraska, nesting has continued to occur throughout the Platte River basin but has been primarily occurring within the AHR. New nesting records on the South Platte River were documented for both least terns and piping plovers in 2016. This was the first and only year where least tern or piping plover in-channel nesting on the South Platte occurred during the first increment of the Program (CNPPID, 2017a). In total, 18 adult piping plovers, 12 active nests and 10 fledglings along with 21 adult least terns, 4 active nests and 1 fledgling were documented from the three surveys.

When considering the state of Nebraska as a whole, the population of least terns has maintained a stable and possibly increasing population which recently exceeded the 1988 recovery plan benchmark (635). Despite high annual variability, the species has persisted in the Platte River drainage since listing. This led the Service to conclude the Platte River least tern habitat has been successfully managed (USFWS, 2014). Rangewide surveys indicated a Nebraska population of 1,038 least terns in 2005 (the last complete, rangewide survey) and the 2012 partial count on the Platte River system indicated 665 least terns. While variable the Platte River population is considered stable. Piping plover populations statewide have declined over the same period, though it is unknown how much of the decrease is attributable to survey efforts and detection verses known population declines (e.g. Lake McConaughy). While population fluctuations resulting in recent lower nesting at Lake McConaughy are highly correlated to lake levels which have generally been higher during Program Implementation (resulting in lower beach habitat and lower number of nests), Program least tern and piping plover production has been increasing in the AHR.

Tern and Plover population viability analyses done prior to the First Increment indicated the species' had a low probability of persistence long term on the Platte and Loup Rivers (assuming isolation of the sub-population) [National Research Council, 2005]. Lott et al.

(2013), suggest that dispersal of individuals between populations is an important factor in the persistence of peripheral populations of least terns such as the Platte River. Lott (2006) conceptualized least terns functioning as a large meta-population (a group of spatially separated populations of the same species which interact at some level), which might also include least terns on the Gulf Coast. These factors were considered in the context of a stable or increasing population of least terns on the Platte River and in Nebraska and when combined with least terns being proposed for delisting, suggest that the current baseline conditions on the Platte River are contributing toward recovery objectives.

The draft revised piping plover recovery plan recommends a strategy of maintaining stable or increasing populations for the Southern Rivers sub-population of piping plovers to reach recovery goals. While riverine nesting does not appear to be capable of maintaining sufficient production necessary to meet piping plover recovery goals, mechanically created off-channel nesting habitat may be capable of providing for some principal elements that could help maintain the population and contribute to the recovery for piping plovers. However, the recovery plan also indicates these habitats are a lower priority, due to their inability to independently recover the species. When combined with successful riverine management that provides a diverse and abundant forage supply, Program efforts have increased reproductive success and productivity by creating and maintaining on and off-channel habitat. This facilitates maintaining a stable or increasing population trend. These efforts help sustain the population and contribute to recovery efforts that are aimed primarily at restoring and maintaining natural riverine processes deemed necessary for survival and recovery of piping plover throughout its range. While piping plover production is highly variable throughout the entire Platte River system (due in large part to Lake McConaughy fluctuations), when evaluated as a whole, we find that the current baseline conditions on the Platte River are contributing toward piping plover recovery goals.

<u>Lake McConaughy</u>:
Reductions in the species use and reproduction have occurred at Lake McConaughy during the period of Program Implementation (CNPPID, 2017b), though fledge success has rebounded some recently (CNPPID, 2017a). *Appendix F* summarizes use and productivity data at Lake McConaughy during the period of record and Figure VI-8, below, depicts the percentage of hatched chicks fledged at Lake McConaughy.

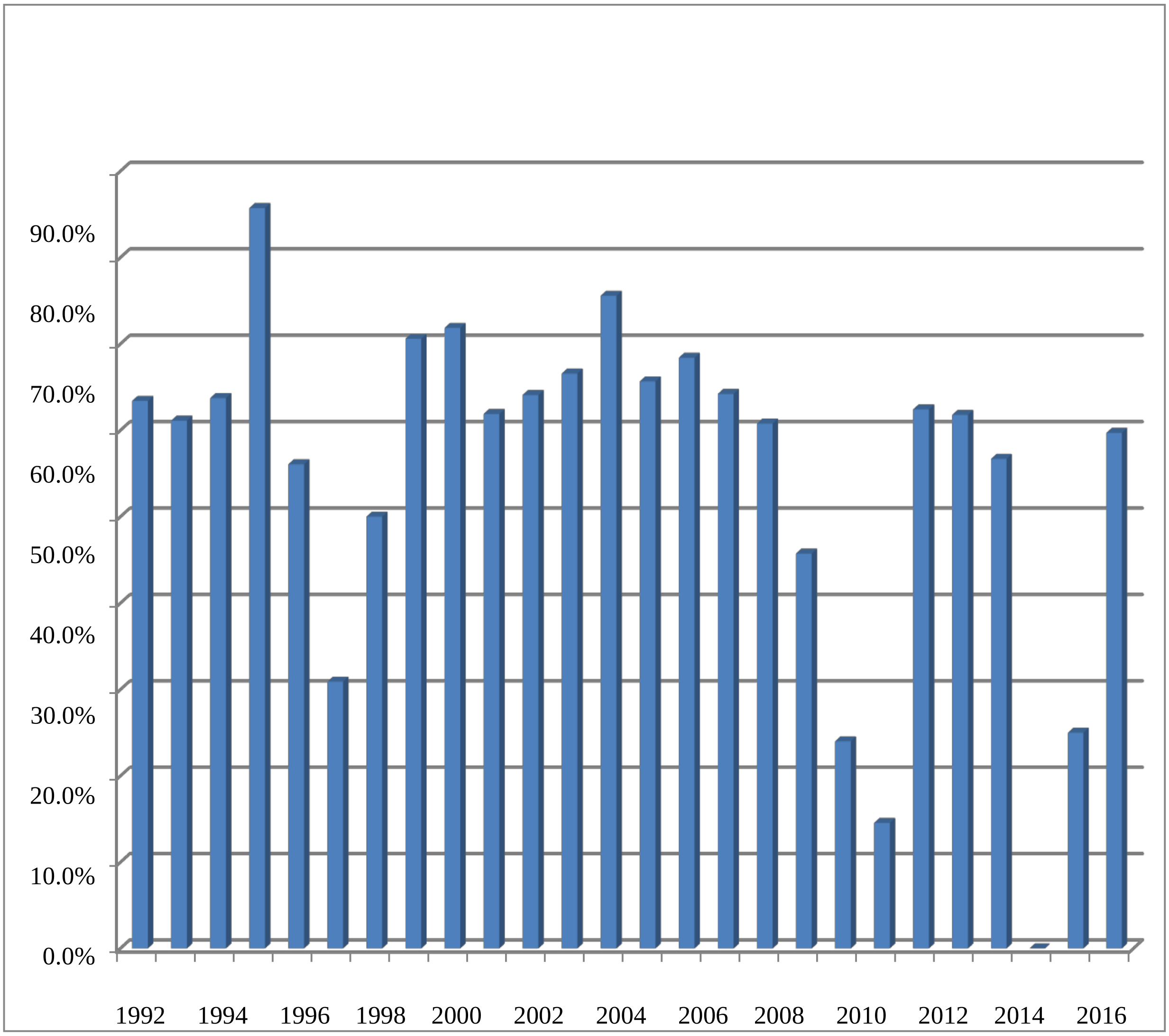


Figure VI-8. Percent of Hatched Chicks that Fledge Lake McConaughy, 1992 – 2017. (CNPPID, 2017a)

Beginning in 2010, a decrease in fledge success (lowest on record) attributed to rising lake levels (flooding nests) and increased predation, corresponded to a period with numerous years of an overall decrease in available beach habitat (high lake levels). Combined, this resulted in a decline from the highest piping plover production (236 adult pairs, 318 fledged in 2006; 371 fledged in 2004) to the lowest in 2015 and 2016 (42, 10 adult pairs, 0, 1 fledge respectively). The highly variable nature of habitat conditions at Lake McConaughy result in years with significant contributions to the population and others with no contribution at all. Least terns do not use the lake nearly as much but showed the same reproductive trends at a smaller scale.

<u>Upper and central Platte River</u>:

Additional habitats are managed or monitored by CNPPID or NPPD on the Upper and central Platte River above the AHR. While survey efforts are variable among sites and years preventing comparable and meaningful analyses, it appears that least tern and piping plover use and productivity remained similar during Program Implementation compared to levels observed prior (CNPPID, 2017b). *Appendix F* provides data from the remaining sites monitored by CNPPID throughout the Upper and central Platte River.

Tern and plover monitoring has also been done by the Program and its partners in the central Platte River (Table VI-2 andVI-3).

Table VI-2. Summary of Least Tern Reproductive Success at Off-Channel and On-Channel Nesting Sites on the AHR Portion of the Central Platte River in Nebraska.

Reproductive Parameter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Adults Observed	132	80	97	123	125	116	136	166	224	157
Breeding Pairs	39	37	42	53	60	64	58	98	141	88
Total Nests	53	64	60	76	90	88	95	145	188	119
Successful Nests (at least one egg)	22	27	37	43	52	63	51	80	116	74
Apparent Nest Success	0.42	0.42	0.62	0.57	0.58	0.72	0.54	0.55	0.62	0.62
Chicks Observed (less than 15 days)	50	54	71	105	124	144	118	180	258	170
Hatch Ratio (Chicks/Nest)	0.94	0.84	1.18	1.38	1.38	1.64	1.24	1.24	1.37	1.43
Fledglings (21 days)	—	—	—	64	89	84	64	91	146	80
Fledge Ratio (21-day Chicks/Nest)	—	—	—	0.84	0.99	0.95	0.67	0.63	0.78	0.67

*Note: — indicates these data were not reported.
**2007–2016). (Keldsen and Baasch, 2016, reproduced from *Appendix A*

Table VI-3. Summary of Piping Plover Reproductive Success at Off-Channel and On-Channel Nesting Sites on the AHR Portion of the Central Platte River in Nebraska.

Reproductive Parameter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Adults Observed	52	23	31	46	55	60	68	69	74	64
Breeding Pairs	19	13	12	20	27	30	27	30	39	43
Total Nests	27	21	15	33	34	46	31	43	54	60
Successful Nests (at least one egg)	15	8	9	21	27	32	23	34	34	40
Apparent Nest Success	0.56	0.38	0.60	0.64	0.79	0.70	0.74	0.79	0.63	0.68
Chicks Observed (less than 15 days)	44	26	27	76	87	99	80	116	119	120
Hatch Ratio (Chicks/Nest)	1.63	1.24	1.80	2.30	2.56	2.15	2.58	2.70	2.2	2.00
Fledglings (28 days)	—	—	—	42	45	59	28	55	52	55
Fledge Ratio (28-day Chicks/Nest)	—	—	—	1.27	1.32	1.28	0.90	1.28	0.96	0.92

*Note: — indicates these data were not reported.
**2007-2016), (Keldsen and Baasch, 2016, reproduced from *Appendix A*

The total number of breeding pairs of least terns and piping plovers has increased for both species in the AHR during the First Increment of the Program (Figure VI-9 and Figure VI-10). In 2016, a total of 88 breeding pairs of terns and 43 breeding pairs of plovers were observed in the AHR. Piping plover breeding pair counts increased slightly from 2001 to 2007, declined during 2008 and 2009, and have increased since that time. The Program observed a decrease in least tern breeding pairs in 2016; however, these counts are still above the counts during the years prior to Program implementation. Though nesting has occurred on riverine sandbars and habitat increased during 2015, off-channel sandpits have provided the most consistent nesting habitat for both species. As can be gleaned from Table VI-2 and VI-3, nesting success for the least tern and piping plover has been on a steady increase since implementation of the First Increment in 2007. Not only have nest, chick, and fledgling counts increased greatly (primarily because of off-channel availability), but hatch ration has increased, while fledglings ratios have remained steady. This has resulted in increased production of both least terns and piping plovers in the AHR during the first increment to date.

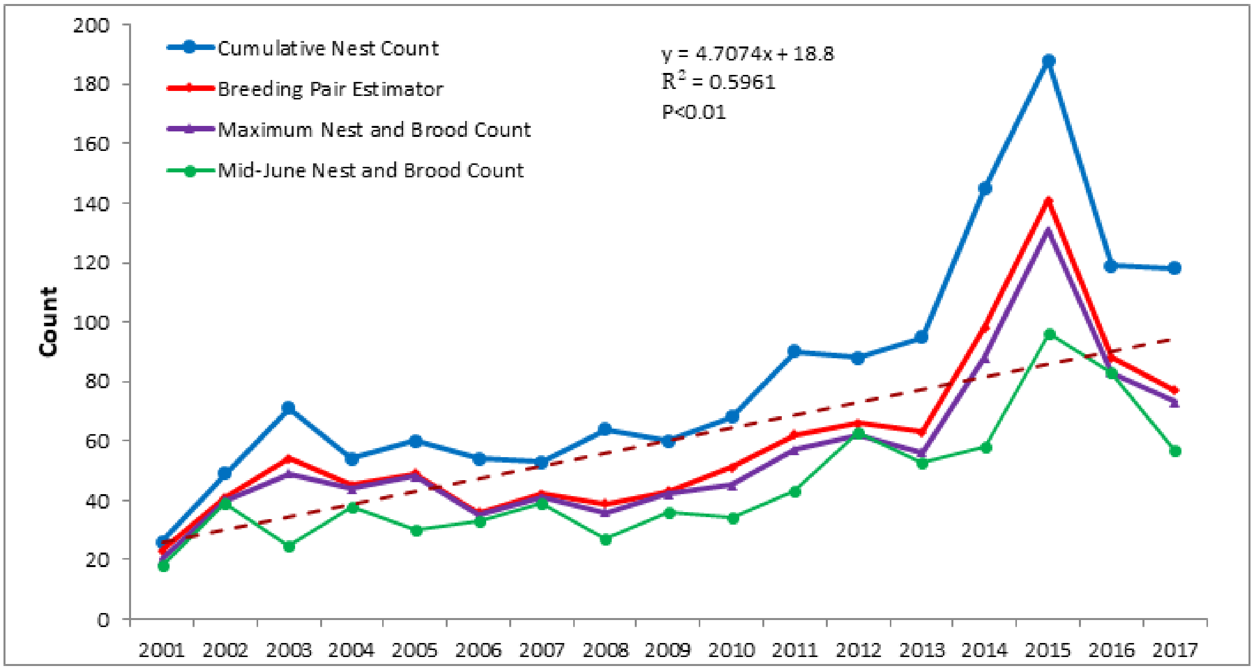


Figure VI-9. Least Tern Breeding Pair Counts on the Central Platte River AHR (2001-2016), (Source: Keldsen and Baasch 2016, reproduced from *Appendix A*).

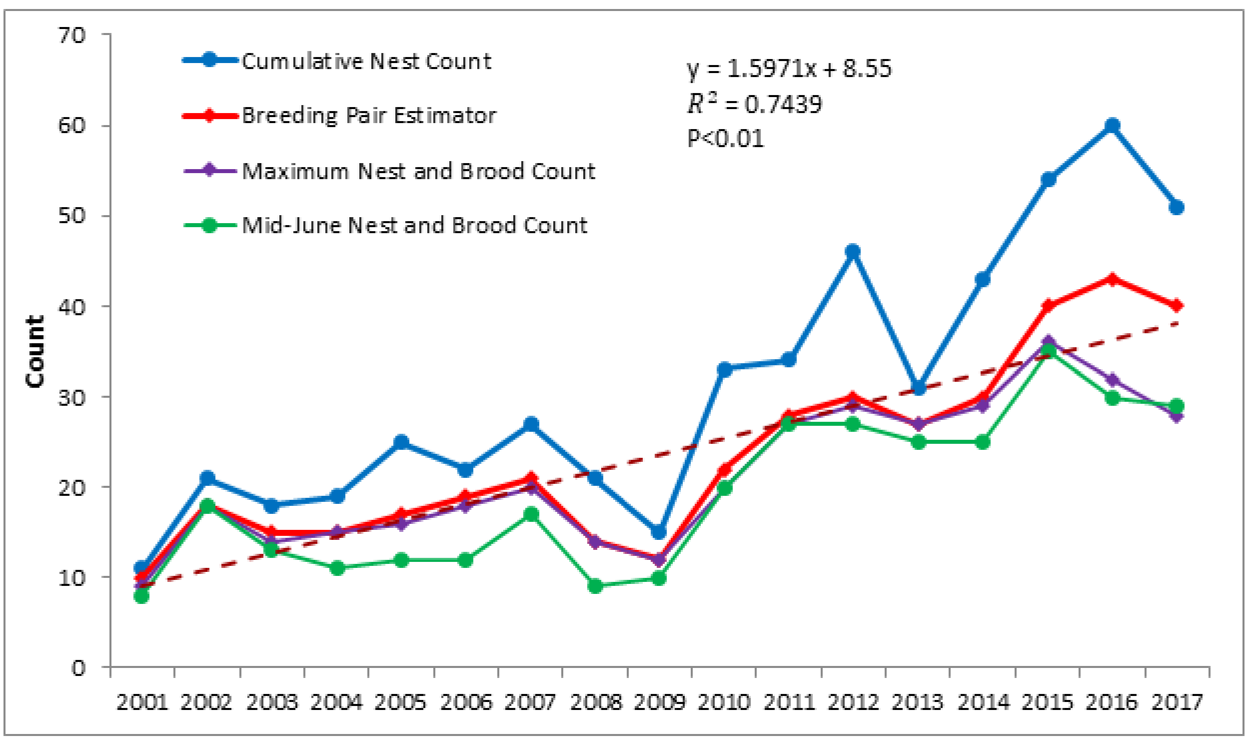


Figure VI-10. Piping Plover Breeding Pair Counts on the Central Platte River AHR (20012016), (Source: Keldsen and Baasch 2016, reproduced from *Appendix A*).

VC2. Factors Affecting the Species in the Action Area

The 2006 Opinion summarized anticipated effects of implementation of the Program. The list of beneficial effects included: 1) increased nesting substrate available at Lake McConaughy and managed sandpits; 2) a slight increase in July flows at Grand Island, Nebraska, resulting in a decreased probability of water temperatures dangerous to fish which would benefit forage resources; 3) the possibility of improvements in the availability of channel nesting habitat downstream of Lexington through water management and sediment augmentation; and 4) a 53,000-foot increase in the length of braided channel in the central Platte River. The list of adverse effects included: 1) A substantial reduction in the frequency and significant reduction in magnitude of spills from Lake McConaughy, which exacerbate the decline of ecosystem processes maintained by a normative hydrologic regime and sediment transport through the system; 2) an increased probability of continued channel narrowing and habitat degradation from North Platte to Lexington that may negatively affect the availability of resources to piping plovers and least terns currently using this reach of the Platte River; and 3) A slight increase in the possibility of inundation of least tern or piping plover nests downstream of Chapman through slightly elevated July flows at Grand Island. These effects are included within our environmental baseline of this Supplement.

<u>Availability of Riverine Nesting Habitat</u>:
Water resource development in the Platte River basin has been extensive, resulting in reduced peak and annual flows and reduced sediment load and transport. This resulted in changes in river plan form that allowed vegetation of the formerly active river channel (Murphy et al. 2004, FEIS 2006). Under existing conditions within the action area, in-channel nesting habitat along the Platte River between North Platte and Grand Island is created only under peak flow conditions such as those experienced in 2015 (approximately 15,000 cfs). The reduced frequency of these events (peak flows) compared to historical conditions has been well documented. In-channel nesting on naturally created islands or sandbars has occurred infrequently and at low levels in the first increment. Data collected by the Program indicates sandbars do not build to the water surface and a sufficient amount of suitable in-channel sandbars or islands are unlikely to be created by any Program flow releases as currently envisioned (Program, 2017).

While suitable in-channel nesting habitat has been infrequent, increases in the amount and suitability of off-channel habitats in the AHR created and maintained by the Program have occurred. This has resulted in an increase in overall available habitat, utilization and reproductive successby terns and ploverson off-channel habitats. As previously described, nesting success has occurred at sufficient levels and predators and disturbance has been sufficiently managed leading to increased reproductive success as was envisioned for the First Increment. The Governance Committee has directed the Program to continue focusing on mechanically creating and maintaining on- and off-channel nesting habitats for least terns and piping plovers with a focus on off-channel habitat.

<u>Riverine Foraging Habitat</u>:

While fish sampling has occurred in the central Platte River, (Jenniges and Peyton, 2014, Sherfy et al., 2012), systematic annual fish sampling has not been completed and an investigation comparing historic and current species composition of minnows (forage fish for least terns) was not done in the first increment. Periodic low flows corresponding to with times of high temperatures are still considered a critical factor in determining the abundance and diversity of the fish community in the central Platte River. While Baasch et al. (2017b) suggest forage fish were abundant in all but the lowest flows and that forage fish don't appear to be limiting least terns, fish kills do occur and were documented in the AHR during the 2012 and 2013 nesting season when portions of the central Platte River went entirely dry. While the distribution, abundance and composition of forage doesn't appear to be limiting under most scenarios, the driest of years (little or no flow in the channel) appear insufficient in supporting least tern forage fish and invertebrates needed for piping plover foraging (found on moist sandbars) under existing conditions.

VID. Pallid Sturgeon Environmental Baseline

VD1. Species Status in the Action Area

<u>Summary</u>:
Since publication of the 2006 Opinion, the amount of new information has increased substantially for the pallid sturgeon range-wide and specific to the Platte River. The Service has revised the environmental baseline section to incorporate new information.

The Service will consider the effects of the Program on the following life stages of the pallid sturgeon in this Supplement: 1) juvenile to non-reproductive adults; 2) non-reproductive adults to spawning adults; 3) spawning adults to the deposition of eggs; 4) hatching of eggs to larvae; and 5) transition from larvae to juvenile. This is based on observed species presence and indirect information in published scientific literature.

<u>Present Status of Pallid Sturgeon Population for the Platte River</u>:
For pallid sturgeon to be considered for reclassification from endangered to threatened, a self-sustaining genetically diverse population of 5,000 adult Pallid Sturgeon must be maintained within each management unit for 2 generations (20-30 years). The CLMU is one of four management units that must satisfy the above criteria for reclassification to threatened (Service 2014). One important component of the above reclassification criteria is the number of adults. Steffensen et al. (2013a) estimated 48,000 individuals (6,000 wild and 42,000 hatchery-reared) reside in the 811 mile-long Lower Missouri River recognizing slight differences in population boundaries between the CLMU and the river segment studied by Steffensen et al. (2013a). Totals provided by Steffensen et al. (2013a) and Winders and Steffensen (2014) illustrate a range in species densities within the CLMU. Extrapolating densities from Winders and Steffensen (2014) result in estimates ranging from 7,962 to 14,488 individuals for the Lower Missouri River. A recent assessment by Steffensen et al. (2017) estimated 13,616 (Standard Error [SE] ±7,142) pallid sturgeon for the Lower Missouri River.

Hamel (2013) estimated that approximately 926 pallid sturgeon are present in the lower Platte River during the study. This is a coarse estimate for a dynamic Platte River population with individuals from the CLMU migrating into and out of the Platte River (Delonay et al. 2016; Peters and Parham 2008). However, the Service has determined that 926 individuals represent a reasonable estimate given actual captures of 137 individuals with only four recaptures (Hamel et al. 2014a). The small number of recaptures reported in Hamel et al. (2013) indicates more individuals are present in the Platte River than what is being captured by researchers, and thus, the population using the lower Platte River is expected to be higher than the 137 pallid sturgeon captured. To better understand pallid sturgeon use of the lower Platte River, the Service applied densities reported in the scientific literature for the Lower Missouri River to the 103.5 miles of the lower Platte River. The total number of pallid sturgeon ranged from 1,016 to 1,849 individuals when applying densities from Winders and Steffensen (2014); 5,664 to 6,862 individuals using densities from Steffensen et al. (2012); and 828 to 2,649 individuals using densities from Steffensen et al. (2017). A population of 926 individuals estimated by Hamel (2013) represents the lower end of ranges reported above. Hamel et al. (2014b) provided insight as to why the densities in the Platte River may be lower than that of the Missouri River because the reduced availability of deep-water habitats in the Platte River may limit wild adults that are larger in size. When considering that the Platte River densities would be less than that reported for the Missouri River, 926 individuals in the Platte River estimated by Hamel et al. (2013) is in line with comparable studies for the Lower Missouri River.

Pallid sturgeon have been captured throughout the entire lower Platte River, but are more abundant downstream of the Elkhorn River confluence. Of the 137 individuals collected by Hamel (2013), only 13 individuals were collected in the lower Platte River upstream of the Elkhorn River confluence. Individuals have been captured from March through November and are likely present year round; however, pallid sturgeon are more abundant during spring and fall seasons (Table VI-4 and Table VI-5). DeLonay et al. (2016) and Peters and Parham (2008) documented seasonal use of the Platte River by pallid sturgeon.

Table VI-4. Annual total number of pallid sturgeon captures in the lower Platte River

	Year			
	2009	**2010**	**2011**	**2012**
Segment 1[a]	66	34	14	10
Segment 2[b]	3	5	3	2

[a] lower Platte River from Elkhorn River confluence to mouth (approx. 32 miles)
[b] lower Platte River from Loup River Hydroelectric Project tailrace return to Elkhorn River confluence (approx. 66 miles)

*Source: Hamel 2014a as modified by USFWS

Table VI-5. Pallid sturgeon captures by season and location in the lower Platte River

	Average Number per Year		Range in Observed Numbers	
	Segment 1[a]	Segment 2[b]	Segment 1[a]	Segment 2[b]
Spring	9.8	1.8	5-21	1-3
Summer	6.5	1.0	1-16	0-2
Fall	14.8	0.5	1-42	0-1

[a] lower Platte River from Elkhorn River confluence to mouth (approx. 32 miles)
[b] lower Platte River from Loup River Hydroelectric Project tailrace return to Elkhorn River confluence (approx. 66 miles)

*Source: Hamel 2014a as modified by USFWS

The absence of natural recruitment limits species recovery in the CLMU. It is unknown to what degree the conditions on the Platte River may or may not limit natural recruitment. We evaluated existing information to assess if populations in the lower Platte River are self-sustaining. We also reviewed information to determine if the Missouri River is essential for sustaining the Platte River population. The following describes the findings of our evaluation.

Several pallid sturgeon life stages have been documented in the Platte River. Peters and Parham (2008) noted that adult and juvenile pallid sturgeon have been captured in the lower Platte River, which is a significant indicator that the habitats are suitable for adults and juveniles. Both wild and hatchery-reared individuals have been observed, but the proportion of wild individuals is less than what is reported for the Missouri (Hamel et al. 2014a). The authors hypothesized that the reduced availability of deep-water habitats in the lower Platte River may limit access for wild adults that are larger in size. Additionally, there is data to indicate that the lower Platte River is likely used for spawning (DeLonay et al. 2016; Swigle 2003). Long-term telemetry monitoring of pallid sturgeon have documented several instances where male and female individuals have migrated into the Platte River in a likely attempt to spawn (DeLonay et al. 2016). Pallid sturgeon larvae were documented within the lower Missouri River basin (USACE, 2015), but the location or origin has not been confirmed. Additionally, larval *Scaphirhynchus* has been documented in the lower Platte River, but captured larvae could not be identified to species (Hofpar 1997, Reade 2000) demonstrating that there is suitable spawning substrate in the Platte River. Given the information provided above, the Service concludes that pallid sturgeon spawn in the Platte River although actual spawning has not been confirmed.

In a review of existing information for the 2016 Biological Opinion for the Loup River Hydroelectric Project, the Service has found no documentation that would suggest pallid sturgeon free embryos observed in the CLMU (USACE 2015) are able to transition to free swimming juveniles. The Service reviewed existing drift models from DeLonay et al. (2009) and Braaten et al. (2008) to predict when and where free embryos are expected to transition from drifting individuals to those capable of swimming (USFWS 2016). In the opinion, the Service concluded that free embryos would typically disperse several hundred miles downstream from spawn and hatch locations.

Recent publication indicates free embryos/larval pallid sturgeon may be able to transition to free swimming juveniles using drift distance that are shorter than what has been reported in previous studies (Marotz and Lorang 2017). Additionally, a hatchery raised pallid sturgeon free embryos/larvae were released into the upper Missouri River in June 2016 as part of a larval drift study, and one individual was recaptured in June 2017 (pers. communication, Ryan Wilson, March 2018). The larval drift study was conducted in a river segment with a truncated drift distance due to Lake Sakakawea, and the recapture indicates that at least one free embryos/larvae was able to survive beyond the draft life stage within this truncated river segment. In consideration of the aforementioned new information, the Service will consider Program water-related effects to larval pallid sturgeon because of the potential for larvae retention in the Platte River.

In summary, the Service will consider the effects of the Program on the following life stages from: 1) juvenile to non-reproductive adults; 2) non-reproductive adults to spawning adults; 3) spawning adults to the deposition of eggs; 4) hatching of eggs to larvae (which includes the free embryo life stage); and 5) transition from larvae to juvenile.

VD2. Factors Affecting the Species in the Action Area

Hydrology Baseline:
Monthly averages, maximum daily mean flows, and minimum daily mean flows in lower Platte River streamflow are summarized in Tables VI-6 and VI-7 for the North Bend and Louisville stream gages, respectively for the entire period of record.

Table VI-6. Average daily flows by month on the Platte River at North Bend, Nebraska for water years 1949 to 2017; and highest/lowest mean monthly flow recorded within the period of record.

Month	Mean Flow (cfs)	Maximum Flow (cfs)	Minimum Flow (cfs)
January	3,459	7,361	932
February	5,221	11,850	2,688
March	6,879	16,870	3,570
April	5,869	19,400	2,672
May	5,940	21,770	1,724
June	6,893	25,340	1,255
July	3,625	17,070	348
August	2,602	8,021	273
September	3,047	9,022	785
October	3,873	10,130	1,624
November	4,122	9,462	1,938
December	3,590	8,581	1,413

*Source USGS 2017a.

Table VI-7. Average daily flows by month on the Platte River at Louisville, Nebraska for water years 1953 to 2016; and highest/lowest mean monthly flow recorded within the period of record.

Month	Mean Flow (cfs)	Maximum Flow (cfs)	Minimum Flow (cfs)
January	4,966	10,810	1,822
February	7,740	17,270	3,237
March	10,700	27,010	4,898
April	9,760	34,250	3,701
May	10,170	35,350	2,548
June	12,330	51,120	2,489
July	6,418	43,440	978
August	4,356	13,890	519
September	4,479	12,870	975
October	5,447	15,630	1,603
November	5,699	10,580	2,234
December	5,117	11,030	1,456

*Source USGS 2017b.

In the 2006 Opinion, several life functions important to the pallid sturgeon (i.e., feeding, breeding, sheltering) were aggregated by month. For example, the 2006 Opinion identified the pallid sturgeon spawning time period from April to June. Service then summarized the Program's water management effects to flow and percent change in flow for those months within the spawning time period. Also in the 2006 Opinion, the Service evaluation a small portion of total flow. For example, the Service only evaluated the lowest 33-percent of flows when evaluating temperature-related species effects during the summer time period because the lowest flows are most sensitive to high temperatures. For the Supplement, the Service collated results from multiple tables in the 2006 Opinion into one table depicting Program's qualitative effects to pallid sturgeon at the Louisville stream gage (Table VI-8). The 2006 Opinion subdivided flows by thirds and sixths, and the Service converted these subdivisions into percentages for Table VI-8. For example, the highest one sixth of flows is equivalent to the 83.4 to 100 percent.

In summary, the Program's water management actions are expected to reduce flows during in January and December for all years. The Program is also expected to impact the highest of 16.6 percent of flows (i.e., the top one sixth of all flows) from February through July. The remaining time periods show either improvements to (or no change in) lower Platte River flows.

Table VI-8. Program improvements in monthly flow and reductions in monthly flow at the Louisville stream gage.

	January	February	March	April	May	June	July	August	September	October	November	December
100-83.4 percent												
83.3-66.8 percent												
66.7 -50.1percent												
50.0-33.4 percent												
33.3-16.8 percent												
16.7-0 percent												

Key	
	Program Reduction in Flow
	Positive to No Change in Flow
	Program Improvement in Flow
	Results Not Reported in 2006 Opinion

* Source: 2006 Opinion, Section VII.F.F2 as modified by the Service

Sediment Transport Baseline

2006 Opinion summarized mean and median daily sediment transport rates at river mile 162.2 (i.e., <RM 38 near Chapman) in Table VI-9.

Table VI-9. Daily sediment transport rates from the upper basin.

	Modeled Daily Sediment Transport Rate (in tons)		Percent Change from Present Conditions	
	Mean	Median	Mean	Median
Present Conditions	1,121	405	-	-
Governance Committee Alternative	1,179	506	5%	25%

VIE. Western Prairie Fringed Orchid Environmental Baseline

VE1. E1. Status of the Species in the Action Area

Historic records of the Western Prairie Fringed Orchid exist in multiple places along the Platte River. Changes in land use (conversion to agriculture) and irrigation or drainage of fields began changing the moisture regime. These factors combined with historic alterations to the hydrograph which reduced flows result in the present conditions which contain very little remaining suitable habitat for the orchid.

Surveys for Western Prairie Fringed Orchid were conducted during the First Increment by the Crane Trust. However, these surveys did not detect the presence of any specimens of Western Prairie Fringed Orchid (Josh Wiese, personal communication, 2018) and no additional surveys for this species occur in other locations in the Platte Valley. The Mormon Island Crane Meadows site has not detected flowering plants since 1999 and the population is likely extirpated.

VE2. Factors Affecting Environment in the Action Area

Management actions and implementation during the Program Extension remain the same as those described for the 2006 Opinion (as they related to the orchid). These effects were previously analyzed and are included in our environmental baseline. The 2006 Opinion summarized these anticipated effects of implementation of the Program on the Western Prairie Fringed Orchid. The list of beneficial effects included: 1) minor increases in early-spring (mid-February to mid-March) water surface elevations which will facilitate growth and activity of wet meadow communities including the orchid; 2) increases in late spring (mid-April to June) peak water surface elevations in normal years could improve groundwater levels and related improvements in wetland maintenance during years with normal river flows. This would generally benefit the lowest and wettest meadow; and 3) neutral effects to wet meadow hydrology associated with lower Platte River peak flows. The list of adverse effects included: 1) decreases in late-spring river elevations and peak flows in the wettest years that would adversely affect groundwater elevations that sustain wetland habitats; 2) decreases in short-duration peak flows that create overbank flows into meadows and facilitate surface water connections between meadows. Surface water overflows are a unique driver of the wet meadow and wetland system that probably cannot be mitigated or offset by other means.

VII. EFFECTS OF THE ACTION

Continued Effects of Existing and New Water Related Activities Considered in the First Increment

The Environmental Baseline section of the 2006 Opinion described the adverse effects that existing water-related activities in the North Platte River, South Platte River and Platte River basins have had on the natural hydrograph and sediment balance in the Platte River ecosystem. Those changes resulted in consequences to channel morphology and the availability of habitat for federally listed species. Their effects were described and considered within the effects of the First Increment. While the proposed Program Extension will enable continuation of existing and new water-related activities (list of new water-related activities consulted on in the First Increment are included in *Appendix C*), they will operate as they have in the past. Consistent with the Program Document, new water-related activities will continue to be offset by the federal and states' water depletions plans and the Program serves as the offset for existing Reclamation and Service water-related activities. Adverse effects of these existing and new water related activities are interrelated with the proposed Program First Increment and are incorporated in the environmental baseline of the Program Extension. New adverse effects from these water projects are not anticipated in the Program Extension and will not be further investigated or described as effects of the Program Extension.

However, given their relationship with existing channel conditions and those aspects of the system processes the Program will effect in the Program Extension, we discuss many of these effects where needed, to provide context. Briefly, the primary effects from existing water-related activities are continued dampening of late spring or early summer rise of river flows and continued impairment of sediment transport and channel maintenance processes. In absence of future protection of these peak flows, water storage and direct diversions during this time period will continue to flatten the natural hydrograph by capturing the high spring run-off, thereby significantly reducing and retiming annual peak flows reaching habitat in the central and lower segments of the Platte River.

As described in the 2006 Opinion, peak flow reductions resulting from continuation of existing water-related activities will also decrease the frequency of inundation of the Platte River floodplain and wet meadows. Reduced floodplain connectivity will adversely impact nutrient cycling within the system, inundation of backwaters and other floodplain habitats essential for fish spawning, re-distribution, and use as nursery areas. Reduced peak flows will also adversely affect both sub-irrigation and surface overflows that support the biological functions of wet meadows.

Annual peak flows, and sediment supply and conveyance are fundamental components of channel maintenance. The combination of reduced peak flows and sediment trapping in the large reservoirs, diversion dams and canal systems will impair the river's sediment load and transport capacity. Consequently, the river processes that maintain broad and braided river channels, sandbars, and river stage are anticipated to remain impaired. The resulting adverse effects on the listed species and their habitats will continue to worsen with time. These river changes will adversely affect roosting habitat and wet meadow feeding habitats for whooping cranes.

Because existing water-related activities will continue largely operating as in the past, we do not anticipate new effects of water-related activities within a large segment of the Platte River system, from North Platte to Lexington, Nebraska resulting from the Program Extension. Downstream of Lexington, the result of sediment-free discharges from the J-2 Return are anticipated to be reduced but may continue contributing toward erosion of the channel bed if sediment augmentation is not 100 percent effective. If the sediment deficit continues, channel incision and narrowing, and in some river sections, vegetation growth on parts of the channel no longer scoured by the river flows, may occur, as anticipated within the First Increment.

Sediment captured by in-channel structures of water-use facilities on the North Platte River and erosion of the riverbed below the J-2 Return contributed to coarsening of riverbed particle sizes in the central Platte River. Riverbed particle size during the First Increment did not undergo significant changes in particle size and sediment augmentation may slow coarsening of the river bed. During the Program Extension, changes resulting in additional coarsening is not anticipated but will be monitored to continue to investigate long-term trends under Program Implementation. Existing coarsening has contributed to impaired channel maintenance processes and additional coarsening would further impair these processes. If additional coarsening does not occur, new adverse effects resulting from coarsening would occur, though existing effects would continue.

VIIA. Effects of the Action on the Platte River System

The general effect of the Program on the Platte River system within the First Increment was considered in the context of expected and modeled effects included in the Final EIS (Reclamation and Service, 2006). The majority of the models developed as part of that effort were not re-evaluated for this effort as their effects are included as part of the environmental baseline resulting in existing conditions.

Generally, trends observed during the First Increment were highly variable. The Program contributed to changes in the hydrologic and geomorphic conditions during the First Increment though these were significantly more heavily influenced by natural hydrologic conditions from Program actions. Further complicating the evaluation of the Program's effect on the Platte River system during the First Increment; many Program actions were just recently implemented (e.g. sediment augmentation) or have yet to be completed (e.g. water objectives related to reduction in shortages to target flows). Once completed, many of these actions effect on the system require years to evaluate. For this reason, we provide an update on current conditions that were experienced during the First Increment and evaluate whether any recent information or proposed changes by the Program during the Program Extension will result in new anticipated effects on the system.

The average annual surface flow overview contained in *Appendix A* provides an overview of the surface water behavior in the central Platte River during Program Implementation. Table VII-1 below, depicts the average annual flow and peak flows for the 3 primary stream gages (Overton, Kearney and Grand Island, Nebraska) in the central Platte River.

The Program provides approximately 90,000 acre-feet toward the First Increment objective of 130,000 to 150,000 acre-feet. Prior to Program implementation, the average annual flow was 1,751 cfs at Overton and 1,746 at Grand Island (Reclamation and Service, 2006). Since the implementation of the Program, the average annual flow at Overton has decreased slightly to 1,731 cfs and increased at Grand Island to 1,834 cfs (Program 2017b). When compared with flows at Overton and Grand Island, Nebraska, prior to implementation of the Program, the Program's influence on water management has been detectable in the Platte River (*Appendix A*). From approximately April through November, mean monthly discharge in the river increased at the Overton and Grand Island gages. During the rest of the year, it decreased or remained almost unchanged. The largest increase in mean monthly discharge was during June, and the largest decrease was during February and March. A large portion of the reduction in shortages to target flows is due to the retiming of water and not an additional volume of water. Service releases from the Environmental Account (Figure VII-1) also occurred primarily during the April-November timeframe. While changes to target flows are also influenced by natural variability, average annual flows during this time period would likely have decreased in absence of Program water (see Figure VII-2 for an example of the 2017 hydrograph with the Environmental Account release contributions).

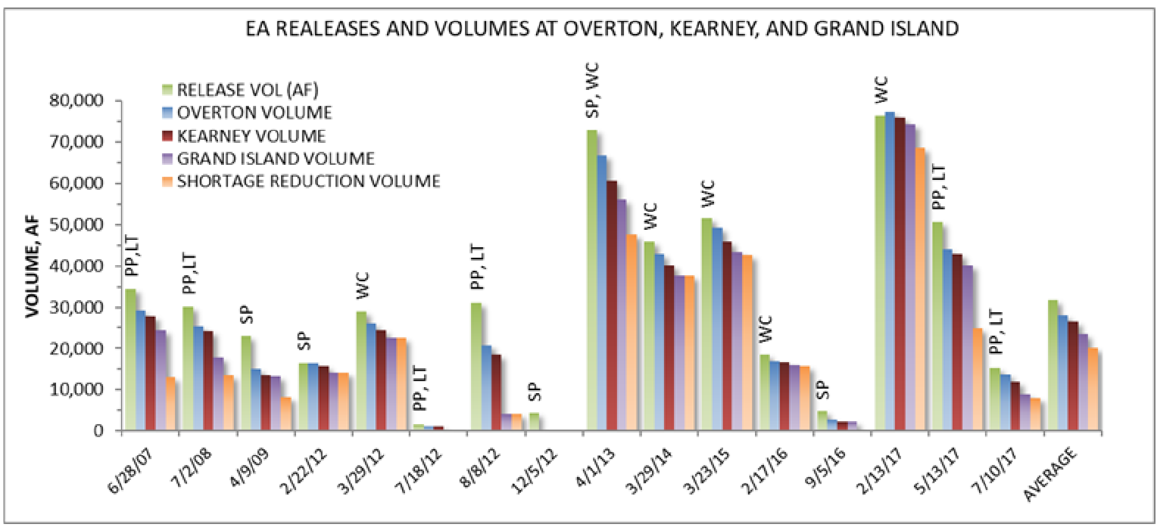


Figure VII-1. Total Environmental Account Releases throughout the First Increment (Source: Program 2017 Platte River Surface Water Flow Summary).

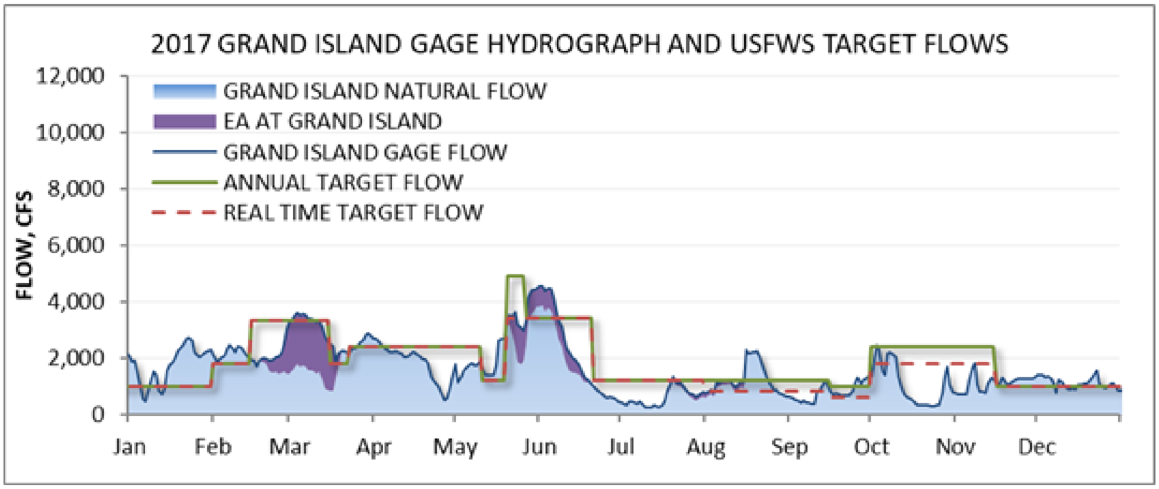


Figure VII-2. 2017 Grand Island Hydrograph with Environmental Account contributions (Source: Program 2017 Platte River Surface Water Flow Summary).

Although the Program influenced flows in the First Increment, local weather conditions and regional climate patterns are factors outside the control of the Program. Considerable variability in mean annual flows occurred (see Figure VII-3 below). Vegetation removal, weed management, overall wet conditions and a higher than normal frequency of peak flows have increased the un-vegetated river widths, increased braiding river conditions and improved mobilization of the bed and bars within the river. The primary drivers in the observed changes to the system are believed to be the annual peak flow amount and duration as well as mechanical vegetation treatment completed by the Program and other conservation partners in the AHR.

Table VII-1. Average Annual Flow and Instantaneous Peak Flow in the Platte River (2007–2016).

Year	Overton Gage Average Annual Flow (cfs)	Overton Gage Instantaneous Peak Flow (cfs)	Kearney Gage Average Annual Flow (cfs)	Kearney Gage Instantaneous Peak Flow (cfs)	Grand Island Gage Average Annual Flow (cfs)	Grand Island Gage Instantaneous Peak Flow (cfs)
2007	800	4,420 on June 2	857	5,430 on February 25	1,121	7,300 on February 23
2008	791	11,200 on May 25	929	13,400 on May 26	1,300	13,600 on May 27

Year	Overton Gage Average Annual Flow (cfs)	Overton Gage Instantaneous Peak Flow (cfs)	Kearney Gage Average Annual Flow (cfs)	Kearney Gage Instantaneous Peak Flow (cfs)	Grand Island Gage Average Annual Flow (cfs)	Grand Island Gage Instantaneous Peak Flow (cfs)
2009	942	3,700 on April 19	916	3,350 on April 20	1,039	3,540 on April 22
2010	2,157	7,500 on June 27	2,069	8,510 on June 17	2,289	8,840 on June 24
2011	3,877	8,820 on June 20	3,972	9,460 on June 25	4,214	10,400 on June 27
2012	1,114	3,500 on January 20	1,032	3,430 on January 26	978	3,590 on January 26
2013	1,140	13,100 on September 25	1,068	12,500 on September 28	1,024	10,600 on October 3
2014	1,249	7,580 on June 12	1,177	6,730 on June 14	1,199	8,800 on June 15
2015	3,506	15,500 on June 17	3,304	16,300 on June 18	3,341	16,100 on June 5
2016[1]	2,936	8,740 on May 29	2,945	8,820 on May 30	3,032	8,910 on May 31
Average	**1,851**	**8,406**	**1,827**	**8,793**	**1,954**	**9,168**

Source: *Appendix A*

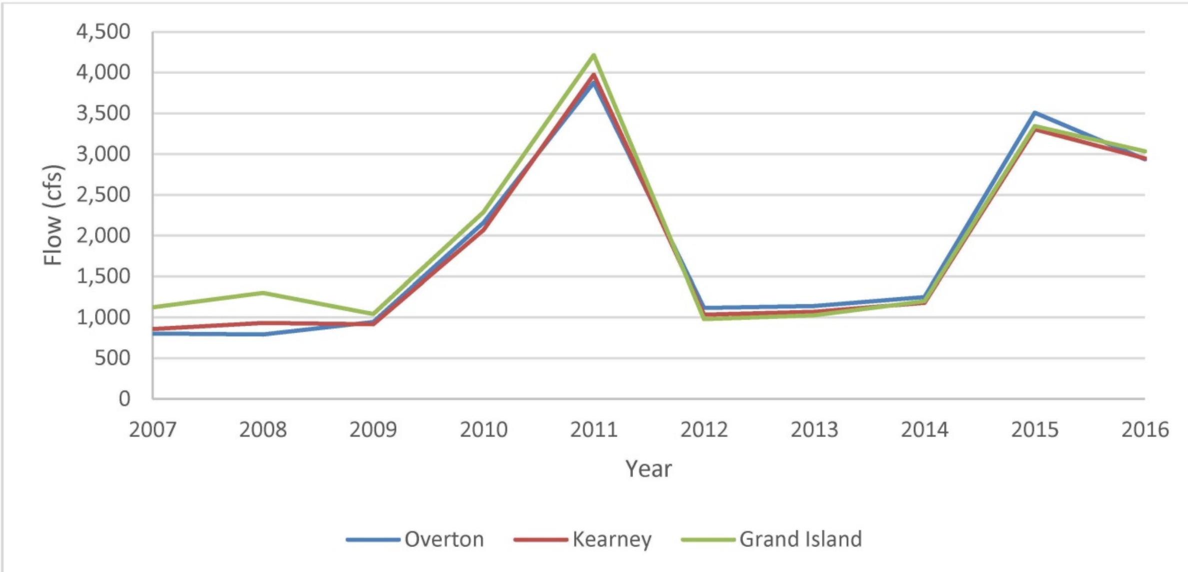


Figure VII-3. Average Annual Flow in the Platte River (2007-2016) [*Appendix A*].

Long-term trends are required to fully evaluate the effect of the Program's First Increment actions on the Platte River system. It is expected that knowledge gained during the Program Extension can be used to continue improving braiding, sediment aggradation/degradation, and vegetation free channel widths during the Program Extension. The Program's influence on average annual flows in the Program Extension and the resulting adverse or beneficial effects are not anticipated to be substantially different from those anticipated for the First Increment. The anticipated effects on the Platte River system included in the environmental baseline are consistent with the range of conditions observed during the First Increment to the extent in which Program actions were implemented. New beneficial effects from Program actions during the Program Extension are anticipated from additional land management actions. These include additional increased vegetation removal, bed and bar mobilization and channel widening which contribute to improvements in system scale processes in the Platte River. In general, these effects are localized in areas where the Program acquires and restores new properties above existing levels. However, new reach-wide beneficial effects may also be realized as the Program acquires new knowledge and uses it to improve water management at a system scale. It is anticipated that target flows will be investigated during the Program Extension and revised by the Service where appropriate. Modification of target flows would be based on the best available science. Changes to target flows informed by the best available science is anticipated to result in improvement, protection and maintenance of a flow regime targeted at sustaining riverine processes responsible for improved channel maintenance and suitable habitat conditions for the target species.

VIIB. Effects of the Action on the Whooping Crane

VB1. Factors to be Considered for Effects of the Action on Whooping Crane

The Federal action was evaluated for the following effects on whooping cranes: a) land and water management effects on crane stopovers and roosting during spring and fall migration; b) feeding and nutrition; and c) protection of whooping cranes from disturbance and human intrusion. Whooping Cranes only occur in the action area twice during the year, during their spring and fall migration and direct effects to whooping cranes can only occur during that biannual period. Indirect effects on fitness (i.e. the effect of stopover habitat contributing toward their physiological fitness) will continue throughout their annual life cycle.

<u>In-channel Roosting</u>:

Past water related activities included in the environmental baseline contributed heavily toward significant reductions in the availability of suitable channel roosting habitat for whooping cranes. During the period leading up to the First Increment, this reduction in suitability peaked, resulting in the narrowest, most heavily vegetated conditions experienced on record in the action area. During this period whooping crane use (proportionate to population size) was extremely low (some of the lowest on record [USFWS, 2018]), or in some cases, not occurring. During the First Increment, the Program successfully acquired an interest in and restored, where practical, approximately 12,000 acres of habitat lands in blocks between Lexington and Chapman, Nebraska (referred to as habitat complexes). The cleared and widened length of channel at these habitat complexes and other managed lands throughout the AHR represent approximately 24 miles of river (or portions of) located primarily between Lexington and Grand Island, Nebraska.

During spring, migratory stopovers maintain the physiological fitness of adult birds for reproduction and rearing of young. Recent research suggests migratory and breeding mortality may influence population growth and recruitment more than winter mortality. This suggests it may be prudent to focus conservation on migratory and breeding habitats as drought and winter mortality may not heavily influence demographic population growth (Butler et al, 2014). Whooping cranes in the remaining wild and self-sustaining AWBP cross the Platte River twice each year. During the average life span, individual birds cross the Platte River 40 to 60 times. Based on recent whooping crane utilization (over 25 percent of the population detected using the AHR during spring 2018), whooping cranes might use stop over habitat on the Platte River during migration once every two years on average (if recent use trends were maintained). Over the course of a lifetime, whooping cranes may use the Platte River as stopover habitat ten to fifteen times during their biannual migrations. The increased habitat resulting from Program efforts benefited cranes by providing secure and reliable stopover sites which contributed to increased utilization and improved survival during migration and productivity throughout the year.

Whooping cranes observed in migration are usually found near suitable wetland roosting sites and the availability of suitable roost sites is a primary attraction at stopover points. Suitable channel roost habitat must be present at or near locations where a crane crosses over the Platte River for whooping cranes to stop. Therefore, the biological benefits are directly related to the improvements in the distribution, quantity, and quality of the restored habitat.

The AHR is entirely encompassed within the whooping crane corridor. Wide unvegetated channels restored by the Program closer to the center of the migrational pathway have a higher potential for providing benefits to migrating whooping cranes. Whooping cranes migrate as single individuals, as family groups, or as small flocks. Though the approximately 24 miles of restored or managed channel is a small proportion of the approximately 200-mile wide migration corridor (Pearse et al. 2017), it represents a benefit to the whooping cranes because it places more high quality habitat near the center of the species migration path than previously existed. Observed from migrating altitudes, whooping cranes may be able to observe and select habitat five miles in either direction (East or West) as they migrate over the Platte River (Program, 2017). When combined with existing lands managed by conservation organizations, land interests acquired and managed by the Program during the First Increment improved channels conditions and increased the availability of habitat complexes; habitat complexes (or start of) managed at least in part for whooping cranes occur in every bridge segment west of Grand Island, Nebraska. This has increased the instance of whooping cranes locating and using suitable habitat along the Platte River during migration. During the Program Extension, an additional 1,500 acres are anticipated to be acquired and added to the Program land holdings. The additional land restoration and management is intended to facilitate development of a new habitat complex or be located in a bridge segment with little or no existing management (*Appendix B*). This effort will result in progress toward the long term land objectives for the Platte River and provide additional beneficial effects not assessed for the First Increment. Given increases in habitat conditions experienced during the First Increment and the goal of increasing land interests and habitat management in the Program Extension, we anticipate the amount of highly suitable habitat will be maintained, or more likely, increased. Program improvements in the availability of suitable roost sites will provide additional beneficial effects to whooping cranes by increasing survival and reproductive fitness.

<u>Feeding and Nutrition</u>:

Whooping cranes routinely rest and feed in croplands at migration stopover sites to replenish energy and nutritional requirements. The amount of cropland owned, managed or protected by the Program is a small proportion of the Platte River valley landscape and is more directly intended to function as buffer than feeding habitat. The likelihood that whooping cranes would select or use the particular fields managed by the Program may be relatively small due to the vast amount of available agricultural fields to choose from. That said, multiple agricultural properties with Program protection (easements) have been used by whooping cranes, likely due to their location in proximity to suitable channel habitat also managed by the Program. The Program investigated whooping crane selection of off-channel habitat in relation to its proportion on the landscape to determine if whooping cranes selected for or against agricultural fields (specifically corn). Their results suggested that whooping cranes did not disproportionally select for agricultural fields but instead, used them in proportion to their availability on the landscape. It is anticipated that land interests acquired in the Program Extension will include low amounts of agricultural fields (if any) and we conclude that the existing amount and distribution of agricultural fields available for foraging by whooping cranes continues to support the species food and nutrition needs, though decreased available waste grain within those fields could potentially reduce fitness in the future (see below).

A secondary potential benefit from Program improvements in the quantity and distribution of channel roost habitat may be a decrease in interspecific competition for food resources in the Platte River valley. Use of the Platte River valley by the mid-continent population of sandhill cranes and large populations of geese precedes the arrival of whooping cranes. Combined with improved farming efficiency, this has reduced the amount of waste corn available to foraging migratory birds (Krapu 2003). The habitat requirements of these bird populations are much like whooping cranes and the populations often concentrate in parts of the valley with wide river channels. Improvements in the distribution and quantity of wide river channels may have contributed to dispersing concentrations of sandhill cranes and geese across larger areas by improving reaches of the Platte River, thereby reducing the competition for limited grain resources in those river reaches that previously contained suitable roost habitat and the highest concentration of migratory birds. Presumably, this has resulted in benefits for whooping cranes that have less competition at every location as well as sandhill cranes, a Program species of concern.

Whooping cranes, like sandhill cranes, require animal matter to satisfy their nutritional needs, and this material is obtained primarily from grasslands and wetlands. Along the Platte River, grasslands and wet meadows provide animal food items and nutrients that cranes cannot obtain from other agricultural waste grain.

The Program has increased the amount and improvement of the distribution of wet meadows along the central Platte River. The amount of bottomland riparian grassland and wet meadow acquired by the Program for feeding or buffers is a relatively small proportion of the Platte River valley landscape (estimated less than 11 percent of the land within 1 mile of the river). Whooping crane use of an area may be related to the location of grasslands/meadows in relation to the river channel and surrounding landscape. Baasch et al. (2018, submitted for publication) found that wetlands (river, slough, open water) and lowland grassland (i.e. wet meadows) were selected for over all other diurnal land cover types, including agriculture. Repeated use of wet meadows was documented on many high-quality wet meadows in the AHR during the First Increment including lands managed as part of the Mormon Island complex, Shoemaker Island complex, Cottonwood Ranch complex, Elm Creek complex and the recently acquired Clark Island complex (USFWS, 2018). Some of these wet meadows were created by large scale conversions of riparian forest to wet meadow (John’s tract and Dippel tract). In general, high quality wet meadows owned and managed by the Program and other conservation organizations in the Platte River Valley have and will continue to provide suitable habitat for whooping cranes and sandhill cranes that use them as diurnal habitats. During the

Program Extension, the amount and location of new acquisitions of wet meadow are unknown. While a portion of the new habitat is anticipated to include wet meadows, given the relatively small amount of land available to fulfill habitat objectives for the Program Extension, the focus will is anticipated to be on riverine habitats. The Program will continue managing its existing suite of high quality wet meadows in the Program Extension.

As with all migratory birds, the physiological fitness of whooping cranes arriving at breeding grounds in spring affects their reproductive fitness. During migration, wetlands and wet meadows could provide food sources and nutrients necessary for reproduction that are not obtainable from grain fields. The distribution of wet meadows along the Platte River valley will continue to benefit migrating whooping cranes where those habitats exist. Wet meadows increase the availability of nutrients not supplied by other habitats, thereby supporting reproductive fitness of the whooping cranes using these areas.

Protection from Disturbance and Predators:

Whooping cranes observed roosting on the Platte River use wide channels with shallow, slow moving water, usually stand on shallowly submerged sandbars, and normally occupy a single position within the river channel area throughout the night. The expanse of water likely functions as a barrier that protects cranes from disturbance and predators. The Program land and water management activities will continue to increase the quantity and improve the distribution of wide channels that include increased amounts of shallow and slow-moving water. These improvements benefit whooping cranes by increasing the probability of locating suitable roost sites in which to stand and rest securely during the night, free from disturbance and predators. The availability of suitable roost habitat not only helps protect whooping cranes from predation, but also reduces energy expenditures, thereby helping to maintain the birds' physiological condition.

Whooping cranes do not readily tolerate disturbance**.** Program actions to acquire, restore and protect land secured areas from human intrusion at times of whooping crane use them. The Program Extension will increase the amount and distribution of secure and protected lands from disturbance and the threat of predators. Habitat acquisition and protection would preclude future land use changes (i.e. conversion to commercial, residential, or industrial purposes). Therefore, Program acquisitions and proper management of buffer and feeding habitats would provide biological benefits for the long-term protection and conservation of whooping cranes. Overall, this will result in less harassment to whooping cranes using the AHR.

Effects of Continuation of Program Management Actions during the Program Extension:

Adverse effects resulting in take of whooping cranes are anticipated to result from continuation of other Program actions during the Program Extension. While a variety of adverse effects were evaluated and described in the 2006 Opinion effects section (those included in this environmental baseline), adverse effects from other activities resulting in take were only described in the incidental take section of the 2006 Opinion and were only estimated for the first 13-year period of the First Increment. For these activities, adverse effects resulting in take are anticipated to occur at similar levels (as those described for the First Increment) during the Program Extension (see 2006 Opinion, Incidental Take Statement) [USFWS, 2006]. Given that the anticipated Program actions that were responsible for resulting in anticipated take will occur in the Program Extension, we conclude effects resulting in take remain the same and will occur during the Program Extension. These effects are categorized under 1) harm or harassment of whooping cranes from monitoring and research activities; and 2) harm or harassment of whooping cranes related to land restoration and management activities. Given the suite of Program activities will remain similar but be extended for an additional 13 years, we anticipate similar levels of adverse effects resulting in take during the Program Extension for these activities, except as noted otherwise within the incidental take statement.

VB2. Analysis of Effects of the Action on Whooping Crane Habitat and Designated Critical Habitat

This analysis provides the basis for determining the significance of anticipated effects of the proposed Federal action on critical habitat. The threshold for destruction or adverse modification is evaluated in the context of whether or not the critical habitat would remain functional to serve the intended conservation role for the species.

Changes in channel characteristics over time were described at length within the Platte River environmental baseline section of this Supplement. Channels within the Program AHR and designated critical habitat (which is a subset of the AHR) have increased in un-vegetated width, unobstructed width, and width to depth ratio. In general, channels are wider, shallower and have less vegetation growing within them. Additionally, due in large part to targeted tree clearing along the banks, un-forested widths of the river have also increased on average. The Program Extension is anticipated to result in beneficial affects to whooping crane habitat and designated critical habitat resulting from increased land management and restoration of suitable habitat in the Platte River.

Program research confirms whooping crane disproportionally use wider channels more than they are available on the landscape. The Program concluded it could further increase suitability by managing for unobstructed channels of at least 650 feet wide and un-forested widths of at least 1100 feet wide (Program, 2017). Given that habitat changes during the First Increment improved channel characteristics as they relate to whooping crane suitability, Program management resulted in beneficial effects to the whooping cranes habitat in the AHR, including designated critical habitat. As noted previously (whooping crane environmental baseline), use on the central Platte increased significantly during the First Increment (most notably during the spring migration). While factors outside Program influence affect habitat conditions, we anticipate additional Program actions in the Program Extension will contribute to maintenance of existing habitat and creation of additional suitable habitat.

Compared to habitat throughout the U.S. migration corridor, present conditions on designated critical habitat in the central Platte River have resulted in the highest documented use in a single migration by whooping cranes (USFWS, 2018). Continued management and protection of this habitat is needed to improve and maintain the habitat and ensure its availability in the future.

Summary of Beneficial Effects

- Increase/improvement in the amount and distribution of wide channels free of vegetation, with suitable un-forested widths. This results from the addition of 1500 acres of new habitat acquired, managed, and restored where appropriate. Additionally, it is anticipated that the Program will continue increasing efforts in existing or new areas (e.g. improvements on existing habitat lands, contributing to phragmites spraying, etc.);
- Slight increase in the amount of protected grasslands and wet meadows available as a secondary source of crane foraging (assumes some portion of the 1500 may be grassland or wet meadow);
- Increase in the miles of stream bank and adjacent land area protected to minimize disturbance or predation;
- Sustained or increased utilization of available suitable stopover habitat on the Platte River by whooping cranes. This contributes to improved physiological fitness, survival, reproductive success and lower rates of mortality.

Summary of Adverse Effects:

- Adverse Effects resulting in take of whooping cranes are anticipated at similar levels as those described for the First Increment and involve: harming or harassing whooping cranes during implementation of land restoration, management, monitoring, or research.

VIIC. Effects of the Action on the Least Terns and Piping Plovers

Program activities were designed to improve habitat for least terns and piping plovers in the central Platte River (i.e., between Lexington, Nebraska and Chapman, Nebraska). However, Program actions also affect least tern and piping plover habitat in other locations in the action area. Those effects as well as effects to least terns and piping plovers in the AHR were evaluated in the 2006 Opinion and included as part of the environmental baseline for this action.

Terns and plovers use the Platte River during late spring and throughout the summer to breed and raise young to fledging. They migrate into and out of the area prior to and immediately following reproductive and brood rearing efforts. Program Extension activities resulting in different or new effects during this time period are evaluated further in this section. These effects are primarily related to the amount or distribution of nesting habitat and the availability of forage needed to raise young.

Effects on Nesting Habitat:

New effects related to nesting on the Platte River at locations outside the AHR (Lake McConaughy, the Platte River between North Platte and Lexington, and the lower reach of the Platte River between Columbus and the Missouri River) are not anticipated in the

Program Extension as Program management actions at these areas remain unchanged. Nesting at these areas was highly variable during the First Increment and the Program is limited in its capacity to effect tern and plover nesting within these areas. New effects resulting from the Program Extension in the AHR are primarily related to its ability to increase or decrease available habitat or reproductive success in the Platte River.

During the Program Extension, anticipated beneficial effects described for the within the environmental baseline for the First Increment remain unchanged with one exception. The possibility that the Program will meaningfully increase the availability of naturally created (flow) in-channel nesting habitat is considered to be unlikely in the Program Extension, though testing of the FSM strategy (thought to be capable of providing this) will occur. This represents a decrease in in-channel habitat relative to the anticipated effects for the First Increment. However, given low levels of nesting on in-channel habitat naturally created during the First Increment, this change would not result in an actual decrease in in-channel habitat; instead it represents a decrease in the anticipated in-channel habitat.

Prior to Program Implementation, sandbars were assumed to be built to the water surface during peak flow events. Research conducted by the Program indicated that the median height of sandbars formed during natural high-flow events (in the range of SDHF) in 2010, 2011, 2012, and 2014 were 1.2 to 2.3 feet below peak stage (Program, 2018). Flow magnitudes in the range of 15,000 cfs, experienced in 2015 were sufficient to produce sandbars suitable for tern and plover nesting. Flows of this magnitude occur infrequently and the Program is unable to release or contribute to flows above flood stage (approximately 5,000-8,000 cfs in the AHR). The Program concluded its ability to naturally create and manage for tern and plover nesting habitat using flow was severely limited at best. Efforts by the Program as well as Partners for fish and wildlife resulted in mechanical creation of tern and plover nesting islands in-channel during some years. In general, Program efforts related to creation or maintenance of in-channel nesting habitat were met with limited success (table VII-2). This was due to a variety of reasons including limited access to create or restore nesting habitat, limited long-term persistence of habitat once created (due to flooding), and limited successful reproduction (producing fledged chicks) on the available in-channel habitat. As a result, the Governance Committee underwent a structured decision making process that resulted in the Program shifting its tern and plover management actions primarily to off-channel nesting habitats. The Governance Committee agreed to continue maintaining 10 acres of in-channel habitat annually while increasing efforts off-channel aimed at acquiring and maintaining an additional 60 acres of off-channel nesting habitat for terns and plovers. Table VII-2 provides cumulative data from on and off-channel habitat in the AHR during the First Increment.

Table VII-2. Constructed On- and Off-Channel Habitat in the AHR Within the Central Platte River by Year (2007−2016)

Year	On-Channel Habitat (Acres)	Off-Channel Habitat (Acres)

	Program	Others	Total	Program	Others	Total
2007	0	24	24	0	48	48
2008	0	21	21	0	48	48
2009	0	15	15	0	48	48
2010	0	5	5	32	48	80
2011	0	5	5	60	48	108
2012	0	0	0	72	48	120
2013	55	0	55	72	48	120
2014	19	0	19	80	48	128
2015	47	0	47	90	48	138
2016	4	0	4	87	61	149
Mean	**12.5**	**7.0**	**19.5**	**48.8**	**49.9**	**98.7**

Source: Keldsen and Baasch, 2016, from *Appendix* A

Creating and maintaining off-channel nesting habitat has resulted in substantial use and productivity of least terns and piping plovers since 2001 (see Figure VII-4 and Figure VII-5). During this same time frame, in-channel habitat availability and least tern and piping plover nesting and productivity have been sporadic and at low levels. In-channel habitat availability under Program implementation has only contributed marginally to the maintenance of the central Platte River least tern and piping plover populations. Combined, Program habitat creation resulted in a substantial increase in available nesting habitat.

While populations of both species have increased within the central Platte River AHR, increases of similar magnitude have not been observed throughout the species' range. The Program is anticipated to increase and maintain an additional 60 acres of off-channel nesting habitat during the Program Extension, while providing a small amount of in-channel habitat (approximately 10 acres per year). The Program's management actions in the Program Extension will result in beneficial effects by increasing nesting habitat (primarily off-channel). Program data throughout the First Increment suggests this increase in habitat is likely to result in an increase in survival and productivity of terns and plovers by increasing the amount of nests, chicks and fledged young that are recruited into the population. Based on Program data throughout the First Increment, the additional 60 acres of off-channel habitat and 10 acres of on-channel habitat is estimated to result in increased breeding pairs and nests that produce 141 additional piping plovers and 645 least tern fledglings during the Program Extension over existing levels (Compass, 2016). While the increase in productivity does not restore ecosystem processes prescribed within the draft piping plover recovery plan (for the species to be recovered rang-wide), it does fulfill the Programs goals of providing defined benefits to the species and contributes to maintaining a stable or increasing population for the recovery unit pertaining to the AHR (USFWS, 2016).

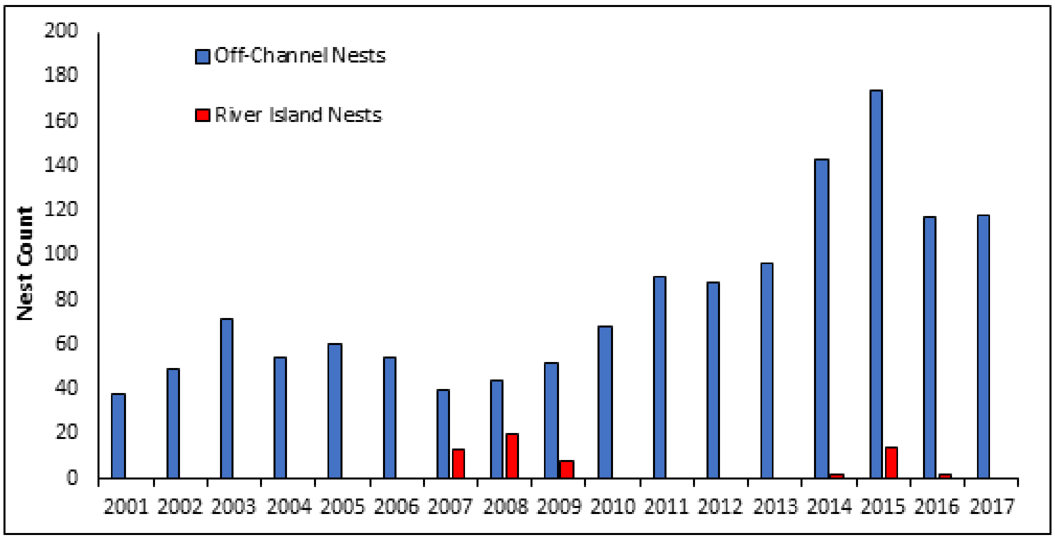


Figure VII-4. Comparison of Least Tern Off-Channel (blue bars) and On-Channel (redbars) Nests within the Program AHR (2001-2017) [Keldsen and Baasch, 2016 from *Appendix A*]

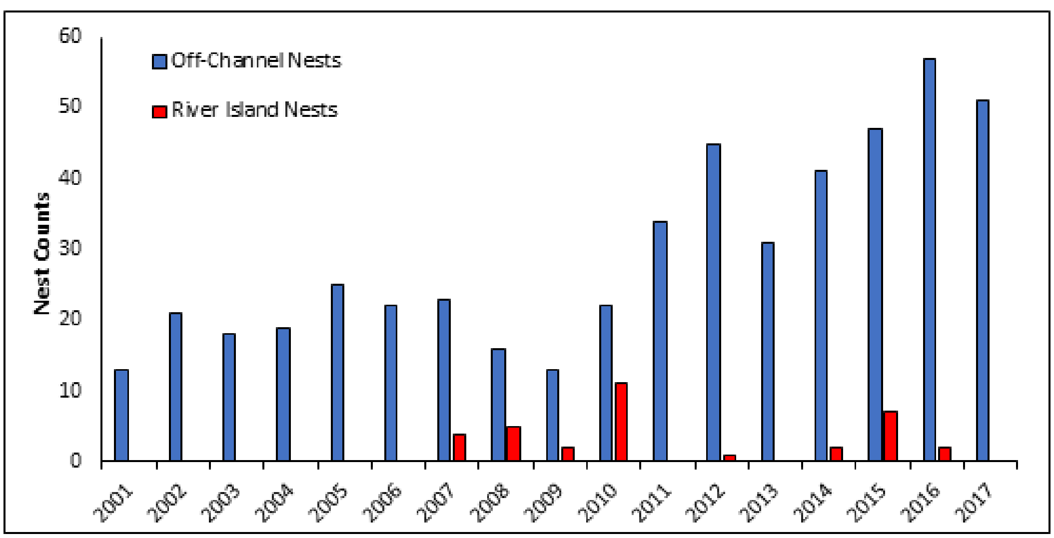


Figure VII-5. Comparison of Piping Plover Off-Channel (blue bars) and On-Channel (red bars) Nests within the Program AHR (2001-2017) [Keldsen and Baasch, 2016 from *Appendix A*].

Effects on foraging habitat:

High water temperatures in the central Platte River negatively impact the forage fish community. Low flows and water temperatures higher than the Nebraska water quality standard of 90 degrees Fahrenheit are associated with many of the fish kills observed in the central Platte River. New Program effects on temperature thresholds are not anticipated during the time when the development of least tern chicks is dependent on adequate availability of forage fish.

Research conducted during the First Increment suggests the central Platte River contains adequate forage fish during all but the lowest flows. The Program documented that least tern productivity was high throughout the First Increment and the majority of mortality was related to weather or predation; they concluded that forage abundance and reproductive success are adequately high to support central Platte River tern and plover populations (Program, 2018). However, while fledge ratios remained high despite a number of years with flows below the 800 cfs target flow, 32 percent of the broods failed due to unknown causes and the Program did not directly investigate the linkage between the available forage and tern and plover survival or productivity. The Governance Committee determined that additional expenses, efforts and the risk of injury to terns and plovers did not warrant the research needed to conclusively establish this relationship. System-wide, summer-long forage sampling, tern and plover behavioral studies, and potentially capturing and weighing chicks on multiple occasions would be needed to establish relationships between forage abundance, flow, productivity, and long-term survival (Program, 2018). However, given the results of the forage fish study (Sherfy et al, 2012) and data indicating high productivity with no difference in fledge ratios when flows were below 800 cfs (Baasch et al, 2017), there is no evidence that flow, and thus forage availability, is limiting tern and plover productivity within the AHR. Piping plovers also rely on in-channel sandbars and moist sandy substrate within the channel for foraging on invertebrates. However, existing data suggests the Program will not result in new adverse effects to least tern and piping plover productivity and survival; forage fish and invertebrates appear to be adequate for maintaining tern and plover productivity under the suite of anticipated flows in the Program Extension (Baasch et al, 2017). Additional investigation into summer flows aimed at sustaining riverine processes could provide additional benefits. Protection of peak flows or higher summer base flows (*Appendix A*) during tern and plover nest and brood rearing periods could further improve riverine processes that sustain the aquatic fish community and availability of invertebrates that terns and plovers rely on, though these effects are less known.

Effects of Program management actions considered in the First Increment that are anticipated to result in additional adverse effects during the Program Extension:

Adverse effects resulting in take of least terns and piping plovers are anticipated to result from continuation of other Program actions during the Program Extension. While a variety of adverse effects were evaluated and described in the 2006 Opinion effects section (those included in this environmental baseline), adverse effects from other activities resulting in take were only described in the incidental take section of the 2006 Opinion and were only estimated for the first 13-year period of the First Increment. For these activities, adverse effects resulting in take is anticipated to occur at similar levels (as those described for the First Increment) during the Program Extension (see 2006 Opinion, Incidental Take Statement) [USFWS, 2006]. Given that the anticipated Program actions that were responsible for resulting in anticipated take will occur in the Program Extension, we conclude effects resulting in take remain the same and will occur during the Program Extension. These effects are categorized under 1) inundating flows from exceeding benchmark flow levels; 2) Environmental Account flow releases resulting in nest flooding; 3) increased Predation at Program off-channel nesting sites; 4) harm from monitoring and research activities; 5) harassment and harm from land management and restoration activities; and 6) harm to nests at inland lakes of Reclamation's North Platte Project in Nebraska. Given the suite of Program activities will remain similar but be extended for an additional 13 years, we anticipate similar levels of adverse effects resulting in take during the Program Extension for these activities.

Summary of Beneficial Effects:

- The Program Extension will result in increased nesting habitat and improved survival and productivity on habitat created during the Program Extension (primarily off-channel). The Program Extension will result in the creation and maintenance of an additional 60 acres of off-channel nesting habitat while annually maintaining 10 acres in-channel which will add to the existing suite of beneficial effects resulting from implementation of the First Increment. We estimate the increased habitat will produce 141 additional piping plovers and 645 least tern fledglings during the Program Extension over existing levels.

Summary of Adverse Effects:

- Slight reduction of nesting habitat and productivity in-channel compared to conditions anticipated during the First Increment. The Program was anticipated to provide beneficial effects through improvement of the availability of in-channel nesting habitat due to its water management and sediment augmentation. While sediment augmentation will facilitate creation and maintenance of in-channel habitat resulting from natural high flows, these effects were previously anticipated and included in the environmental baseline. It appears Program releases may not be capable of creating in-channel nesting habitat and only low levels of in-channel habitat will be mechanically maintained. The reduction in in-channel habitat will not result in an overall reduction in nesting habitat as off-channel habitat created during the First Increment offset these reductions and resulted in an overall increase in nesting habitat and productivity.

- Adverse Effects resulting in take of least terns and piping plovers are anticipated at similar levels related to the Program actions involving: flow management (benchmark flow exceedance and Environmental Account releases); harming or harassing least terns and piping plovers during implementation of land restoration, management, monitoring, or research; increased predation on off-channel nesting sites in the AHR; and harming nests or chicks at inland lakes of Reclamation's North Platte Project.

VIID. Effects of the Action on Pallid Sturgeon

As described in the Environmental Baseline, the Service considered the effects of the Program on the following life stages: 1) juvenile to non-reproductive adults; 2) non-reproductive adults to spawning adults; 3) spawning adults to the deposition of eggs; 4) hatching of eggs to larvae; and 5) transition from larvae to juvenile. The Service described the following effects of the Program within the lower Platte River.

The above effects to pallid sturgeon were assessed using the following approach: 1) Describe how 2006 Opinion evaluated effects to species; 2) Identify modifications to how pallid sturgeon effects were analyzed due to new scientific and commercial issued after the 2006 Opinion; and 3) Identify modifications to how pallid sturgeon effects were analyzed due to changes Program commitments since the 2006 Opinion. The continued operation of existing and certain new Federal water-related activities were evaluated in the 2006 Opinion, so these effects will not be evaluated in the Supplement.

VD1. Factors to be Considered

<u>New Scientific and Commercial Information</u>:
Since issuance of the 2006 Opinion, there has been substantial amount of scientific and commercial information relating to species use and species threats specific to the Platte River basin. New information resulted in modification to the pallid sturgeon biological status and environmental baseline (see Biological Status and Environmental Baseline sections for specific references).

<u>Changes to Program Water and Land Management Actions</u>:
This section describes changes in Program water management actions from those evaluated in the 2006 Opinion as detailed in the Draft EA. In the 2006 Opinion, the Service evaluated of pallid sturgeon effects based on the Program commitment to reduce annual target flow shortages by 130,000 to 150,000 acre-feet, and there are no changes in water commitments for the Program's first increment extension, though the implementation strategy has been slightly modified (see previous description in the Environmental Baseline; as described in *Appendix B*).

Changes in Program land management actions include the Program commitment to acquire an interest an additional 1,500 acres of complex habitat, with the intent of establishing a new habitat complex. Refer to the Description of the Proposed Action for additional information about specific changes and Service assumptions applied in this 2006 Opinion.

<u>Changes to Program Research Plan</u>:
There have been no changes to commitments described in the Program's Adaptive Management Plan (Program Document, Attachment 3); however, there has been a change in timing of commitments. The 2006 Opinion summarizes the following Program commitments: 1) the Program document and attachments identify that the Program will undertake an effort to assess Program related impacts to the pallid sturgeon's lower Platte River habitat within the first three years following Program implementation; and 2) if this

study identifies adverse impacts, the Program has committed to develop and implement activities to negate or offset those adverse impacts during the first 13 years of the Program increment. Efforts to evaluate impacts to the pallid sturgeon's lower Platte River habitat is still ongoing while the commitment to develop and implement activities to negate or offset those adverse impacts has not changed in the Program Extension document.

VD2. Analyses for Effects of the Action

The original Program commitment to reduce annual target flow shortages by 130,000 to 150,000 acre-feet has not changed for the first increment extension, and thus, beneficial and adverse effects described in the 2006 Opinion is not expected to change within the first increment extension.

Program commitment to acquire an interest an additional 1,500 acres of complex habitat and land management activities such as vegetation clearing is expected to increase sediment supplied to the lower Platte River (Service 2006). An increase in sediment transported to the lower Platte River was identified in the 2006 Opinion as a beneficial effect to pallid sturgeon, and this beneficial effect is expected to continue through the first increment extension.

The 2006 Opinion identified the mortality and/or injuring of pallid sturgeon from stress of capture and handling for monitoring and research activities. No activities have been conducted within the first increment, and thus it is reasonable to conclude that monitoring and research activities will be conducted in the first increment extension. Effects to individuals were not monitoring and research activities quantified in the 2006 Opinion. However, the assumption in the 2006 Opinion is that researchers would be required to secure a permit under section 10(a)(1)(A) of ESA prior to conducting monitoring and research; and thus, adverse effects would not exceed that allowed in 10(a)(1)(A) permits authorized. The 2006 Opinion did not specify what life stages would be affected by Program monitoring and research. Similarly for the Supplement, the Service anticipates adverse Program effects to pallid sturgeon from monitoring and research activities, and these effects would not exceed that authorized in 10(a)(1)(A) permits.

Summary of Beneficial Effects:

- With the exception of the above adverse effects, the Program operations will improve lower Platte River flows from February through November with the exception of the 16.6 percent of flows from February through July.
- Program will increase the amount of sediment available to be transported to the lower Platte River.
- Program commitment to develop and implement activities to negate or offset adverse impacts during the Program increment.

Summary of Adverse Effects:

- Program's water management actions are expected to reduce flows during in January and December for all years.

- Program's water management actions are also expected to impact the highest of 16.6 percent of flows (i.e., the top one sixth of all flows) from February through July.
- Program monitoring and research activities will result in mortality and/or injuring of pallid sturgeon from stress of capture and handling.

VIIE. Effects of the Action on Western Prairie Fringed Orchid

Program activities were not specifically designed to impact habitat for Western Prairie Fringed Orchid in the central Platte River (i.e., between Lexington, Nebraska and Chapman, Nebraska). Program actions also have the potential to affect orchid habitat in other locations in the action area. Those effects as well as effects to Western Prairie Fringed Orchid in the AHR were evaluated in the 2006 Opinion and included as part of the environmental baseline for this action.

Western Prairie Fringed Orchids are not believed to occur on Program lands and are believed to be extirpated from the Crane Trust Mormon Island Crane Meadows property which is within the AHR. Program Extension activities that could potentially result in different or new effects were further evaluated in this section.

The Programs land management activities in the Program Extension are anticipated to be similar to the First Increment. While the Program is likely to acquire and restore new land, it is not anticipated that the Program would acquire land containing Western Prairie Fringed Orchid and we conclude the Programs land management, restoration, monitoring, and research will have no effect on the Western Prairie Fringed Orchid. Effects of Program water management are the same as those evaluated in the 2006 Opinion. Therefore, new effects (beneficial or adverse) to Western Prairie Fringed Orchid within or outside the AHR are not anticipated in the Program Extension as Program management actions remain unchanged from those within the environmental baseline.

Summary of Beneficial Effects:

- No new beneficial effects are anticipated. The Program did not directly implement conservation measures within the First Increment to date which would benefit Western Prairie Fringed Orchid. If these conservations measures are implemented in the Program Extension, they could result in beneficial effects.

Summary of Adverse Effects:

- No new adverse effects are anticipated beyond those considered previous in the Opinion.

VIII. CUMULATIVE EFFECTS

The implementing regulations for section 7 define cumulative effects as "*...those effects of future State, or private activities, not involving Federal activities that are reasonably certain to occur within the action area of the Federal action subject to consultation.*" (50 CFR §402.02) (emphasis added). The purpose of identifying and assessing cumulative effects is to examine whether there are additional actions in the action area that while not part of the proposed action under consultation, might need to be considered in assessing the impact of the effects of the action to the listed entity. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation.

The Service's consultation handbook (Service 1998) recommends review of the action agency's NEPA document as a method for identifying potential cumulative effects. The Handbook cautions however, that NEPA cumulative impacts are not identical to the narrower definition of cumulative effects for consultation under 7(a)(2). The difference arises from the degree of likelihood of the impact occurring. The standard for NEPA is "reasonably foreseeable" whereas the consultation standard is a much more narrow "reasonably certain to occur".

<u>Whooping Cranes</u>

Cumulative effects for whooping crane are reasonably certain to occur in the AHR as a result of human disturbance and harassment. Disturbance to roosting and feeding whooping cranes associated with human interaction increases stress to individual cranes and increases migration mortality. Public harassment of whooping cranes occurs in the central Platte River valley as concentrations of people visit the area (typically in the spring) to experience the sandhill crane migration staging in the spring (Rabbe personal communication, 2018). In 2018, a juvenile whooping crane that stayed in the Platte River valley for over a month became well known to the general public. The lone whooping crane was repeatedly harassed by individuals seeking to get up close and observe or photograph it. These interactions resulted in the whooping crane being harassed and flushing. In addition to the increased stress, harassment leading to whooping cranes unexpectedly taking flight increases the potential for collisions with nearby power lines. Utility infrastructure, such as high-voltage electric transmission lines are located throughout the action area. While we are unaware of any new, proposed transmission lines reasonably certain to occur in the action area, utility infrastructure is an existing threat to migrating whooping cranes. Mortality from collisions with power lines represents the primary source of documented mortality for this species (Stehn and Strobel 2014). As demonstrated by past interactions, harassment by the general public will continue to occur and this leads to increased stress, decreased fitness and in rare instances, mortality to a small amount of individuals using the central Platte River. Expansion of residential and commercial development along the river in the central Platte River valley also increases disturbance. The Program Extension will continue increasing the amount of secure, protected habitat that whooping cranes can utilize free from disturbance.

Least Terns and Piping Plovers

Disturbance from airboat use or other recreation occurs within the Lower Platte River. Nest, chicks and adults can be exposed to a variety of effects ranging from lethal loss to non-lethal harassment. While Program and Service monitoring efforts use airboats to survey tern and plover nesting, avoidance and minimization measures significantly reduce or eliminate disturbance leading to lethal or non-lethal effects. However, public recreation, including the use of airboats in the central and lower Platte Rivers is frequently documented and human presence on nesting habitat has been observed. Nest trampling or disturbance causing parents to leave nests for extended periods of time reduces nesting success. Given documented past activity, it is likely that public harm or harassment will continue to occur in these areas. Public disturbance from recreation has also been documented near Program off-channel nesting areas. Collectively, these recreational activities are likely to decrease reproductive success where they occur. Program efforts such as posting signs that restrict access to breeding areas, placing barricades/fencing to exclude human access, and conducting outreach efforts, can help to reduce human disturbance during the nesting season.

Sand and gravel mining occurs frequently throughout Nebraska and is expected to continue within the foreseeable future (Brown et al. 2011). Nebraska contains aggregate material along the Loup River and Platte River. Sand and gravel mining is reasonably certain to continue expanding and new locations and sites will be developed as there are no cheaper alternatives and suitable material remains present throughout the action area. Additional mines, if actively managed for least tern and piping plover, could supplement existing populations (Brown et al. 2011). If not managed and protected, these areas can also act as a source of disturbance and lethal take. Abandoned sand mining sites are often converted into housing developments, which maintain bare sand for recreational beaches. These too can positively or negatively affect least terns depending upon management and protective measures (Brown et al. 2011). We expect both positive and negative impacts to least terns and piping plovers will occur in the future resulting from new or expanded sand and gravel mining or housing developments. The Program and its partners will continue management of off-channel habitats. Efforts to provide education aimed at increasing awareness and decreasing disturbance or harm will continue to decrease effects of human disturbance.

Cumulative effects on least terns and piping plovers resulting from water development in the lower Platte River is likely and is discussed below under the lower Platte River Depletions heading.

Depletion Related Impacts to the Lower Platte River

Cumulative effects to Lower Platte River hydrology were derived using a report titled, 2014 Annual Evaluation of Availability of Hydrologically Connected Water Supplies (NDNR 2015). The report projects the streamflow losses in the Lower Platte River at the North Bend and Louisville gages for a 25-year time period starting in 2014. Based on the available information, effects to stream flows resulting from future both surface and groundwater development (depletions) is anticipated. NDNR (2015) projects that future water development in the basin would result in an additional reduction in stream flows of

76 cfs at the North Bend stream gage and 173 cfs at the Louisville stream gage by 2041. Streamflow losses from future water development are in addition to expected declines from existing development reported as a 64 cfs reduction at the North Bend stream gage and a 398 cfs reduction at the Louisville stream gage by the year 2041 (NDNR 2015). Effects from water development resulting in reductions of streamflow can negatively impact least tern and piping plover nesting habitat creation and maintenance as well as pallid sturgeon spawning cues, and occurrence of lethal water temperatures.

Pallid Sturgeon

Outside of cumulative effects from depletion related impacts to the tower Platte River, the Service is unaware at this time of specific new future State or private actions that would significantly affect the pallid sturgeon in the lower Platte River.

Western Prairie-Fringed Orchid

The Service is unaware at this time of specific new future State or private actions that would significantly affect the MICM western prairie fringed orchid population in the central Platte River. It is believed to be extirpated, suggesting no future actions can negatively affect it in the action area.

IX. CONCLUSIONS

The severity and extent of historic habitat degradation in the Platte River ecosystem resulted principally from extensive development of Platte River basin water resources. The Program Extension will contribute to the continued survival and recovery of the whooping crane (*Grus americana*), least tern (*Sternula antillarum athalassos*), northern Great Plains population of the piping plover (*Charadrius melodus),* and pallid sturgeon (*Scaphirynchus albus*), collectively referred to as the target species. The Program Extension is intended to maintain and build upon existing efforts of the Program in the First Increment. These efforts are aimed at reversing habitat loss and providing defined benefits to the species by improving their habitat, thereby resulting in enhancement of the structure, function and processes of the Platte River ecosystem they depend upon.

The Program has been successfully implemented for nearly 12 years during the First Increment which is set to end December 31, 2019 (legislative funding and authorization provided through September 30, 2020). The Program will not be capable of completing all of its milestones (two water milestones will not be completed) during the last year of implementation- additional time and resources are required to fulfill these milestones. The Program Extension addressed by this Supplement is needed to continue progress toward recovering the four target species associated with the central and lower reaches of the Platte River in Nebraska by implementing certain aspects of the recovery plans. By continuing to provide defined benefits to the target species and enhancing the structure and function of habitat in the Platte River ecosystem, the Program will continue to help offset the adverse impacts to the Platte River from the continuation of existing and new water-related projects in the basin upstream of Columbus, Nebraska, for such projects during the additional 13 years of the Program Extension. The Program is also intended to continue protecting designated critical habitat for the whooping crane.

In section 7 of the ESA, Congress required that every federal agency must insure that any action "*…authorized, funded, or carried out…is not likely to jeopardize the continued existence of any endangered or threatened species*…" (emphasis added). To meet this requirement, Congress required that the action agencies request assistance from the United States Fish and Wildlife Service (Service) and seek their biological opinion regarding whether the proposed action is likely to jeopardize the continued existence of a listed species.

The definition of "Jeopardize the continued existence of" is "*…to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.*" 50 CFR §402.02 (emphasis added).

The purpose of this Supplement is to evaluate the effects of the Federal action to determine whether that action, as described earlier, is likely to jeopardize the continued existence of federally listed endangered and threatened species, or adversely modify or destroy designated critical habitat in the action area. As is inherent in large programmatic consultations in which there is a range of possible effects, there remains some uncertainty regarding the ultimate effects of the Federal Action (Program Extension) on the federally listed species and their habitats in the central and lower reaches of the Platte River basin. For this reason and others, the effects of Program Extension activities will be carefully monitored, and the activities adjusted via the process of scientific adaptive management described in the Program's Adaptive Management Plan and implemented in the First Increment. As new information is gained, updates to the Adaptive Management Plan may also be required to achieve benefits for the target species. While the specific adverse effects may change based on adaptive management and changes to implementation resulting from that process, we conclude those adverse effects would not be significant and that beneficial effects of any such changes are anticipated to outweigh those adverse effects.

Whooping Crane

Summary of Effects of the Action:
The present habitat conditions in the central Platte River, including designated critical habitat from Lexington downstream to Denman, Nebraska, reflect an improvement in habitat conditions resulting from implementation of the First Increment and natural hydrologic conditions (including a higher frequency of natural peak flows) during the First Increment in the Platte River basin. This resulted in increased utilization by whooping cranes during migration, contributing positively to their survival and fitness. Continuation of effects described in the 2006 Opinion are anticipated and described within the Environmental Baseline. The Program Extension remains fundamentally the same but is likely to result in new beneficial and adverse effects. Beneficial effects include: 1) increase/improvement in the amount and distribution of wide channels free of vegetation, with suitable un-forested widths, resulting from an additional 1500 acres of new habitat acquired, managed, and restored where appropriate increase efforts in the same way on existing or new areas (e.g. improvements on existing habitat lands, contributing to phragmites spraying, etc.); 2) slight increase in the amount of protected grasslands and wet meadows available as a secondary source of crane foraging (assumes some portion of the 1500 may be grassland or wet meadow); 3) increase in the miles of stream bank and adjacent land area protected to minimize disturbance or predation; and 4) sustained or increased utilization of available suitable stopover habitat on the Platte River by whooping cranes which contribute to improved physiological fitness, survival, reproductive success and lower rates of mortality. Adverse effects resulting in take of whooping cranes are anticipated at similar levels as those described for the Programs First Increment and involve: harming or harassing whooping cranes during implementation of land restoration, management, monitoring, or research. Overall, the Program Extension will contribute to improved survival and reproductive fitness for whooping cranes.

Conclusions:
In 2006, we made a determination that the Proposed Action (Program First Increment) was not likely to jeopardize the continued existence of the whooping crane. The definition of "likely to jeopardize" hinges on a change to the reproduction, abundance and distribution of a species such that it appreciably reduces the likelihood of survival

and recovery. Therefore, the impacts of the Proposed Action were analyzed to determine the probable effects on reproduction, abundance, and distribution of whooping cranes in the Action Area. Since that time, habitat conditions on the Platte River have steadily improved in the First Increment with suitable habitat widely distributed across much of the AHR. Whooping Crane use has substantially increased over the same time period and additional habitat restoration and management is expected in the Program Extension. Whooping crane use of these areas contributes to increased survival, reproduction and fitness.

The Proposed Action is not likely to reduce the current reproduction, abundance or distribution of the whooping crane. In fact, the overall effect of the Proposed Action including the adaptive management approach is likely to lead to an improvement in each of those factors. It follows then that they are not likely to reduce appreciably the likelihood of both survival and recovery of the whooping crane. Based on that rationale, and after reviewing the current status of whooping crane, the environmental baseline for the action area, the effects of the Proposed Action, and the cumulative effects, it is the Service's biological opinion that implementation of the Proposed Action is not likely to jeopardize the whooping crane.

<u>Effect on Whooping Crane Critical Habitat</u>:
We conclude that the Proposed Action is not likely to destroy or adversely modify the critical habitat designated for the AWBP of the whooping crane. To make this determination, Service must determine whether the action results in an alteration of the quantity or quality of the essential physical or biological features of designated critical habitat, or that precludes or significantly delays the capacity of that habitat to develop those features over time, and if that effect appreciably diminishes the value of critical habitat for the conservation of the species. Suppression of the natural ecosystem processes which maintained the central Platte River had a marked effect on the extent of the critical habitat in the action area that contains the primary constituent elements, but the Program Extension will continue efforts which create or restore habitat, countering the effects of historic and ongoing water development. The Program Extension is expected to beneficially affect elements of designated critical habitat on the Platte River for the whooping crane between Lexington and Denman, Nebraska. These elements in the central reach of the Platte River valley include wide, open river channels with wide wetted widths for nightly roosting, bottomland feeding areas (including wet meadows), and the element of isolation from disturbance. These effects on the channel and surrounding areas increase suitable habitat protected from disturbance and predators for migrating whooping cranes. In light of the Program Extension's anticipated contributions aimed at a) continuing to protect, maintain, and improve the nature and extent of designated critical habitat for whooping cranes and b) offsetting aspects that could otherwise decrease available habitat, we conclude that it will not destroy or adversely modify critical habitat for the whooping crane.

Least Tern and Piping Plover

Summary of Effects of the Action:
The present habitat conditions in the central Platte River and surrounding areas used by least terns and piping plovers reflects an improvement in the amount and distribution of habitat resulting from Program implementation of the First Increment. The increase in habitat conditions resulted in an increase in least tern use and reproductive success in the AHR during the First Increment. Continuation of effects described in the 2006 Opinion are anticipated and described within the Environmental Baseline. The Program Extension remains fundamentally the same but is likely to result in new beneficial and adverse effects. Beneficial effects are likely to result from increased nesting habitat and improved survival and productivity on habitat created during the Program Extension (primarily off-channel). The Program Extension will result in the creation and maintenance of an additional 60 acres of off-channel nesting habitat while annually maintaining 10 acres in-channel which will add to the existing suite of beneficial effects resulting from implementation of the First Increment. We estimate the increased habitat will produce 141 additional piping plovers and 645 least tern fledglings during the Program Extension over existing levels. Adverse effects are anticipated resulting from a slight reduction of nesting habitat and productivity in-channel compared to conditions anticipated during the First Increment. The Program was anticipated to provide beneficial effects through improvement of the availability of in-channel nesting habitat due to its water management and sediment augmentation. It appears Program releases may not be capable of creating in-channel nesting habitat and only low levels of in-channel habitat will be mechanically maintained. The reduction of in-channel habitat will not result in an overall reduction in nesting habitat as off-channel habitat created during the First Increment offset these reductions and resulted in an overall increase in nesting habitat and productivity. Adverse effects resulting in take of least terns and piping plovers are also anticipated at similar levels related to the Program actions involving: flow management (benchmark flow exceedance and Environmental Account releases); harming or harassing least terns and piping plovers during implementation of land restoration, management, monitoring, or research; increased predation on off-channel nesting sites in the AHR; and harming nests or chicks at inland lakes of Reclamation's North Platte Project. Overall, implementation of the Program Extension is anticipated to result in a net benefit to least terns and piping plovers by increasing their survival and reproductive success.

Conclusions:
In 2006, we made a determination that the Proposed Action (Program First Increment) was not likely to jeopardize the continued existence of the least tern and piping plover. The definition of "likely to jeopardize" hinges on a change to the reproduction, abundance and distribution of a species such that it appreciably reduces the likelihood of survival and recovery. Therefore, the impacts of the Proposed Action were analyzed to determine the probable effects on reproduction, abundance, and distribution of least terns and piping plovers in the Action Area. Since that time, habitat conditions on the Platte River and surrounding areas have steadily improved in the First Increment. The amount of suitable habitat has increased and is widely distributed across much of the AHR. Tern

and plover use reproductive success has substantially increased over the same time period and additional habitat restoration and management is expected in the Program Extension. Least tern and piping plover use of these areas contributes to increased survival, reproduction and fitness. These habitats, which are primarily man-made off-channel habitats, act as a stabilizing buffer for the populations as they are not dependent upon the return interval of peak flows in the central Platte River to create and maintain habitat.

The Proposed Action is not likely to reduce the current reproduction, abundance or distribution of the least tern and piping plover. In fact, the overall effect of the Proposed Action including the adaptive management approach is likely to lead to an improvement in each of those factors. It follows then that they are not likely to reduce appreciably the likelihood of both survival and recovery of the least tern and piping plover. Based on that rationale, and after reviewing the current status of least tern and piping plover, the environmental baseline for the action area, the effects of the Proposed Action, and the cumulative effects, it is the Service's biological opinion that implementation of the Proposed Action is not likely to jeopardize the least tern and piping plover.

Pallid Sturgeon

Summary of Effects of the Action:
Under the scope of the Supplement, the Service has analyzed and described the likely adverse effects to the pallid sturgeon as a result of changes in Program commitments for the first increment extension. Through this evaluation, the Service anticipates adverse Program effects to pallid sturgeon from monitoring and research activities, and these effects would not exceed that authorized in 10(a)(1)(A) permits. The Service has previously evaluated the effects of 10(a)(1)(A) permits on pallid sturgeon in the Biological Opinion on the Intra-Service Programmatic Section 7 Consultation on Region 6's Section 10(a)(l)(A) Permitting Program and Fish and Wildlife Service Initiated Recovery Actions (Mega BO)(USFWS 2016).

Conclusions:
The Service made a determination in the 2006 Opinion that the Program would not jeopardize the pallid sturgeon. In the Program Extension, the Service anticipates adverse Program effects to pallid sturgeon from monitoring and research activities, and these effects would not exceed that authorized in 10(a)(1)(A) permits. In the Mega BO, the Service concluded that monitoring and research actions authorized under 10(a)(1)(A) is not likely to jeopardize the pallid sturgeon, so the Service similarly concludes in our biological opinion that implementation of the Proposed Action is not likely to jeopardize the pallid sturgeon.

Western Prairie Fringed Orchid

Summary of Effects of the Action:
As a result of historic and ongoing reductions in river flow, the Mormon Island population of the western prairie fringed orchid may be extirpated. Records of the species had not been documented for years leading up to the First Increment and have not

occurred during the First Increment. Program actions related to water and land management that were described as affecting western prairie fringed orchid during the First Increment remain unchanged; we conclude the Program Extension will not result in any new adverse effects.

Conclusions:
In 2006, we made a determination that the Proposed Action (Program First Increment) was not likely to jeopardize the continued existence of the western prairie fringed orchid. Given the population is likely extirpated in the AHR; we conclude that the Program Extension will not affect orchids in the central Platte River. While very marginal changes in lower Platte River peak flows were considered in the 2006 Opinion and are a part of the environmental baseline for the Program Extension, the absence of records within the lower Platte River floodplain, and the current records throughout many of the orchid's recovery units that contain the lower Platte River, suggests that orchid recovery efforts will be minimally affected in the lower Platte River. The Proposed Action is not likely to reduce the current reproduction, abundance or distribution of the western prairie fringed orchid. The Program Extension will not result in any new effects to the western prairie fringed orchid. It follows then that it is not likely to reduce appreciably the likelihood of both survival and recovery of the western prairie fringed orchid. Based on that rationale, and after reviewing the current status of the western prairie fringed orchid, the environmental baseline for the action area, the effects of the Proposed Action, and the cumulative effects, it is the Service's biological opinion that implementation of the Proposed Action is not likely to jeopardize the western prairie fringed orchid.

X. INCIDENTAL TAKE STATEMENT

Section 9 of ESA and federal regulations pursuant to section 4(d) of ESA prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct, and applies to individual members of a listed species. Harm is defined by regulation as "an act which actually kills or injures wildlife. Such act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.". Harass is defined by regulation as "… an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding or sheltering." Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the federal agency or applicant." Under the terms of Section 7(b)(4) and Section 7(o)(2), such taking is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Take under Section 9 of the Act does not apply to federally listed plant species (e.g., Colorado butterfly plant, Ute ladies' tresses orchid, and western prairie fringed orchid). However, section 9 of the ESA prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on non-federal areas in violation of state law or regulation or in the course of any violation of a state criminal trespass law. Such laws vary from state to state.

The Service developed the following update to the incidental take statement for the 2006 Opinion. This incidental take statement describes incidental take associated with implementation of the Program Extension which is largely a continuation the ongoing First Increment for an additional 13 years. Program actions which affect the species (resulting in take) remain largely the same but are associated with continuation of the First Increment for an additional 13 years. Similar to the First Increment, successful implementation of the Program Extension is anticipated to result in incidental take of listed species that may indirectly result from: 1) existing and new water-related activities[13] covered by the Program; 2) habitat restoration and land management; or 3)

[13] The term "water-related activities" means activities and aspects of activities that (1) occur in the Basin upstream of the Loup River confluence; and (2) may affect Platte River flow quantity or timing, including but not limited to water diversion, storage, and use activities and land-use activities. Changes in temperature and sediment transport will be considered impacts of a "water-related activity" to the extent that such changes are caused by activities affecting flow quantity or timing. Impacts of "water-related activities" do not include those components of land use activities or discharges of pollutants that do not affect flow quantity or timing. "Existing water-related activities" include surface water or hydrologically-connected groundwater activities implemented on or before July 1, 1997. "New water-related activities" include surface water or hydrologically-connected groundwater activities including both new projects and expansion of existing projects, both those subject to and not subject to section 7(a)(2) of the ESA, that may affect the quantity or timing of water reaching the associated habitats and that were implemented after July 1, 1997.

monitoring and research activities conducted by the Program. For the purpose of this incidental take statement, all terms and conditions within the 2006 Opinion, as modified by the May 19, 2009, letter (USFWS, 2009), apply to the Program Extension unless otherwise noted below. The levels of take anticipated remain unchanged but apply instead for the period of the Program Extension. Updates, modifications or edits to take is further described below for each species.

Estimating the number of least terns, piping plovers, whooping cranes, and pallid sturgeon taken in the manner described in the 2006 Opinion remains difficult. Consistent with the 2006 Opinion, we determined Program management actions served as a proxy for anticipated levels of take. Where Program activities remained unchanged from the First Increment, anticipated levels of take were not applied for an additional 13 years of the Program Extension.

The Service also wishes to make clear that any Terms and Conditions, or Reasonable and Prudent Measures (RPMs) in this Incidental Take Statement, do not supersede or change the Incidental Take Statement in the biological opinion for FERC Project Nos. 1417 and 1835 (USFWS 1997), nor do they modify the Incidental Take Statement for the 2006 Opinion (USFWS, 2006), as they apply to the first 13 years. These changes (noted in italics and bold below) update the Incidental Take Statement for this Supplement and applies only the period of the Program Extension. The three Incidental Take Statements above and this Incidental Take Statement are intended to complement one another. Unless noted below, all other components of the Incidental Take Statement within the 2006 Opinion (amount or extent, Reasonable and Prudent Measures, Terms and Conditions) apply as stated for an additional 13 years for the duration of the Program Extension.

Consistent with the 2006 Opinion (USFWS, 2006), and given the programmatic nature of the action and the consultation, should an individual measure of allowable take be exceeded, consultation should be reinitiated on the aspect of the Federal Action resulting in that take, rather than the Federal Action as a whole. Assuming the Program is being implemented in accordance with the requirements in the Milestones Document, ESA compliance for individual water-related activities covered by the Federal Action will continue during the process of such reconsultation.

XA. Least Tern and Piping Plover

Amount or Extent of Incidental Take Anticipated

The anticipated amount and extent of incidental take exempted in the 2006 Opinion remains unchanged. The same level of take is expected to occur during the 13-year Program Extension.

Reasonable and Prudent Measures to Minimize Take

<u>RPM1:</u> All *known* least tern and piping plover nesting sites on the central Platte River and adjacent sandpits will be surveyed and monitored by the Program *or its partners*, subject to permitted access by any private landowners.

Terms and Conditions

<u>Terms and Conditions (RPM 1):</u> The following statement below replaces the sentence: "It is anticipated that this will be consistent with the Program IMRP that is currently under development."

Monitoring and Research shall be conducted as described within the approved Program IMRP monitoring and research protocols, as amended or approved by the Governance Committee.

XB. Whooping Crane

Amount or Extent of Incidental Take Anticipated

The anticipated amount and extent of incidental take exempted in the 2006 Opinion remains unchanged. That same level of take is expected to occur during the 13-year Program Extension. Additionally, consistent with the amount and extent of activities listed under #2 and given the similar nature of monitoring and research activities which also have the potential to result in harassment of whooping cranes, the following language is added to #1: ***"Six instances of take in the form of harassment of whooping cranes is exempted during the first increment and 13 year Extension of the Program resulting from Program monitoring and research activities."***

Reasonable and Prudent Measures to Minimize Take

<u>RPM1:</u> Surveys to document whooping crane use of the central Platte River study area shall be conducted during spring and fall migrations according to the IMRP protocols developed by the Program with concurrence of the Service ***and consistent with the "Requirements for Avoiding Disturbance to Migrating Whooping Cranes" dated October, 2015, as modified by the Service.***

Terms and Conditions

<u>Terms and Conditions (RPM 1):</u>
1) Program personnel engaged in monitoring and research of whooping crane habitat use in the central Platte River valley will maintain a safe distance from whooping cranes, as identified in the ***"Requirements for Avoiding Disturbance to Migrating Whooping Cranes" dated October, 2015, as modified by the Service, and*** whooping crane monitoring protocol (in the IMRP) or as identified in the section 10(a)(1)(A) permit(s) issued by the Service, whichever distance is greater.

<u>Terms and Conditions (RPM 2):</u>

1. *If habitat restoration and land management activities within the channel of the Platte River occur between March 6 and April 29, or October 9 and November 15, construction shall only take place from one hour following sunrise to two hours prior to sunset unless otherwise approved by the Service's Coordinator of the Whooping Crane Migration Tracking Program. Program staff will notify the Service when Program habitat restoration work will be conducted during the above dates from the Highway #283 and Interstate 80 intersection near Lexington, Nebraska downstream to Chapman, Nebraska. The construction should be completed as quickly as possible. (This RPM term and condition was modified in the Service's May 9, 2009 letter.*
2. *Construction or other work crews working in or within 0.25 miles of the channel during the above dates will check channel areas for the presence of whooping cranes prior to starting work each day, and report the presence of whooping cranes to Program staff. When whooping cranes are discovered in the Platte River valley, either by the Program monitoring crew or the above required check by construction or work crews, or are known to be in the valley through other sources, including via notification from the Service's Coordinator, Program staff will confer with the Service and notify construction crews if it is necessary to temporarily halt construction activities. (This RPM term and condition was modified in the Service's May 9, 2009 letter)*
3. *Construction work should be completed as quickly as possible. Earth moving equipment will be moved from the river channel to an upland site located behind a tree line at the end of each work day if such features are available on the property. In the instance that such features are unavailable, equipment should be moved to a position at least 0.25 miles away from the channel.*

(This RPM term and condition was modified in the Service's May 9, 2009 letter)

XC. C. Pallid Sturgeon

Amount or Extent of Incidental Take Anticipated

The amount and extent of incidental take anticipated remains unchanged. However, the time frame for incidental take is extended through the 13-year Program Extension.

Reasonable and Prudent Measures to Minimize Take

<u>RPM1:</u> Minimize the likelihood of pallid sturgeon mortalities from Program monitoring and/or research activities.

Terms and Conditions

<u>Terms and Conditions (RPM 1)</u>:

4. *Ensure only qualified individuals who hold a valid section 10 recovery permit for the species shall be authorized to conduct monitoring activities.*

5. *Ensure that individuals conducting the monitoring are complying with terms and conditions described in the section 10 recovery permit.*

6. *Reinitiation of consultation will occur if pallid sturgeon mortalities exceed those authorized in the section 10 recovery permit. In the event that more mortality than is permitted occurs, the Service's Nebraska Field Office must be contacted within 24 hours at (308) 382-6468.*

XI. CLOSING STATEMENT

This concludes the Supplement of the 2006 Opinion addressing the Program Extension on the actions outlined in the March 7, 2018, request from Reclamation. As provided in 50 CFR § 402.16, Reinitiation of formal consultation is required and shall be requested by the Federal agency or by the Service, where discretionary Federal involvement or control over the action has been retained or is authorized by law and: (a) If the amount or extent of taking specified in the incidental take statement is exceeded; (b) If new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (c) If the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in the biological opinion; or (d) If a new species is listed or critical habitat designated that may be affected by the identified action."

XII. CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of ESA directs Federal agencies to utilize their authorities to further the purposes of ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of an action on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation Measures are adopted by reference from the 2006 Opinion (USFWS, 2006) with the following exceptions. Conservation Measures #1 and #9 are no longer included for activities within the Program Extension. Conservation Measure #4 resulted in an effective establishment of a partnership with weed management areas and other private landowners but continued efforts are needed indefinitely as future activities and funding to reduce and maintain phragmites control are likely necessary for the Program and other conservation partners in the Platte River valley to achieve the desired habitat conditions. We recommend the Program continue supporting ongoing efforts aimed at reducing or controlling invasive species (e.g. phragmites).

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting federally listed species or their designated critical habitats, the Service requests notification regarding the implementation of any conservation recommendations described in the 2006 Opinion (USFWS, 2006).

APPENDIX A – Draft PRRIP EA

RECLAMATION

Managing Water in the West

Platte River Recovery Implementation Program, Proposed First Increment Extension

Draft Finding of No Significant Impact

GP-2018-01-EA

U.S. Department of the Interior
Bureau of Reclamation
Great Plains Region

EMPS inc.

February 2018

MISSION STATEMENT

Protecting America's Great Outdoors and Powering Our Future

The Department of the Interior protects and manages the Nation's natural resources and cultural heritage; provides scientific and other information about those resources; and honors its trust responsibilities or special commitments to American Indians, Alaska Natives, and affiliated island communities.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Cover photos – Background (David Batts, EMPSi); Inset photos (U.S. Fish and Wildlife Service)

Contents

Page

Appendix

Tables

Page

Figure

Charts

This page intentionally left blank.

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
AHR	associated habitat reach
AMP	adaptive management plan
BA	biological assessment
BO	biological opinion
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLMU	Central Lowlands Management Unit
CNPPID	Central Nebraska Public Power and Irrigation District
Corps	U.S. Army Corps of Engineers
CPRV	central Platte River valley
CWA	Clean Water Act of 1972
Department	U.S. Department of the Interior
EA	environmental assessment
EIS	environmental impact statement
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act of 1973
°F	Fahrenheit
FERC	Federal Energy Regulatory Commission
FR	Federal Register
FSM	flow-sediment-mechanical
FWCA	Fish and Wildlife Coordination Act of 1934
IMRP	Integrated Monitoring and Research Plan
MBTA	Migratory Bird Treaty Act of 1918
MCM	mechanical creation and maintenance
NDNR	Nebraska Department of Natural Resources
NEPA	National Environmental Policy Act of 1969
NHPA	National Historic Preservation Act of 1966
NPPD	Nebraska Public Power District
NRC	National Research Council
NRHP	National Register of Historic Places
NVCS	National Vegetation Classification System
PEM	Palustrine Emergent
PFO	Palustrine Forested

P.L.	Public Law
Program	Platte River Recovery Implementation Program
Program Agreement	Platte River Recovery Implementation Program Cooperative Agreement
PSS	Palustrine-Shrub
Reclamation	U.S. Department of the Interior, Bureau of Reclamation
ROD	record of decision
SDHF	short-duration high flows
Secretary	U.S. Secretary of the Interior
Service	U.S. Department of the Interior, Fish and Wildlife Service
SHPO	State Historic Preservation Officer
USC	United States Code
USGS	U.S. Geological Survey
WNS	white-nose syndrome

1.0 Purpose of and Need for Action

1.1 Introduction

The U.S. Department of the Interior, Bureau of Reclamation (Reclamation) has prepared this environmental assessment (EA) to analyze the environmental effects of extending the Platte River Recovery Implementation Program's (Program) First Increment by 13 years, through 2032. In addition, this EA serves as a biological assessment (BA) for Endangered Species Act of 1973 (ESA) consultation with the U.S. Department of the Interior (Department), Fish and Wildlife Service (Service).

The First Increment of the Program began in 2007 and extends through 2019. Its long-term goal is to improve and maintain the associated habitats of target species (specific species listed for protection under the ESA[1]). This includes the following:

- Improving and maintaining migrational habitat for whooping cranes (*Grus americana*) and reproductive habitat for interior least terns *(Sternula antillarum*) and piping plovers (*Charadrius melodus*)
- Reducing the likelihood of future listing of other species found in this area
- Testing the assumption that managing flow in the central Platte River[2] also improves the pallid sturgeon's (*Scaphirhynchus albus*) lower Platte River habitat

This EA has been prepared in accordance with the National Environmental Policy Act of 1969 (NEPA; 42 U.S. Code [USC] 4321, et seq.), the Council on Environmental Quality's (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508), the Department's NEPA regulations (43 CFR 46), and other relevant federal and state laws and regulations.

1.2 Background

1.2.1 The U.S. Fish and Wildlife Service's Instream Flow Recommendations

In 1994, the Service developed instream flow recommendations for restoring and maintaining river habitat for a myriad of species in the central Platte River habitat area, including the whooping crane, interior least tern, and piping plover (Bowman 1994; Bowman and Carlson 1994). In these documents, the Service recommended and prioritized minimum flows for specific

---

[1]The four target species are whooping crane, interior least tern, piping plover, and pallid sturgeon. All depend on habitat in the central Platte River basin, and the Program cooperative agreement was developed to protect them.

[2]"Central Platte River" refers to the center section of the Platte River; unlike the North Platte River and the South Platte River, there is no Central Platte River.

periods of the year under wet conditions, dry conditions, and normal conditions. (See the Service Draft Instream Flow Recommendations in volume 2 of the Platte River Recovery Implementation Program Final Environmental Impact Statement (EIS) [Reclamation and Service 2006]).

The flow recommendations are broadly categorized into species flows, annual pulse flows, and peak flows. All of these categories are relevant to, and must be considered in, the Service's evaluation of the adequacy of proposed actions (Program 2006a); however, only the first two of these categories are being used as benchmarks for measuring Program flow improvements, as follows:

- Species flows are flow levels at Grand Island, Nebraska, that are needed to provide good physical aquatic habitat conditions for the whooping crane, interior least tern, and piping plover when they are using the river. They promote favorable aquatic conditions throughout the year, for example, to maintain healthy populations of fish for interior least tern to eat.
- Annual pulse flows are those in excess of species flows that are needed to help maintain the variety of ecological processes of the river channel and adjacent low areas. They provide favorable physical, chemical, and biological conditions for the species (including a wide channel that is generally free of vegetation, adjacent backwaters, and wet meadow areas).

1.2.2 Program Cooperative Agreement

On July 1, 1997, the governors of Nebraska, Colorado, and Wyoming and the U.S. Secretary of Interior (Secretary) signed the Platte River Recovery Implementation Program Cooperative Agreement (Program Agreement). The Program Agreement outlined a proposed basin-wide recovery implementation Program for endangered species in the central and lower Platte River basins. Thereafter, a Governance Committee began formulating details of the Program to be evaluated by the Department under NEPA and the ESA. The Governance Committee consisted of representatives of the three basin states; Reclamation; the Service; water users from each of the three basin states; and environmental groups.

In 2006, Reclamation released a final programmatic EIS (Reclamation and Service 2006), and the Service issued a final biological opinion (BO) (Service 2006). The Secretary then signed the Record of Decision (ROD) on September 27, 2006, supporting the Program (Department 2006).

The Program became effective January 1, 2007, after the Program Agreement was signed by the governors of Colorado, Wyoming, and Nebraska and the Secretary. In 2008, Congress authorized the Secretary, acting through the Commissioner of Reclamation in partnership with the States, other Federal agencies, and other non-Federal entities, to continue implementing the Program and provided authorization of appropriations for it (Public Law [P.L.] 110-229). The Program is being implemented incrementally, with the First Increment covering the 13 years from 2007 through 2019. The Program is led by the Governance Committee and establishes key standing advisory committees to assist the Governance Committee in implementing the Program. Those committees include the Technical Advisory Committee, the Land Advisory Committee, the Water Advisory Committee, the Finance Committee, and Independent Scientific Advisory

Committee. In addition, an Adaptive Management Working Group has been formed to inform the Governance Committee on implementation of the Program's adaptive management plan (AMP).

The Program provides ESA compliance for water-related activities in the three states, while working to provide recovery benefits for the four endangered and threatened species. The Program signatories committed to achieving the objectives described in **Section 1.4** by the end of the First Increment of the Program.

During the First Increment, ESA compliance is measured by the progress in achieving ten Program milestones that are related to the First Increment objectives. Milestones and current Program status are presented in **Table 1-1**, below.

Table 1-1. Platte River Recovery Implementation Program ESA Compliance Milestones

Milestone	Program Status (as of November 2017)
1. The Pathfinder Modification Project will be operational and physically and legally capable of providing water to the Program by no later than the end of Year 4 of the First Increment.	Achieved
2. Colorado will complete construction of the Tamarack I and commence full operations by the end of Year 4 of the First Increment.	Achieved
3. Central Nebraska Public Power and Irrigation District (CNPPID) and Nebraska Public Power District (NPPD) will implement an environmental account[3] for storage reservoirs on the Platte system in Nebraska as provided in Federal Energy Regulatory Commission (FERC) licenses 1417 and 1835.	Achieved
4. The reconnaissance-level water action plan, as may be amended by the Governance Committee, will be implemented and capable of providing at least an average of 50,000 acre-feet per year of shortage reduction to target flows,[4] or for other Program purposes, by no later than the end of the First Increment.[5]	Not achievable by end of 2019
5. The land plan, as may be amended by the Governance Committee, will be implemented to protect and, where appropriate, restore 10,000 acres of habitat by no later than the end of the First Increment.	Achieved
6. The integrated monitoring and research plan (IMRP), as may be amended by the Governance Committee, will be implemented beginning Year 1 of the Program.	Achieved
7. The Wyoming depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved

[3]The environmental account is a term used for a "block of water" set aside in Lake McConaughy to supplement flows in the Platter River. Water is added to the environmental account and stored in Lake McConaughy until the water is needed downstream. Water released from the account is tracked and protected by Nebraska water law so that the water may provide beneficial instream flows for endangered species.
[4]Target flows (also referred to as Service target flows) are Platte River flows of certain volumes. At certain times of the year, Service personnel identify them to improve habitat conditions for the target species in the central Platte River.
[5]As a water goal, the Program commits to reduce basin-wide target flow shortages by an average of 130,000 to 150,000 acre-feet per year. This is in lieu of the Service's requirement to replace 417,000 acre-feet of shortages to the target flows that it determines.

Table 1-1. Platte River Recovery Implementation Program ESA Compliance Milestones

Milestone	Program Status (as of November 2017)
8. The Colorado depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved
9. The Nebraska depletions plan, as may be amended with the approval of the December 7, 2005 Milestones Document 2 Governance Committee, will be operated during the First Increment of the Program.	Not Achievable by end of 2019[6]
10. The federal depletions plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved

Source: Program 2017a

The First Increment land objective (Milestone #5) has been achieved (Program 2017a). The Program currently protects in excess of 12,000 acres in the associated habitat reach (AHR).

The First Increment water objective (Milestone #4) is not achievable by the end of 2019 (Program 2017a). The Program currently provides approximately 90,000 acre-feet toward the First Increment objective of 130,000 to 150,000 acre-feet. Pathfinder Modification, Tamarack I, and the Service's environmental Account in Nebraska (the combined, state water projects) were to provide an average reduction in shortage of 80,000 acre-feet per year (Program 2006a). The combined impact of the three original state projects and the reconnaissance-level water action plan under Milestone #4 is intended to achieve the Program objective of 130,000 to 150,000 acre-feet per year; therefore, the water action plan is intended to provide an average reduction of at least 50,000 acre-feet per year in shortage. This is in addition to the three state water projects (Program 2006a). Additional water projects in the planning or design phase are expected to provide an additional 40,000 acre-feet of water. However, they will not be operational before the end of the First Increment in 2019 and may require more funding than what is currently available during the First Increment (Program 2017a).

Due to the reliance on water projects being developed by the Governance Committee, the Nebraska Depletions Plan (Milestone #9), which is the responsibility of the State of Nebraska, is also not achievable by 2019 (Program 2017a). All state water projects and the Colorado, Wyoming, and federal depletions plans are operational.

Implementing the AMP, including IMRP activities, is ongoing and has focused on testing of the flow-sediment-mechanical (FSM) and mechanical creation and maintenance (MCM) management strategies. Accordingly, the Program's IMRP milestone has been achieved; however, the objective of examining Service target flows through the AMP has not yet been achieved. Design, implementation, and assessment of target flow-related management actions will not be possible before the end of 2019 (Program 2017a).

Section II.D of the 2006 Final Program Agreement makes provision for it to be extended or amended by the written agreement of all signatories (Program 2006b). This proposal presents a 13-year extension (2020-2032) of the First Increment. The extension would not change First

[6]The State of Nebraska is responsible for achieving this milestone.

Increment objectives, milestones, or the implementation framework. It would provide additional time to complete and operate Program water projects and to conduct the monitoring and research necessary to determine the best use of Program water to benefit the target species. This knowledge is necessary to provide a sound base on which to structure a second increment.

1.3 Proposed Federal Action

The Department, working with the three states, water users, and environmental and conservation organizations, proposes to extend the First Increment of the basin-wide, cooperative recovery implementation Program to meet its obligations under the ESA. The federal action described and evaluated in this programmatic EA is a 13-year extension to the First Increment of the Governance Committee Alternative, as described in the Platte River Recovery Implementation Program Final EIS (April 2006; Reclamation and Service 2006) and ROD (September 2006; Department 2006). The proposed First Increment extension activities are further described in the Addendum to the Final Platte River Recovery Implementation Program—First Increment Extension, as adopted by the Governance Committee on June 7, 2017 (Program 2017a). The resulting programmatic EA will evaluate and disclose the effects of this proposed 13-year extension and will support a determination as to whether there are significant effects warranting the preparation of an EIS.

1.4 Purpose and Need for Action

Federal action is needed to complete the remaining milestones not achieved within the prescribed 13-year timeline of the Program First Increment. Completion of the Program's First Increment is necessary in order to secure the defined benefits under that basin-wide approach for federally listed threatened and endangered species. This would provide continued compliance with the ESA for certain existing and future water-related projects and uses in the Platte River basin, upstream of the confluence with the Loup River.

The purposes of this action are as follows:

- Continue implementing projects that provide additional water to reduce shortages to Service target flows
- Continue land management activities necessary to provide habitat for target species
- Continue integrated monitoring, research, and adaptive management to assess the progress of the Program and to inform future management decisions

Activities need to be consistent with and support meeting the Program's First Increment objectives as follows:

- Provide water capable of improving the occurrence of Platte River flows in the central Platte River's associated habitats. This would be relative to the present occurrence of target species and annual pulse target flows (hereinafter referred to as reducing shortages to target flows) by an average of 130,000 to 150,000 acre-feet per year, as measured at Grand Island, Nebraska. Target flows would be examined through the AMP and peer review and may be modified by the Service accordingly. These species and annual pulse target flows would continue to serve as an initial reference point for determining periods of excess and shortage in the operation of Program reregulation and water conservation/supply projects.

- Protect, restore where appropriate, and maintain at least 10,000 acres of habitat for the benefit of target species in the central Platte River area, between Lexington and Chapman, Nebraska, and continue progress toward the Program's long-term land objectives.

1.5 Federal Decisions to Be Made

This EA provides analysis to inform two primary federal decisions:

- The Secretary's approval of the June 7, 2017, addendum to the October 24, 2006, Platte River Recovery Implementation Program Cooperative Agreement, which seeks to extend the implementation in the Program's First Increment by 13 years (Program extension is subject to congressional authorization)
- Funding and continued participation in the Program by the Department, through Reclamation and the Service, subject to congressional authorization and appropriations, in cooperation with the States of Wyoming, Colorado, and Nebraska and other participating organizations.

1.6 Description of the Area of Analysis

The area of analysis for this EA are those areas in the Platte River basin that might be affected by Program actions. This includes the main stem, tributaries, and associated water projects of the North Platte River, in Wyoming, Colorado, and Nebraska; the South Platte River in Colorado and Nebraska; and the Platte River in Nebraska. See map of the basin (**Figure 1-1**).

1.6.1 Basins

When discussing river operations in this EA, the basins are defined to encompass river reaches that are operated as functional units, as follows:

- Platte River basin—Refers to the sum of all the sub-basins
- North Platte River basin—Refers to the river from its headwaters in northern Colorado through Wyoming and through Nebraska to its junction with the South Platte River in Nebraska east of the city of North Platte
- South Platte River basin—Refers to the river from its headwaters in Colorado to its junction with the North Platte River in Nebraska east of the city of North Platte

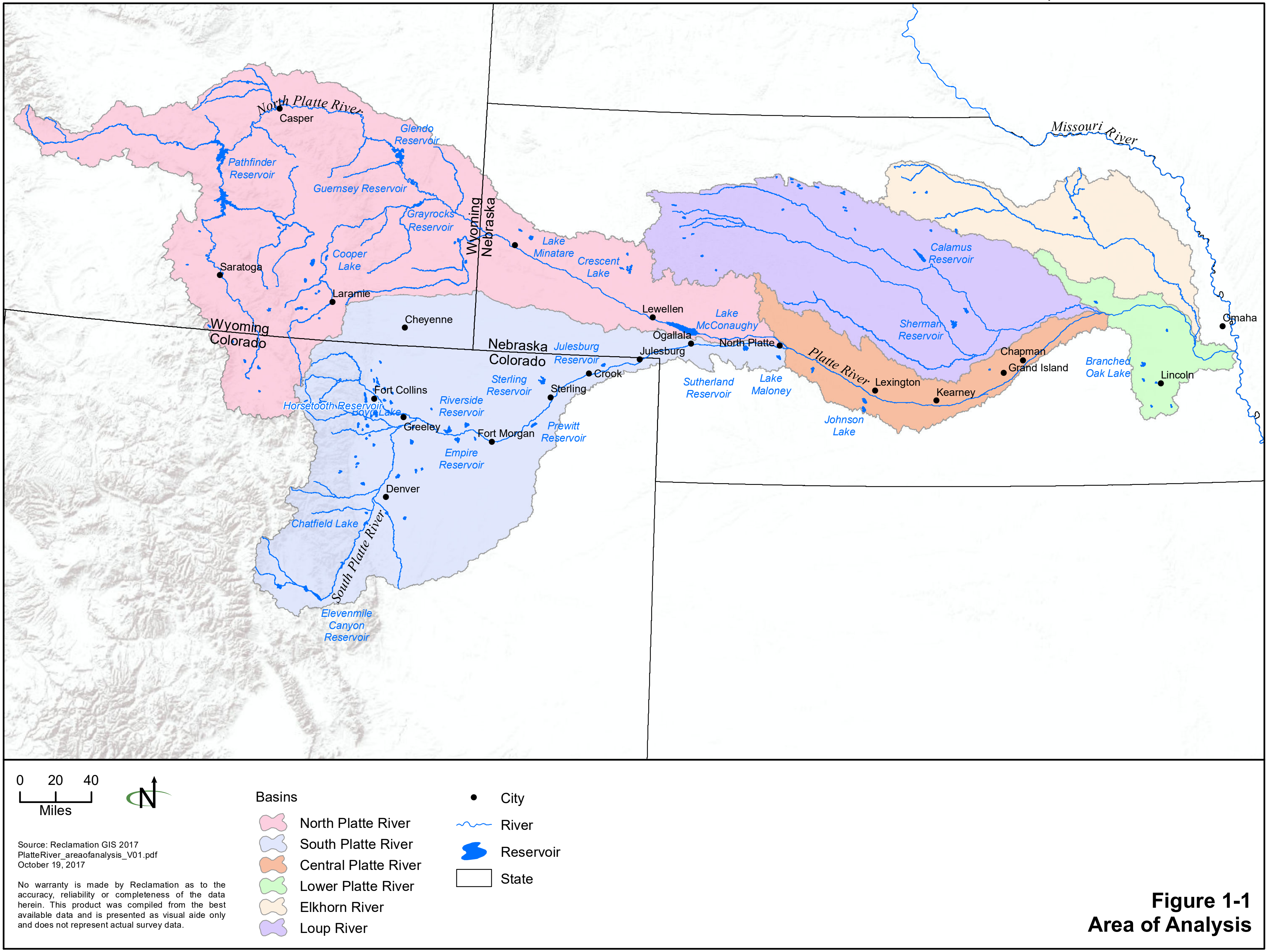


Figure 1-1
Area of Analysis

- Central Platte River basin—Refers to the river from the confluence of the North Platte River and South Platte River to its confluence with the Loup River east of Chapman, Nebraska
- Lower Platte River basin—Refers to the Platte River from the confluence with the Loup River, to its confluence with the Missouri River near Omaha, Nebraska

1.6.2 Habitat Areas

While elements of the proposed Federal action are throughout the basin, the intent of all elements is to improve habitat conditions in the following habitat areas along the Platte River in Nebraska:

- Central Platte River AHR (Lexington, Nebraska, to Chapman, Nebraska) for the whooping crane, piping plover, and interior least tern
- Lower Platte River AHR (from the mouth of the Elkhorn River to the Platte's confluence with the Missouri River) for the pallid sturgeon

1.6.3 Areas of Potential Impact

The area of analysis also includes lands irrigated with Platte River water, generally within a few miles of the river. Here, water could be leased or sold to the Program or other changes in water use could occur. For economic impacts, the affected environment includes the counties in which these irrigated lands occur and in which the regional impacts of changes in agricultural and related economic operations could result. Some minor effects could occur in the Missouri River, close to the mouth of the Platte River.

Reclamation's North Platte Project includes a series of small lakes (for example, Lake Minatare) in the Nebraska Panhandle. The lakes regulate flows of water from the large North Platte reservoirs down to the irrigated project areas near Scotts Bluff, Nebraska. These lakes are included in the area of analysis.

The study area and affected environment also include the lands along the central Platte River in Nebraska, where the habitat would be restored.

1.7 Issues Identified During Scoping

A public involvement program, beginning with public scoping meetings, encouraged the public, Government agencies, and other concerned groups to identify issues related to the proposed Federal action. Some overarching issues were identified during scoping and the planning process (**Table 1-2**) and were considered throughout the analysis.

Additional information concerning public involvement is included in **Chapter 5**.

Table 1-2. Key Issues and Indicators Addressed in the Draft EA

Issues and Indicators	Impact Topics Related to the Issues
1. Issue: Ability to meet target flows for species Indicator: River flows at the habitat (peaks, minimums, timing, frequency, velocity, useable river, and roost area)	Water resources; piping plovers and interior least terns; pallid sturgeon
2. Issue: Channel habitat for the target species Indicator: Extent of braided river, open areas, channel width, sediment erosion and transport, potential for channel incision, and potential for sandbar building	River geomorphology; whooping cranes; piping plovers and interior least terns
3. Issue: Land habitat (out-of-channel) for target species Indicator: Extent of wet meadow habitat, sandpit habitat, and palustrine wetland habitat	Central Platte River terrestrial vegetation communities; wetlands; whooping cranes; piping plovers and interior least terns
4. Issue: Extent of roosting habitat for sandhill cranes and extent of critical habitat for other special status species Indicator: Location of known species occurrences and critical habitats	Water resources; central Platte River terrestrial vegetation communities; sandhill cranes; other federally listed species and designated critical habitat; state-listed species of concern
5. Issue: Agricultural economics Indicator: Changes in agricultural lands irrigated, cropping patterns, production, and revenues	Agricultural economics
6. Issue: Regional economics Indicator: Changes in regional employment, income, indirect business taxes, and sales	Regional economics
7. Issue: Recreation Indicator: Changes in lake elevations, streamflows, and associated fisheries; visitation and projected expenditures for lake and stream recreation; recreation access on Program lands	Recreation; water resources; fisheries
8. Issue: Fisheries Indicator: Changes in fish habitat, reservoir productivity for key species, river flow, useable habitat, water temperature, and fish mortality	Fisheries; water resources; water quality
9. Issue: Wildlife Indicator: Changes in terrestrial habitat, changes in abundance and distribution, and fluctuations in population numbers	Central Platte River terrestrial vegetation communities; wetlands; wildlife
10. Issue: Water quality Indicator: Changes in river temperature, turbidity, and other constituents	Water quality
11. Issue: Land use Indicator: Changes in area of various land cover types and activities, including agriculture and mining operations	Land use/realty

This page intentionally left blank.

2.0 Description of Proposed Action and Alternatives

2.1 Introduction

This chapter describes the alternatives considered for extending the Program's First Increment by 13 years, through 2032. The alternatives development process incorporates a number of guiding principles, as provided by relevant laws and guidance: the CEQ's Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500–1508) and the Department's NEPA Regulations (43 CFR 46).

Collaboration is a critical component of the alternatives development process. Agencies seek agreement from diverse interests on the goals, purposes, and needs for agency plans and activities, as well as the methods anticipated to carry out those plans and activities (43 CFR 46.110(a)). Reclamation used public scoping to help identify issues and concerns that could be addressed through alternative actions. Additionally, it coordinated with cooperating agencies in developing the alternatives.

2.2 No Action Alternative

2.2.1 Program Dissolution

Under the No Action Alternative, the Program would not be extended beyond 2019. Federal funding and involvement would cease, and the Program would end. The Program's Governance Committee would be dissolved, and a signatory committee would be formed to satisfy the legal obligations of the Governance Committee and arrange for disposition of Program Assets. A detailed description of Program termination can be found in the Implementation Program Document: Attachment 1: Finance Document, Crediting and Exit Principles, and Program Budget (Program 2006a).

- Until an asset (e.g., property) is no longer the responsibility of the signatories, property taxes would continue to be paid, liability insurance would continue to be provided, and the property would be managed in compliance with the "good neighbor" policy.
- A signatory or a partnership of signatories may purchase the shares in the Program Assets of any signatory or signatories wishing to sell, under the condition that the Program Assets would continue to be managed to provide habitat for the target species. (A signatory state may offer to donate its interest in a Program Asset to another signatory or partnership of signatories and seek ESA credit from the Service in future reinitiated consultations in that state for the continuing benefits provided to the target species because of the donation.)

- If none of the signatories are interested in acquiring Program Assets, the signatory committee would entertain offers from water users and environmental entities to purchase the Program Assets under the condition that the Program Assets would continue to be managed to provide habitat for the target species.
- If the Program Assets are not purchased as described above, the signatory committee would oversee the sale of such assets. Such sale could be made without the condition that the Program Asset must be managed to provide habitat for the target species.

2.2.2 Endangered Species Act Credits

In the event of Program dissolution, if a state continues to carry out the responsibilities it had under the Program, such actions would be sufficient to provide ESA compliance with respect to all water-related activities in that state until any reinitiated consultations have been completed. When a state continues to carry out the responsibilities it had under the Program, that state and any water-related activities covered also retain the right to argue that the responsibilities undertaken are sufficient to constitute long-term ESA compliance for the reinitiated consultations.

In addition, to the extent the states respective contributions of cash, water (through the initial Program water projects), and land continue to benefit the target species beyond the dissolution of the Program, the states retain the right to argue that such future benefits resulting from their contributions should be considered in any reinitiated consultations.

If the Program dissolves and the states do not continue to carry out their responsibilities under the Program, each water project or activity in the basin that required, or will require, federal approval, permitting, or funding would undergo separate ESA Section 7 consultation, and separate mitigation measures would be implemented.

2.3 Proposed Action

Under the Proposed Action, the Program's First Increment would be extended by 13 years. The Program would continue to provide ESA compliance for existing and certain new water related activities throughout the Platte River basin upstream of the Loup River confluence. The Proposed Action incorporates the extension activities in the Addendum to the Final Platte River Recovery Implementation Program—First Increment Extension, as adopted by the Governance Committee on June 7, 2017 (Program 2017a). It would not change the Program's First Increment objectives, milestones, or implementation framework (Program 2006a). Extending the Program's First Increment by 13 years would continue the following aspects of the Program:

- Water action plan, as may be amended by the Governance Committee, to achieve the water-related milestone of reducing shortages to Service target flows
- Land plan to protect, restore where appropriate, and maintain habitat for the benefit of the target species
- IMRP and AMP, as may be amended in the extension

Proposed extension activities are organized according to the existing Program land, water, and AMP structure. These activities would be implemented from 2020 to 2032 and would reflect Governance Committee decisions through the end of the First Increment. Accomplishing the extension would depend on what is practicably achievable, given available funding and resources.

The proposed First Increment extension is described below.

2.3.1 Land Plan

Land plan activities would proceed under the same principles that have guided land acquisition and management since the Program began (Program 2017a). Land acquisition would proceed under a willing buyer/willing seller approach, and all management would be conducted in accordance with the Program's good neighbor policy.

Land Acquisition

- Review and renew (as appropriate) existing leases and management agreements[1]
- At the request of owners, evaluate existing conservation lands for inclusion in the Program under management or sponsorship agreements
- Acquire an interest in at least an additional 1,500 acres of complex habitat, with the intent of establishing a new habitat complex

Land Management

- Manage lands acquired by the Program for the benefit of the target species and species of concern, when this is not in conflict with the target species
- Manage the land within the framework of the land plan and the AMP

2.3.2 Water Plan

The Program would be committed to achieving the minimum water milestone of 130,000 acre-feet in annual reductions to target flow shortages. However, the Program recognizes there are fiscal constraints to achieving this milestone, and scientific investigations need to be completed to confirm the need for 130,000 acre-feet in annual reductions to target flow shortages (Program 2017a).

The Program would invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the extension. It would also invest in the science necessary to determine if the additional 10,000 acre-feet is justified (Program 2017a).

The Program would be committed to finding the additional resources necessary to achieve that additional 10,000 acre-feet, if justified by the science (Program 2017a).

[1] Renew Cottonwood Ranch sponsorship agreement (2,650 acres), Broadfoot South lease (15 acres), and complex management and land use agreements (1,140 acres)

Extension water plan activities would proceed under the same principles that have guided water supply and management since the Program began (Program 2017a).

Water acquisition would proceed under a willing buyer/willing seller approach, and all water management would be conducted in accordance with the Program's good neighbor policy (Program 2017a).

Water Conservation and Supply

- Design, construct, and implement water action plan projects in time to enable scientific evaluation before the end of the extension term (Program 2017a). The Governance Committee, through the Program's Executive Director's Office, would continue to be responsible for compliance with local, state, and federal laws and regulations as described in the Program document (Program 2006a) and practiced during the First Increment. Examples of water supply and conservation projects include:
  - Leasing federal storage in existing reservoirs, where available
  - Acquiring irrigated farmland from willing sellers and permanently retiring that land from irrigated agriculture
  - Leasing water from irrigators
  - Implementing farm conservation programs, such as no till cropping
  - Creating broad-scale recharge areas, such as flooding fields when there are excess flows in the spring and fall, so the water percolates to the river during lower flow periods. Recharge areas could occur in two ways, as the development of small, shallow recharge ponds over a large area at a single site or as the creation of many recharge sites over a regional-scale geographic area (i.e., the Platte River valley between Brady and Odessa, Nebraska).
  - Creating small-scale slurry wall pits (approximately 60 acres in size) to store water that can be pumped back to the river when needed. Slurry wall gravel pits involve the construction of a low-permeability barrier wall (slurry wall) to enclose a finite, controllable volume of below-grade storage capacity that is isolated from the surrounding alluvial aquifer. The barrier wall is keyed into a low-permeability bottom layer (which may be clay, shale, sandstone, or other geologic material) to prevent seepage of stored water or intrusion of groundwater; this bottom layer is typically 30-50 feet deep in the Platte River valley. A berm may be constructed around the storage pit to create additional above-grade storage capacity. The Program would divert Platte River flows in excess of Service targets and temporarily store the water for release back into the river channel during periods of shortage.
- Revise state and federal depletion plans to remain consistent with operational or statutory requirements (Program 2017a)[2]

[2]The Program would cooperate with the State of Nebraska as it finalizes its depletion plan.

- Renew water project agreements, as deemed necessary, to achieve water milestones (Program 2017a)

Program Water Management

- Aggressively continue to implement channel conveyance improvements at the North Platte choke point, through efforts directed toward achieving and maintaining at least 3,000 cubic feet per second (cfs) conveyance capacity, while remaining below flood stage, with additional capacity developed as practicably achievable with available resources (Program 2017a)
- Implement water releases, including short-duration high flows (SDHF) and target flows once the Program water projects are operational and choke point conveyance issues are resolved (Program 2017a)
- Continue to evaluate the efficacy of available Program water and choke point capacity, over time, to ensure that Program water meets its intended purposes (Program 2017a)

2.3.3 Adaptive Management Plan

During the extension, AMP implementation would include evaluating Service target flows, in addition to current Program management (Program 2017a).

Management Actions

- Continue implementing the management specified in the AMP related to SDHF, sediment augmentation, and least tern, piping plover, and whooping crane habitats
- Contribute to reach-scale phragmites and invasive species control
- Use Program water assets to implement and evaluate flow-related management actions, including SDHF and species-related target flows
- Continue implementing and evaluating mechanical habitat management (e.g., channel widening and vegetation clearing, off-channel sand and water, and wetlands and uplands), as necessary, to achieve the desired habitat conditions

Integrated Monitoring and Research

- The IMRP would continue to provide the framework for monitoring the implementation and effectiveness of Program management actions during the extension, including the efficacy of actions independently and in combination
- Pallid sturgeon activities in the extension would be guided by the results of an incremental four-step analytic process adopted by the Governance Committee (Program 2016a)
- In management and decision-making, the Program would continue to consider the emerging science related to climate change

Independent Science Review

- Retain a six-member (rotating panel) Independent Scientific Advisory Committee
- Continue peer review and publication of key Program science products relevant to decision-making

3.0 Affected Environment and Environmental Consequences

3.1 Introduction

This chapter describes the existing conditions and potential impacts for resources that may be affected by the Proposed Action and No Action Alternative. Environmental consequences to these resources may be direct (as a result of construction) or indirect (generally after a direct effect but not directly resulting from the alternatives), positive (beneficial) or negative (adverse), and long term (permanent, long lasting) or short term (temporary). Potential cumulative effects are also described at the end of resource topics that could have these types of effects, including water resources, whooping cranes, piping plovers and least terns, and pallid sturgeon.

The No Action Alternative commonly represents a continuation of current trends and, as such, serves as the baseline for NEPA analysis over time. In this particular case, the No Action Alternative represents a deviation from current activities and could impact existing conditions; therefore, the existing conditions described under each resource topic area are used as the baseline for analyzing the potential impacts from the Proposed Action and No Action Alternative.

Measures that would be implemented to reduce, minimize, or avoid impacts (mitigation measures) are presented in **Chapter 4** as an inseparable part of the Program's environmental commitments, and discussed under each resource where necessary.

3.2 Resources Considered and Eliminated from Further Analysis

Considering Reclamation's environmental commitments (**Chapter 4**) and in response to comments received from the scoping notice, the Proposed Action would have no potential to affect certain resource areas, or its impact on certain resource areas is so minor (negligible) that it was discounted. These resources include cultural resources, Indian trust assets, social environment, public health and safety, and environmental justice (**Table 3-1**).

Table 3-1. Resources Eliminated from Further Analysis

Resource	Rationale for Elimination from Further Analysis
Cultural Resources	As part of the 2006 Platte River Recovery Implementation Program Final EIS, Reclamation assessed the potential for Program actions to affect the integrity of historic properties on a site-specific basis, primarily through construction, ground disturbance, and river and reservoir water level fluctuations (Reclamation and Service 2006; Cultural Resources Appendix); however, **Chapter 4** outlines environmental commitments designed to identify and avoid, minimize, or mitigate adverse effects on historic properties at the appropriate site-specific level; therefore, further analysis is not needed in this Draft EA, as cultural resource compliance would ensure that adverse effects are identified and resolved.
Indian Trust Assets	As part of the 2006 Platte River Recovery Implementation Program Final EIS, Reclamation assessed the existence and potential location of Indian trust assets according to applicable laws and regulations. Consultation was conducted with tribes that had aboriginal claims to the Platte River basin, including a request to provide information on any Indian trust assets in the Program area. Reclamation reviewed all applicable treaties, statutes, and executive orders (EOs), including findings of the Indian Claims Commission, and consulted with the Bureau of Indian Affairs. No Indian trust assets were identified in the Program area (Reclamation and Service 2006; Indian Trust Asset Appendix). Government-to-government consultation on the Program extension with any affected tribes or with the Bureau of Indian Affairs is not expected to identify any new Indian trust assets issues; therefore, no further analysis is needed in this Draft EA.
Social Environment	The 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006) assessed impacts on the social environment, including population and demographics. Compared with the existing conditions, it was determined in the 2006 Final EIS that the action alternatives would not influence population change in the Platte River basin or other components of the social environment. Due to continuation of this management under the proposed First Increment extension, similar impacts on the social environment are anticipated, and this topic was eliminated from further analysis. Additional site-specific NEPA analysis would be carried out for specific Program land and water actions when they are identified to assess local impacts, including potential impacts on the social environment.
Public Health and Safety	The 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006) assessed impacts from proposed actions on human health and safety, including mosquito-borne diseases, water contamination from waterfowl, and surface flooding. Compared with the No Action Alternative, it was determined in the 2006 Final EIS that the action alternatives would not significantly affect any human health components. Due to continuation of this management under the proposed First Increment extension, similar impacts on the public health and safety are anticipated, and this topic was eliminated from further analysis. Additional site-specific NEPA analysis would be carried out for specific Program land and water actions when they are identified to assess local effects, including potential impacts on public health and safety.

Table 3-1. Resources Eliminated from Further Analysis

Resource	Rationale for Elimination from Further Analysis
Environmental Justice	The 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006) assessed the impacts of proposed management on low-income, minority, and tribal populations per the requirements of EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The 2006 Final EIS concluded that there would likely be no disproportionate adverse impacts on low-income or minority populations based on proposed management. Due to continuation of this management under the proposed First Increment extension, no disproportionate adverse impacts are expected, and this topic was eliminated from further analysis.

3.3 Water Resources

3.3.1 Affected Environment

Overall, the Platte River basin (comprised of the North Platte, South Platte, and central Platte River basins) is a highly regulated and managed water system. Water is stored in reservoirs and released at certain times to meet specific needs and to fulfill contractual requirements (Reclamation and Service 2006). The primary focus of the Program’s First Increment is the central Platte River basin in Nebraska (Reclamation and Service 2006). The central Platte River basin refers to the drainage of the main stem river and tributaries from the confluence of the North Platte and South Platte Rivers to the confluence with the Loup River (Program 2015). The focus of this section is the central Platte River.

Flow magnitude and timing in the central Platte River depend heavily on a large reservoir on the North Platte River (Lake McConaughy) and all the canals and reservoirs, in addition to flows from the South Platte River. In general, waters are released from Lake McConaughy year-round to support power generation at hydroelectric power plants and in the summer to deliver irrigation water (Reclamation and Service 2006).

The Water Resources section of the 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) describes river flow and is incorporated by reference. This includes average monthly flows at Overton and Grand Island, Nebraska. Where relevant, more current supplemental information is provided below.

Many Program activities operate to help achieve daily target flows in order to provide multiple benefits to the river ecosystem and the target species. The daily target flows at Grand Island are summarized in **Table 3-2**. These values are based on the Service’s recommendations for both species target flows and annual target pulse flows. Species flows were established as “wet year”, “dry year”, and “normal year” minimum flows for various periods of the year. This was done to sustain the species and their habitats.

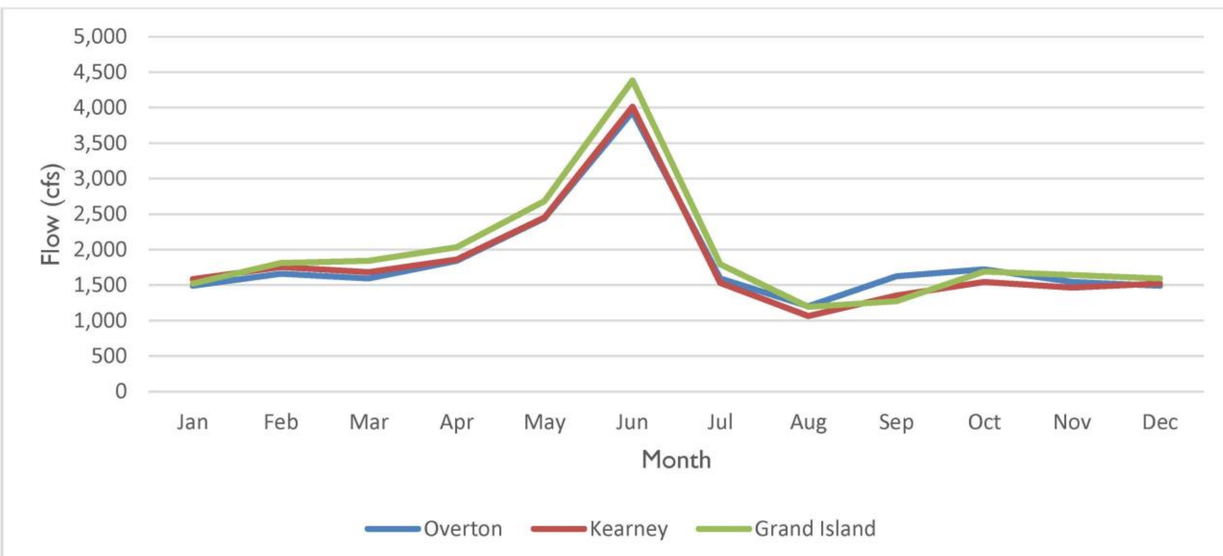
Table 3-2. Fixed Daily Target Flows at Grand Island

Period	Condition		
	Wet Year (cfs)	Normal Year (cfs)	Dry Year (cfs)
January 1–January 31	1,000	1,000	600
February 1–February 14	1,800	1,800	1,200
February 15–March 15	3,350	3,350	2,250
March 16–March 22	1,800	1,800	1,200
March 23–May 10	2,400	2,400	1,700
May 11–May 19	1,200	1,200	800
May 20–June 20	3,700	3,400	800
June 21–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

Source: Reclamation and Service 2006
Note: "Wet years" are defined as the wettest 33 percent, "dry years" as the driest 25 percent, and "normal years" all other years.
cfs = cubic feet per second

U.S. Geological Survey (USGS) stream gages are in Overton, Kearney, and Grand Island, Nebraska, for the central Platte River system. **Table 3-3** lists and **Chart 3-1** depicts the mean of monthly discharge in cfs at Overton, Kearney, and Grand Island during a 10-year period (2007–2016).

Chart 3-1. Mean of Monthly Discharge in the Platte River (2007-2016)



Sources: USGS 2017a, 2017b, 2017c

Table 3-3. Mean of Monthly Discharge in the Platte River (2007–2016)

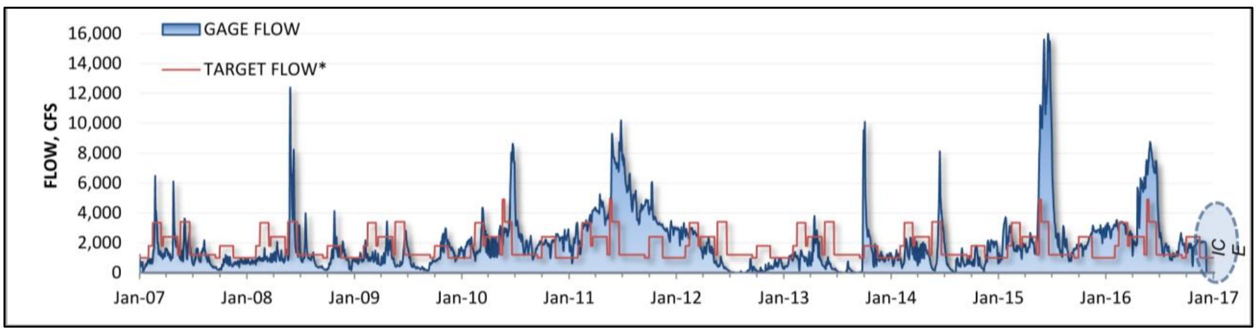
USGS Gage Number and Location	January (cfs)	February (cfs)	March (cfs)	April (cfs)	May (cfs)	June (cfs)	July (cfs)	August (cfs)	September (cfs)	October (cfs)	November (cfs)	December (cfs)
06768000: Platte River near Overton, Nebraska	1,490	1,660	1,590	1,840	2,440	3,940	1,590	1,200	1,620	1,720	1,540*	1,490*
06770200: Platte River near Kearney, Nebraska	1,580	1,750	1,680	1,860	2,450	4,010	1,530	1,060	1,350	1,540	1,460*	1,520*
06770500: Platte River near Grand Island, Nebraska	1,520	1,810	1,840	2,030	2,680	4,380	1,790	1,190	1,270	1,690	1,640	1,590

Sources: USGS 2017a, 2017b, and 2017c
*2016 discharge unavailable

The Program provides approximately 90,000 acre-feet toward the First Increment objective of 130,000 to 150,000 acre-feet. When compared with water flows at Overton and Grand Island, Nebraska, prior to implementation of the Program, Program water management has influenced flows in the Platte River. From approximately April through November, mean monthly discharge in the river increased at the Overton and Grand Island gages. During the rest of the year, it decreased or remained almost unchanged. The largest increase in mean monthly discharge was during June, and the largest decrease was during February and March. A large portion of the reduction in shortages to target flows is due to the retiming of water and not an additional volume of water. Changes to target flows are also influenced by natural variability.

Chart 3-2 shows the Grand Island gage hydrograph from the beginning of 2007 through 2016 and the annual Service target flows. The summary chart is included to provide year-to-year flow comparisons and to indicate general flow trends over the course of the Program's existence. Hydrographs for individual years from 2007 to 2016 are included for further comparison (**Chart 3-3** to **Chart 3-12**) (Program 2017b).

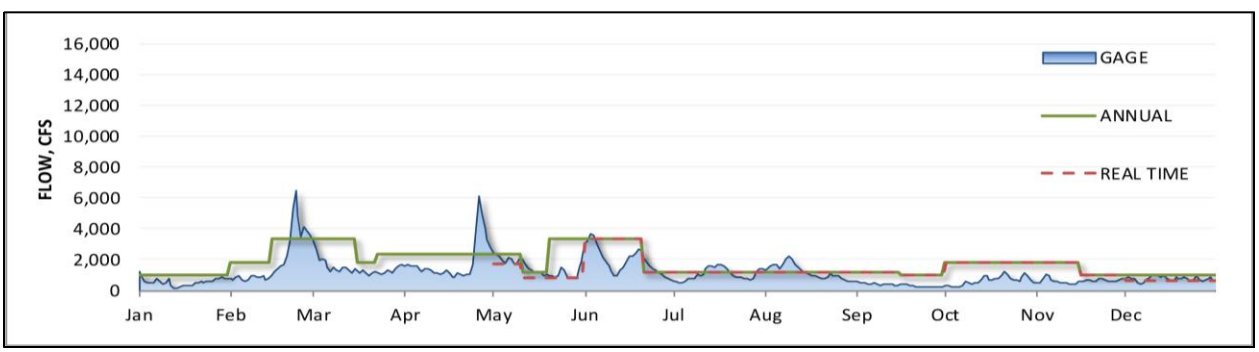
Chart 3-2. Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows



Source: Program 2017b

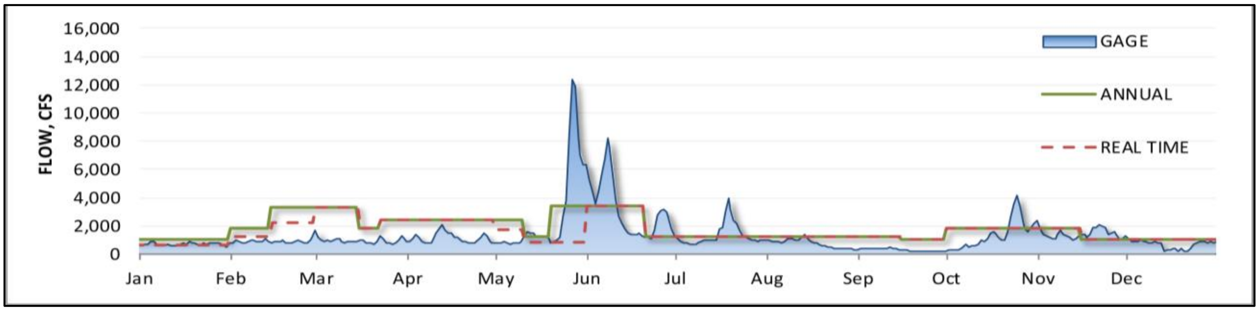
*Target flow based on annual hydrologic condition designation

Chart 3-3. 2007 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



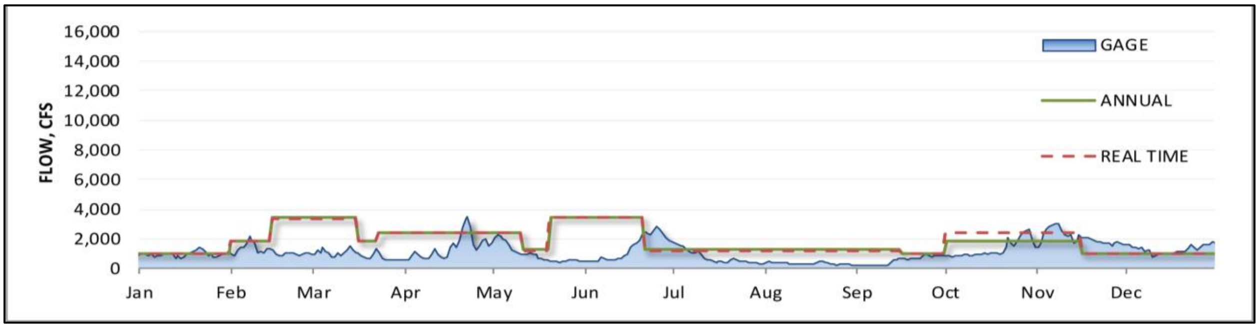
Source: Program 2017b

Chart 3-4. 2008 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



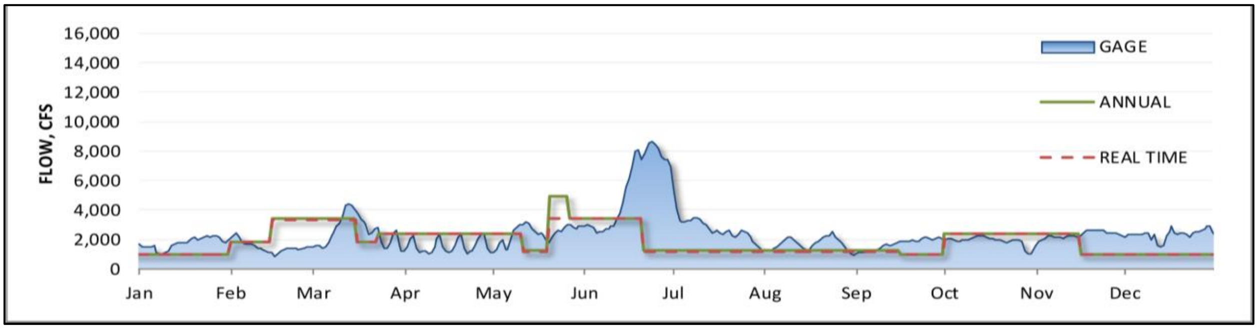
Source: Program 2017b

Chart 3-5. 2009 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



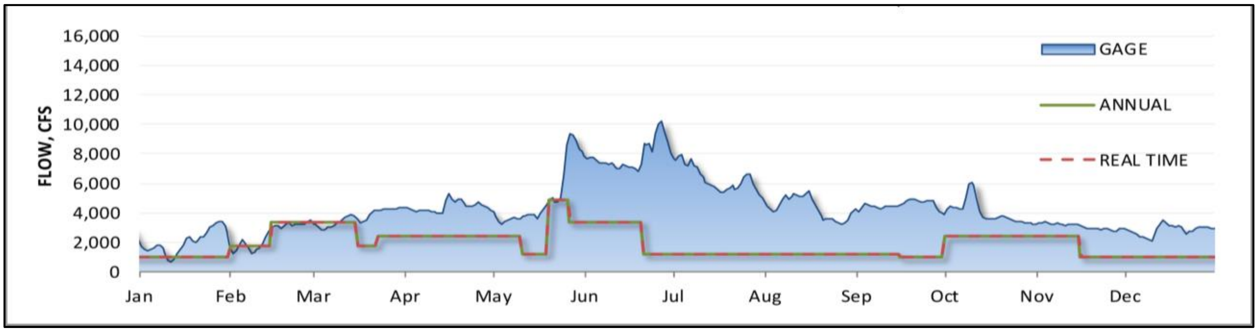
Source: Program 2017b

Chart 3-6. 2010 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Wet



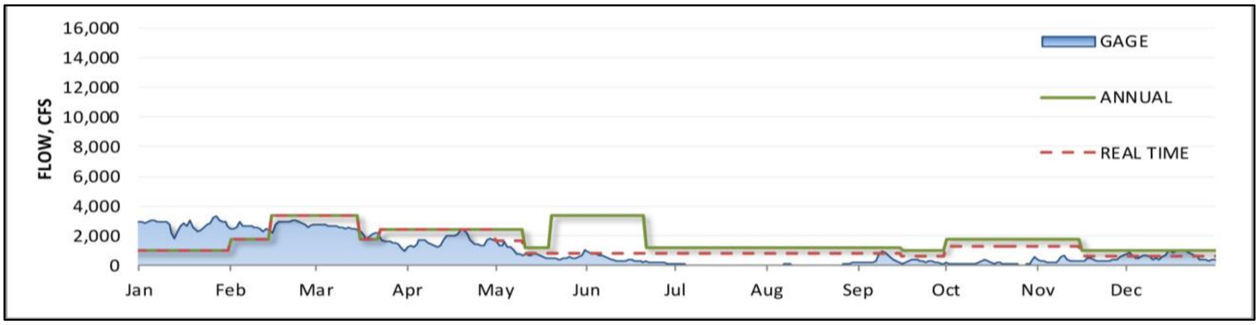
Source: Program 2017b

Chart 3-7. 2011 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Wet



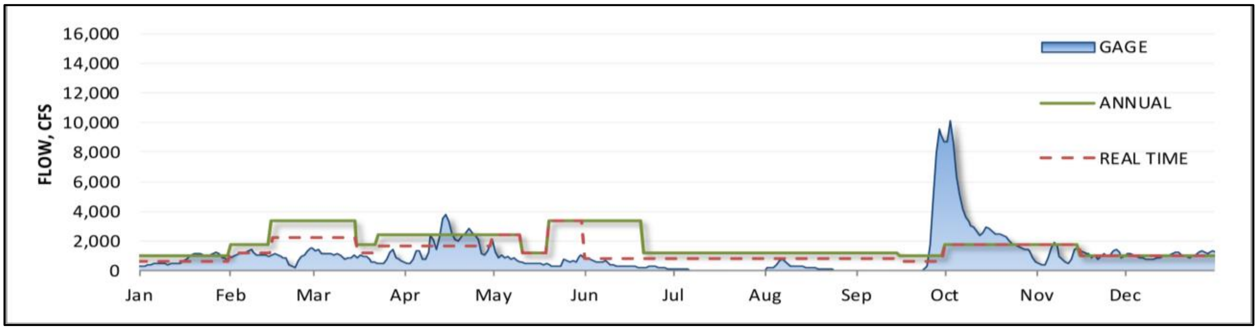
Source: Program 2017b

Chart 3-8. 2012 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



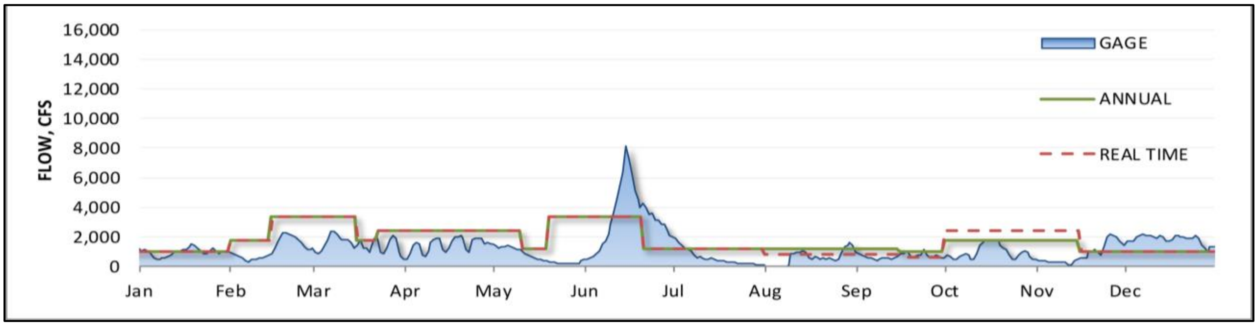
Source: Program 2017b

Chart 3-9. 2013 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



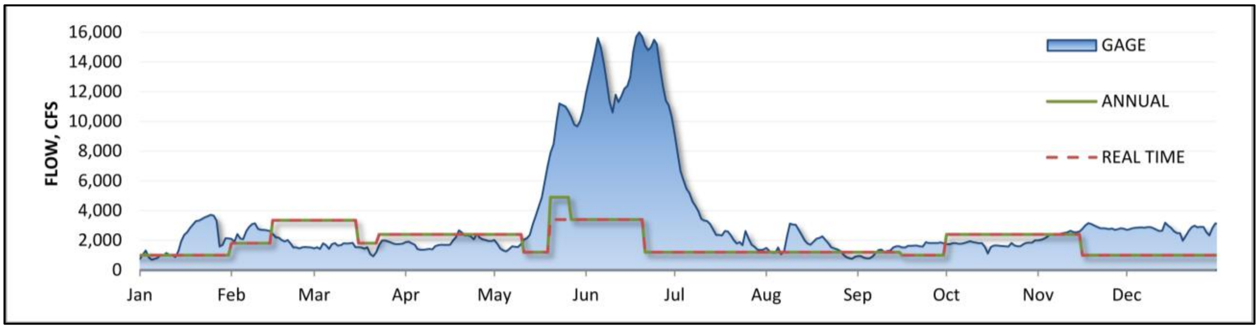
Source: Program 2017b

Chart 3-10. 2014 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



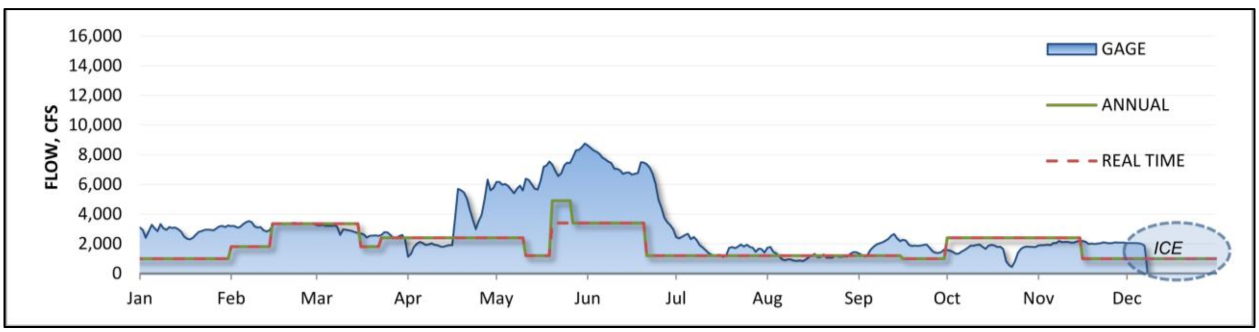
Source: Program 2017b

Chart 3-11. 2015 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



Source: Program 2017b

Chart 3-12. 2016 Grand Island Gage Hydrograph and U.S. Fish and Wildlife Service Target Flows, Year Type: Normal



Source: Program 2017b

From 2007 to 2014, the average annual shortage to target flows at Grand Island was 504,696 acre-feet, representing 8 total years of Program operation. There were 6 years classified as normal and 2 years classified as wet. No dry years were represented from 2007 through 2014; during those years the annual shortages to target flows ranged from 18,197 acre-feet in 2011 to 731,257 acre-feet in 2013 (Program 2017c).

The Service's environmental account in Nebraska and Tamarack Phase 1 were in place by 2007; Pathfinder Modification and Pathfinder Municipal projects were in place by 2012. With the addition of Pathfinder Municipal water, the combined annual reduction to Service target flows is approximately 83,650 acre-feet. Water from both Pathfinder projects are combined with the environmental account at Lake McConaughy, so releases from all three state water projects are tracked through the central Platte River through Grand Island, Nebraska. Contributions from Tamarack Phase 1 are tracked to the Colorado/Nebraska state line only (Program 2017c).

Not including contributions from Tamarack Phase 1, Program water delivered to Grand Island averaged 23,774 acre-feet from 2007 through 2014; the average reduction in shortages at Grand Island was 20,130 of 23,774 acre-feet. The range in annual reduction in target flows is 0 acre-feet in 2010 and 2011 to 47,751 acre-feet in 2013. No analysis has been completed to assess the Program's effects on average annual volume change to the lower Platte River approximating 90,000–100,000 acre-feet annually (Program 2017c).

Although the First Increment influenced water flows, factors outside the control of the Program, include local weather conditions and regional climate patterns. For example, water years 2009 and 2013 were relatively dry, and water year 2011 was one of the wettest years on record (Tetra Tech 2015). These types of influences on water resources would continue.

3.3.2 Impacts from the Proposed Action

The Program would invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the First Increment extension. As shown in **Chart 3-2**, Service target flows have been met during certain times of the year; however, there is also variability in the timing and duration for consistently meeting the target flows. The Program's influence on target flows is expected to continue under the Proposed Action. It is expected that knowledge gained during the First Increment can be used to continue improving flows during the extension of the First Increment under the Proposed Action. Retiming additional water is expected to improve the consistency for meeting target flows.

Cumulative Effects

Other non-Program projects involving water management can also alter water flows. For example, there is a non-Program proposal (Platte Republican Diversion Project) for water to be pumped from Canal E-65 into the east branch of Turkey Creek between Elwood and Smithfield. Canal E-65 starts just above the inlet to Johnson Lake. The water would be piped a short distance and then released into the open creek, which flows about 25 miles south to the Republican River. The Proposed Action seeks to improve river flows in the central and lower Platte Rivers that benefit the target species. Unlike the Proposed Action, diversion projects would remove water from the Platte River, thereby potentially reducing the amount and timing of water available in the Platte River for habitat enhancements for species. If activities outside the Program were to diminish flows at critical times of the year, flow improvements created by the Program could be undermined. This is the reason that each state and the federal government have developed, under the Cooperative Agreement, depletion management plans (Reclamation and Service 2006). The purpose of these plans is to offset or prevent additional depletions of species and annual target flows.

3.3.3 Impacts from the No Action Alternative

The Service's environmental account is a portion of the water stored in Lake McConaughy that is set aside and managed by the Service for the benefit of the target species. The Service manages the environmental account in coordination with the environmental account committee and reservoir coordination committee. This coordination would resume under the No Action Alternative.

Of the existing Program water and water action plan projects, the environmental account would remain in place under the No Action Alternative, because of FERC requirements; however, Tamarack, Pathfinder Modification water, and Program water action plan projects may or may not be in place under the No Action Alternative. The loss of the Program could limit acquisition or establishment of new water projects, thereby reducing the likelihood of meeting Program goals, such as target flows, in the central Platte River.

Cumulative Effects

As described above under the Proposed Action *Cumulative Effects* section, other projects involving water management can also alter water flows. Cumulative effects under the No Action Alternative would similar as under the Proposed Action, except the loss of the Program could limit acquisition or establishment of new water projects, thereby contributing to the reduction of any additional water to the Platte River.

3.4 River Geomorphology

3.4.1 Affected Environment

Braided river is the river plan form that provides the most roosting habitat preferred by whooping crane, and the most nesting and rearing habitat preferred by the interior least tern and piping plover along the river (Reclamation and Service 2006). Braided rivers exhibit numerous channels that split off and rejoin each other to give a braided appearance. The intent of the Program is to rehabilitate habitat in the central Platte River for certain target species by restoring a braided channel morphology with sand bars free of vegetation, increased channel widths, and unobstructed views (Tetra Tech 2015).

The River Geomorphology section of the 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) describes the river conditions of the central Platte River. It describes flows, sediment transport, topography, and river plan form and is incorporated by reference. Additionally, more current river condition information is provided below.

A Channel Geomorphology and Vegetation Monitoring Program was implemented to collect and analyze a suite of data over a multi-year time frame. One of the objectives was to document trends in channel geomorphology parameters throughout the central Platte River during the 13-year First Increment (2007-2019) of the Program, including shape, width, planform, aggradation/degradation trends, bed-material grain sizes, and sediment loads. The most recent information is documented in Channel Geomorphology and In-channel Vegetation (Tetra Tech 2015).

The area of interest for geomorphology and vegetation monitoring consisted of channels within approximately 0.5 miles on either side of the centerline of the Platte River, beginning at the

Source: EMPSi
Platte River west of Kearney

junction of U.S. Highway 283 and Interstate 80 near Lexington, Nebraska, and extending eastward to Chapman, Nebraska (approximately 100 miles). With the 2014 field season, the Platte River Geomorphic and Vegetation Monitoring Program completed 6 years of detailed field monitoring, and the data have been used to quantify at least 35 individual performance metrics. The report presents a summary of all 6 years of data and is incorporated by reference.

According to the report, braiding, sediment aggradation/degradation, and channel width results from the Program involve mixed outcomes and vary by location. For example, Geomorphic Reaches 4 (Elm Creek to Odessa) and 6 (Minden to Gibbon) typically had the highest braiding indices, and Reaches 1 (Lexington to Overton), 2 (south channel at Jeffreys Island), 3 (Overton to Elm Creek), and 8 (Wood River to Grand Island) typically had the lowest indices. Also, the reach-wide average total channel width showed a modest (not statistically significant) increasing trend from 2009 through 2011, and has remained essentially the same since 2011.

In general, the changes in year-to-year width were very small. Geomorphic Reaches 4, 6, 7 (Gibbon to Wood River), and 9 (Grand Island to Chapman) had the largest total channel width (all exceeding 1,000 feet in all years), while Reaches 1 and 2 had the narrowest (in the range of 500 to 550 feet; Tetra Tech 2015).

The Program has compiled unvegetated channel width analyses, between the Overton Bridge and Chapman, from 2007 through 2016 (Program 2017d). The analyses, which are summarized in **Chart 3-13** and **Chart 3-14**, show that vegetation removal, weed management, overall wet conditions, and a higher than normal frequency of peak flows have increased the unvegetated channel width over time. Unvegetated widths can be influenced by many factors, including vegetation management and preceding year peak flow. More information on vegetation management and treatment is provided in **Section 3.6**.

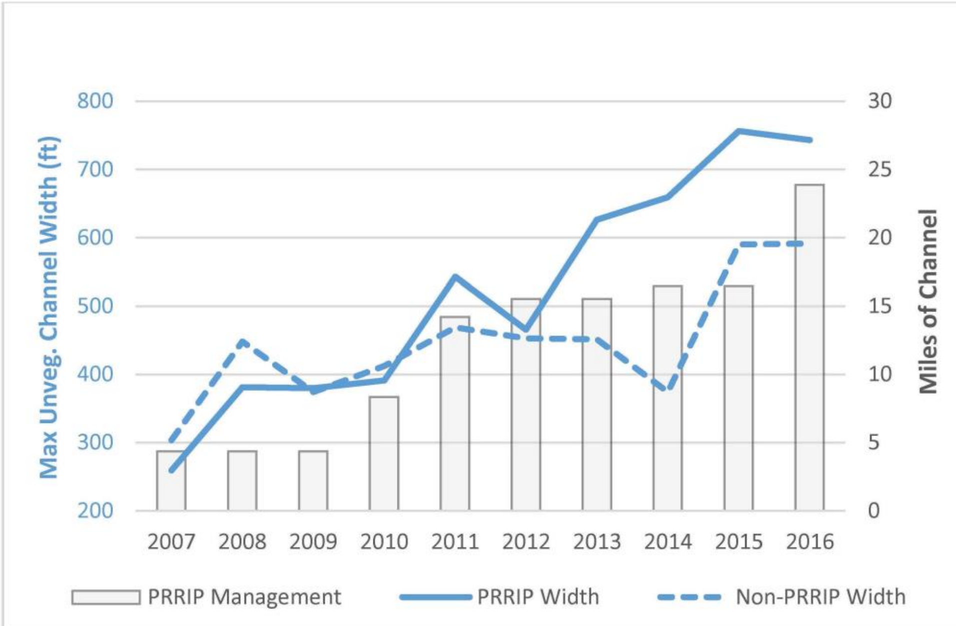
The Annual Platte River Surface Water Flow Summary (Program 2017b) provides an overview of the surface water behavior in the central Platte River. The document provides a summary of central Platte River flows through the Program associated habitat, spanning from Lexington to Chapman, Nebraska, through the 2016 calendar year, and is incorporated by reference. The average annual flows in cfs at Overton, Kearney, and Grand Island, Nebraska, that are provided in the document are listed in **Table 3-4** and depicted in **Chart 3-15**. Lower flows equate to lower stream power. The stream power of a river may drop below the threshold needed to maintain a braided plan form. When this occurs, a meandering plan form can develop and then vegetation colonizes areas of the channel where the riverbed sands are no longer mobilized by annual floods.

Table 3-4. Average Annual Flow and Instantaneous Peak Flow in the Platte River (2007–2016)

Year	Overton Gage Average Annual Flow (cfs)	Overton Gage Instantaneous Peak Flow (cfs)	Kearney Gage Average Annual Flow (cfs)	Kearney Gage Instantaneous Peak Flow (cfs)	Grand Island Gage Average Annual Flow (cfs)	Grand Island Gage Instantaneous Peak Flow (cfs)
2007	800	4,420 on June 2	857	5,430 on February 25	1,121	7,300 on February 23
2008	791	11,200 on May 25	929	13,400 on May 26	1,300	13,600 on May 27
2009	942	3,700 on April 19	916	3,350 on April 20	1,039	3,540 on April 22
2010	2,157	7,500 on June 27	2,069	8,510 on June 17	2,289	8,840 on June 24
2011	3,877	8,820 on June 20	3,972	9,460 on June 25	4,214	10,400 on June 27
2012	1,114	3,500 on January 20	1,032	3,430 on January 26	978	3,590 on January 26
2013	1,140	13,100 on September 25	1,068	12,500 on September 28	1,024	10,600 on October 3
2014	1,249	7,580 on June 12	1,177	6,730 on June 14	1,199	8,800 on June 15
2015	3,506	15,500 on June 17	3,304	16,300 on June 18	3,341	16,100 on June 5
2016[1]	2,936	8,740 on May 29	2,945	8,820 on May 30	3,032	8,910 on May 31
Average	**1,851**	**8,406**	**1,827**	**8,793**	**1,954**	**9,168**

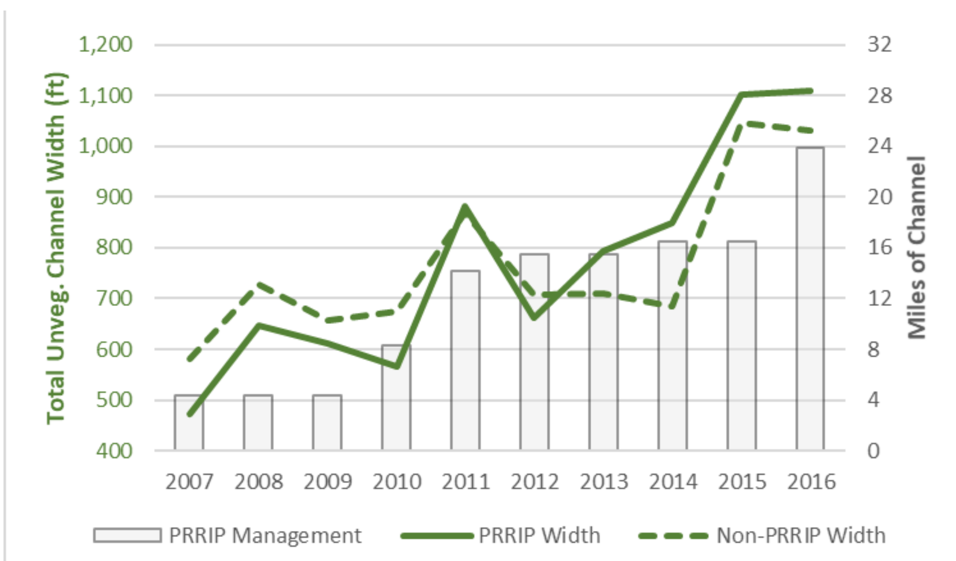
Source: Program 2017b
[1]Provisional data

Chart 3-13. Maximum Unvegetated Channel Width



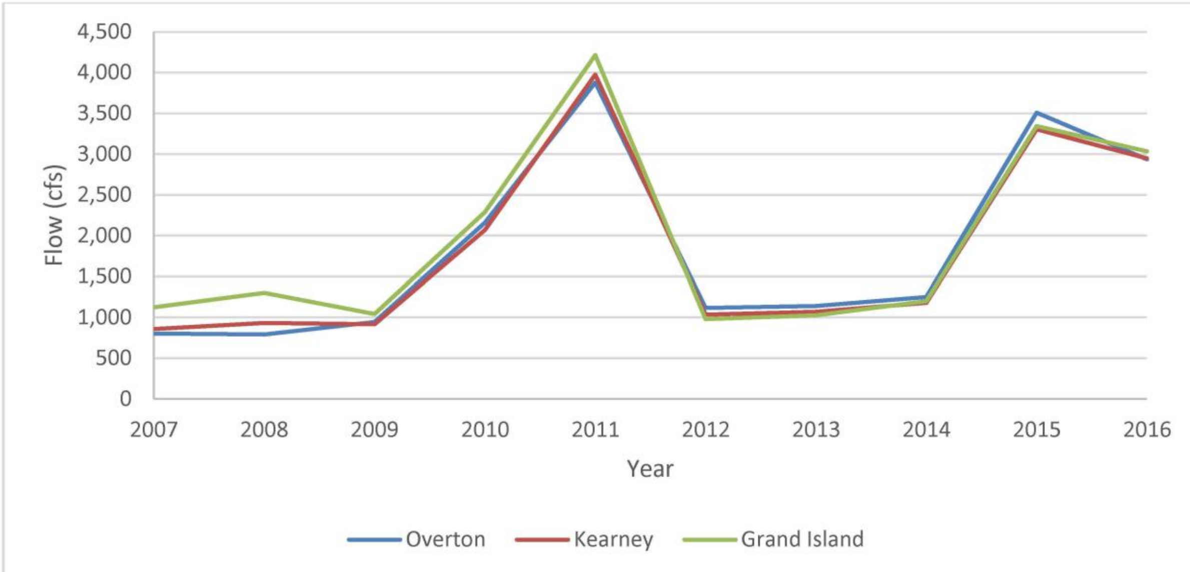
Source: Program 2017d
PRRIP=Platte River Recovery Implementation Program

Chart 3-14. Total Unvegetated Channel Width



Source: Program 2017d
PRRIP=Platte River Recovery Implementation Program

Chart 3-15. Average Annual Flow in the Platte River (2007-2016)



Source: Program 2017b

The Program provides approximately 90,000 acre-feet toward the First Increment objective of 130,000 to 150,000 acre-feet. Before the Program began, the average annual flow was 1,751 cfs at Overton and 1,746 at Grand Island (Reclamation and Service 2006). Since the implementation of the Program, the average annual flow at Overton has decreased slightly to 1,731 cfs and increased at Grand Island to 1,834 cfs (Program 2017b). Also, **Section 3.3.1** above addresses Service target flows at Grand Island, Nebraska.

Although the First Increment influenced water flows, local weather conditions and regional climate patterns are factors outside the control of the Program. For example, water years 2009 and 2013 were relatively dry, and water year 2011 was one of the wettest years on record (Tetra Tech 2015). These types of influences on water resources would continue.

3.4.2 Impacts from the Proposed Action

The Program would invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the First Increment extension. The Program's influence on braiding and average annual flow is expected to continue under the Proposed Action. It is expected that knowledge gained during the First Increment can be used to continue improving the average annual flow during the extension of the First Increment under the Proposed Action.

Sediment augmentation occurs to minimize riverbed degradation. It is also used to curtail increased bed and bank erosion that occurs when flows increase. While mechanically consolidating channels is no longer being considered to improve river plan form, other mechanical actions provide immediate improvements to the river plan form. Examples are clearing and lowering wooded banks and islands in the river channel. These actions increase the reach length of the braided plan form.

It is expected that knowledge gained during the First Increment can be used to continue improving braiding, sediment aggradation/degradation, and channel width during the extension of the First Increment under the Proposed Action.

Braiding, sediment aggradation/degradation, and channel width results from the Program involve mixed outcomes and vary by location, due to limitations in the ability to collect detailed sediment data required for analyses (Tetra Tech 2015); however, Program management, in addition to overall wet conditions and a higher than normal frequency of peak flows, has increased the unvegetated channel width from 2007 through 2016. Also, site-specific improvements during the First Increment can be used in other areas to continue improving the conditions of channel conditions during the extension of the First Increment under the Proposed Action.

3.4.3 Impacts from the No Action Alternative

Impacts from the Service’s environmental account in Nebraska, Tamarack, Pathfinder Modification water, and Program water action plan projects would be similar to impacts described in **Section 3.3.3**. The loss of the Program could limit acquisition or establishment of new water projects, thereby reducing the likelihood for meeting Program goals, such as river braiding, in the central Platte River.

3.5 Water Quality

3.5.1 Affected Environment

The Water Quality section of the 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) describes the water quality conditions of the central Platte River. It describes water temperature, turbidity, and contamination and is incorporated by reference. Additionally, more current water quality information is provided below.

Monitoring central Platte River water quality near Program lands is relevant to the productivity and diversity of native fish and other aquatic species that support the interior least tern, piping plover, and whooping crane. The purpose of the Platte River monitoring is to characterize the water quality in the central and lower Platte River during the 13-year First Increment (2007–2019); this will form the basis for assessing the influence of the Program and Program-covered activities on Platte River water quality.

The Water Quality Monitoring Protocol defines the collection procedures to obtain scientifically credible data to meet the purpose. The water quality monitoring includes monitoring of the following (EA Engineering, Science, and Technology, Inc. 2011):

- Stage/discharge
- Water quality parameters (temperature, turbidity, dissolved oxygen, pH, and specific conductance)
- Representative water quality samples for metals (dissolved copper, dissolved lead, dissolved nickel, total selenium, total calcium, and total magnesium)
- *E.* coli

The Platte River Recovery Implementation Program Annual Data Summary Report (2013) presents the results of the action-based water quality monitoring for the 2012 monitoring season (mid-August through early December) (EA Engineering, Science, and Technology, Inc. 2013). Evidence of the Program's sediment augmentation impact on Platte River water quality was evident in the turbidity data.

Statistically, there is evidence that Program actions, specifically sediment augmentation by putting sediments in place mechanically, increased ambient turbidity levels in the Platte River (EA Engineering, Science, and Technology, Inc. 2013).

The 2016 Surface Water Quality Integrated Report (Nebraska Department of Environmental Quality 2016) lists Category 5 waters for the central Platte River. Category 5 is for a waterbody where one or more beneficial uses are determined to be impaired by one or more pollutants, and all the total maximum daily loads have not been developed. Category 5 waters constitute the Clean Water Act of 1972 Section 303(d) list subject to U.S. Environmental Protection Agency (EPA) approval/disapproval. Only two of the Category 5 waters, however, are listed for the Platte River: Waterbody Identification MP1-10000 (Platte River east of Columbus) and MP1-20000 (Platte River at Duncan). Both are listed for impairment by bacteria with *Escherichia coli* listed as the pollutant of concern. Both are downstream from Grand Island, Nebraska, and, therefore, could be influenced by activities outside of the Program.

There have been numerous fish kills in the central Platte River. Most of these fish kills have been attributed to water temperatures more than 90 degrees Fahrenheit (°F), which is the Nebraska water quality temperature standard in the central Platte River during the summer (June, July, and August). In the BO for the FERC license for the Kingsley Dam hydroelectric plant, the Service established a target flow of 1,200 cfs at Grand Island, Nebraska; the purpose was to maintain whooping crane roosting habitat (Service 1997).

The Service also indicated that a target flow of 1,200 cfs at Grand Island would be adequate to help meet the temperature standard (Reclamation and Service 2006). The species target flows are summarized above in **Table 3-2**. **Chart 3-3** to **Chart 3-12** in **Section 3.3.1** depict when summer target flows were met from 2007 through 2016.

Table 3-5 lists the number of days during a 10-year period (2008-2017) during the summer that Platte River water flow was greater than 1,200 cfs.

Table 3-5. Summer Flow for USGS Stream Gage ID 06770500 Near Grand Island, Nebraska (2008-2017)

Month	Number of Days with Flow Greater than 1,200 cfs	Percentage of Days with Flow Greater than 1,200 cfs
June	250	83
July	144	46
August	96	31

Source: USGS 2017d

The Program provides approximately 90,000 acre-feet toward the First Increment objective of 130,000 to 150,000 acre-feet. Prior to implementation of the Program, the 1,200 cfs target flow was exceeded on a little over half of the days in June, decreasing to about one-third of the days in

July, and less than one-tenth of the days in August. Since the implementation of the Program, the frequency for exceeding the 1,200 cfs target flow has increased.

Although the First Increment influenced water flows, factors outside the control of the Program are local weather conditions and regional climate patterns. For example, water years 2009 and 2013 were relatively dry, and water year 2011 was one of the wettest years on record (Tetra Tech 2015). These types of influences on water resources would continue.

3.5.2 Impacts from the Proposed Action

The Program would invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the First Increment extension. As shown in **Chart 3-3** to **Chart 3-12** above, the Program has been able to meet summer target flows; however, there is also variability in the timing and duration for consistently meeting the summer target flows. The Program's influence on summer target flows is expected to continue under the Proposed Action. It is expected that knowledge gained during the First Increment can be used to continue improving the summer flows during the extension of the First Increment under the Proposed Action.

The Program is expected to improve stream temperatures if shortages to target flows are reduced during the summer. Furthermore, the Program would continue to monitor water quality during the First Increment extension.

There are no Category 5 waters for the central Platte River involving contaminants found in sediments discussed in the 2006 Final EIS. No water quality concerns involving contaminants found in sediments are expected to continue under the Proposed Action.

3.5.3 Impacts from the No Action Alternative

Impacts from the Service's environmental account in Nebraska, Tamarack, Pathfinder Modification water, and Program water action plan projects would be similar to impacts described in **Section 3.3.3**. The loss of the Program could limit acquisition or establishment of new water projects, thereby reducing the likelihood for meeting Program goals, such as summer target flows, in the central Platte River.

3.6 Central Platte River Terrestrial Vegetation Communities

3.6.1 Affected Environment

The 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) provides details of the terrestrial vegetation communities found in the area of analysis. In the 2006 Final EIS, land cover acres were determined by interpreting color-infrared aerial photography from 1998 (Friesen et al. 2000).

The results of an updated 2005 land cover mapping project (Brei and Bishop 2008) are incorporated and summarized in **Table 3-6**. This study generally mapped vegetation according to the National Vegetation Classification System (NVCS) alliance/association level, which characterizes vegetation by the dominant species that represents a community. Several additional

Table 3-6. Land Cover/Land Use Classification Summary

Land Cover/Land Use Type[1]	Acres	Percent
Agricultural fields	973,800	49.7
Bare ground/Sparse vegetation	4,180	0.2
Canal/Drainage	3,630	0.2
Floodplain marsh	20	<0.1
Irrigation reuse pit	350	<0.1
Lagoon	530	<0.1
Meadow sand ridge	2,500	0.1
Mesic wet meadow	15,460	0.8
Phragmites (common reed)	4,200	0.2
Purple loosestrife	220	<0.1
Reservoir	21,550	1.1
Riparian shrubland	18,950	1.0
Riparian woodland	65,311	3.3
River channel	7,850	0.4
River early successional	2,530	0.1
River shrubland	6,530	0.3
Roads	35,390	1.8
Rural developed	71,300	3.6
Sand pit	5,340	0.3
Stock pond	1,430	0.1
Undisturbed grassland	7,260	0.4
Unvegetated sandbar	5,530	0.3
Upland grassland	477,380	24.4
Upland shrubland	3,570	0.2
Upland woodland	34,380	1.8
Urban/suburban	43,298	2.2
Warmwater slough	190	<0.1
Xeric wet meadow	147,470	7.5
Total	**1,960,149**	**100**

Source: Program GIS 2017

[1]The analysis in Brei and Bishop (2008) may not be representative of current conditions because data relied upon to complete the analysis were collected during a period of poor conditions.

classes were developed to map invasive species of management concern, as well as habitat features important to bird species of management concern. Detailed descriptions of land cover/land use classifications are included in Brei and Bishop (2008).

The Program has compiled an analysis of unvegetated channel width, between the Overton Bridge and Chapman, from 2007 through 2016 (Program 2017d). The analysis, which is summarized in **Chart 3-13** and **Chart 3-14** (see **Section 3.4.1**), shows that Program vegetation removal, weed management, overall wet conditions, and a higher than normal frequency of peak flows have increased the unvegetated channel width over time.

Unvegetated widths can be influenced by many factors, including vegetation management and preceding year peak flow. (See **Table 3-4** for a summary of peak flows by river reach from 2007 through 2016.)

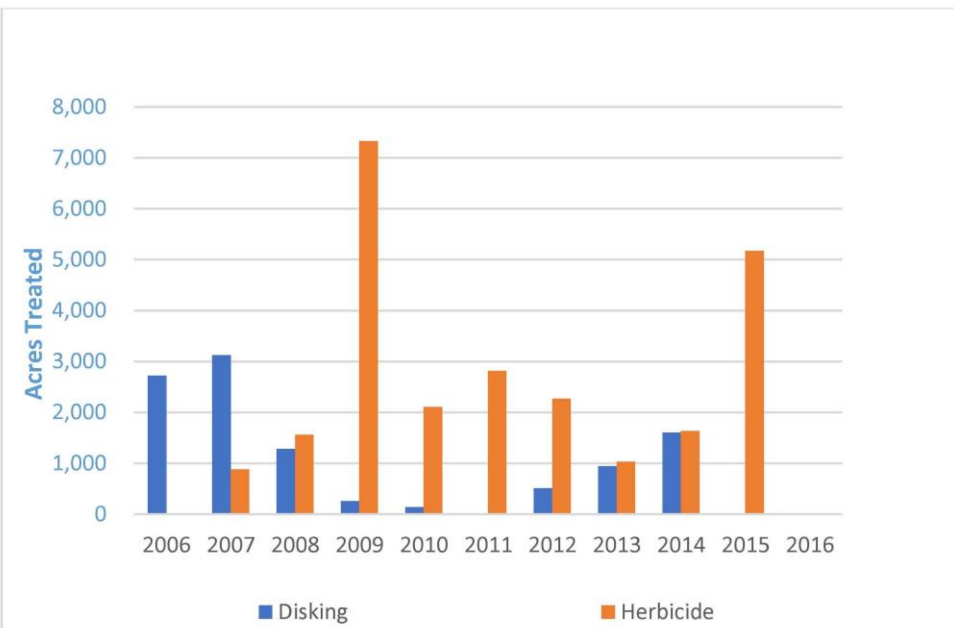
Purple loosestrife (*Lythrum salicaria*) and tamarisk (*Tamarix ramosissima*) are Nebraska noxious weeds (NDA 2017) discussed in the 2006 Final EIS (Reclamation and Service 2006) as species that colonize disturbed wetland areas. Common reed (*Phragmites australis*) is also a Nebraska noxious weed; this is rhizomatous species that can form dense infestations on wet soils along riverbanks, ponds, wet meadows, and other wet areas (NDA 2017).

Vegetation treatments for these species have been conducted on an ongoing basis since 2006. The acres of herbicide treatment and disking conducted each year from 2006 through 2016 are summarized in **Chart 3-16**. Cumulative acres treated from 2006 through 2016 are shown in **Chart 3-17**.

Upon conclusion of the 2016 field season, the Program had completed 8 years of field vegetation monitoring. Data collected have been used to quantify many individual performance metrics, including those for vegetation. The Channel Geomorphology and In-Channel Vegetation 2016 Data Analysis Report (Tetra Tech 2017) presents a summary of all 8 years of data, including spatial and temporal trends in each of the metrics.

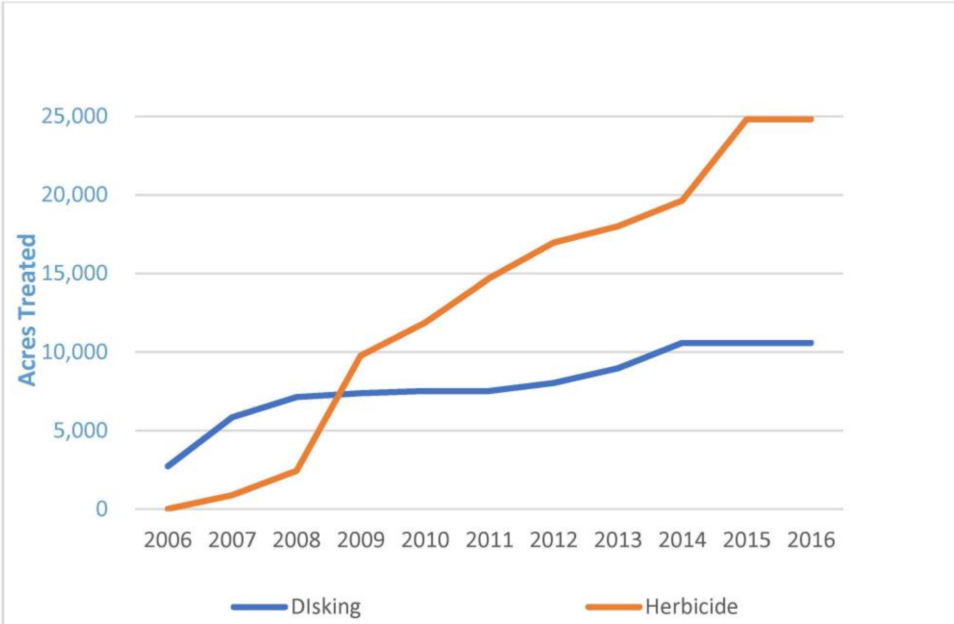
Monitoring has shown that the frequency of purple loosestrife and common reed declined substantially from 2009 through 2012, and then remained relatively consistent through the remainder of the 8-year monitoring period. Purple loosestrife is most common in the portion of the reach downstream from Minden, while common reed is most prevalent in the reaches between Elm Creek and Minden (Reaches 4 and 5), Gibbon and Wood River (Reach 7), and Grand Island and Chapman (Reach 9; Tetra Tech 2017).

Chart 3-16. Acres of Vegetation Treatment



Source: Program GIS 2017

Chart 3-17. Cumulative Acres of Vegetation Treatment



Source: Program GIS 2017

Common reed has been identified as a potentially important factor in preventing the river from sustaining the wide, braided character that is important to good quality habitat for the target species. Both the frequency of occurrence and percent cover of common reed declined during the monitoring period. Percent cover of common reed has shown a statistically significant negative correlation with herbicide spraying; in other words, spraying has been shown to reduce cover of this species. Other factors, such as maximum inundation depth and duration, low flow during the growing season, growing degree days, and precipitation, have not been shown to affect percent cover of common reed (Tetra Tech 2017).

3.6.2 Impacts from the Proposed Action

Under the Proposed Action, the nature and type of impacts on central Platte River terrestrial vegetation communities would be the same as described in the 2006 Final EIS (Reclamation and Service 2006). In general, vegetation would continue to be affected by maintaining habitat for the benefit of the target species. This would entail converting Program lands with woodlands or agricultural areas to wet meadows and removing shrubs and trees from river islands and banks, changing the acres of terrestrial vegetation communities as restoration activities were undertaken.

Removing vegetation for target species habitat may increase the potential for noxious weed infestations on newly cleared or leveled soils; however, the goal of vegetation clearing is to create and maintain unvegetated channel habitat for target species. Thus, under the Proposed Action, program management for purple loosestrife, tamarisk, common reed, and other noxious weeds that may colonize these areas would continue, as described in the 2006 Final EIS. Restoration activities would be closely monitored for weed establishment, and mechanical or chemical means would be used to manage the size of infestations.

3.6.3 Impacts from the No Action Alternative

When the Program ends in 2019, until Program Assets are sold, impacts on terrestrial vegetation communities, including noxious weeds, would include changes in terrestrial vegetation communities from converting wooded areas and agricultural lands to wet meadows, clearing trees and shrubs from river islands, and managing noxious weeds to improve target species habitat. If Program Assets are purchased by signatories that would continue to manage Program Assets to provide habitat for the target species, these impacts would also continue as described above.

Program Assets could be sold without the condition that they be managed to provide habitat for the target species. In this case, changes in the acres of terrestrial vegetation communities may occur, but for other reasons, depending on how the purchaser decides to manage Program Assets. Further, the potential for noxious weed establishment and spread may increase if the purchaser does not continue active monitoring and management of these species on Program Assets.

3.7 Wetlands

3.7.1 Affected Environment

In the 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006), each wetland undeveloped land cover/land use type (see 2006 Final EIS Table 4-WT-1, Central Platte River Study Area Summary of Land Cover/Land Use Classifications, Cowardin Classifications, and Wetland Determination Criteria) was classified using the Cowardin Wetland and Deepwater Habitat Classification system (Cowardin et al. 1979).

As described in **Section 3.6**, land cover types in the project area were updated based on 2005 land cover mapping (Brei and Bishop 2008); however, land cover/land use classifications in Brei and Bishop (2008) used the NVCS with several modified alliances, and these classifications do not match with the land cover/land use classes used in the 2006 Final EIS, nor the Cowardin Wetland and Deepwater Habitat Classification system for wetland land cover/land use classes. As a result, current wetland conditions in the project area are discussed qualitatively below.

Program management to increase habitat quality for target species has resulted in increases in wetland habitat in the project area. Management resulting in the greatest increases in wetlands has been wet meadow or lowland grassland (Cowardin class Palustrine Emergent [PEM]) restoration. This has been accomplished primarily by converting some Program lands with wooded wetlands (Palustrine Forested [PFO]) or non-wetland agricultural lands to wet meadows. To a lesser extent, conversion of shrub-dominated wetlands (Palustrine-Shrub [PSS]), herbaceous riparian areas (PEM), non-wetland upland grasslands, and croplands to wet meadows has also resulted in increases in wet meadows in the project area.

Additional Program management has removed wetlands to increase habitat quality for target species. This has primarily resulted from clearing woodland and shrub-dominated wetlands (Cowardin classes PFO and PSS) from in-stream islands to create additional open river channels (Cowardin class R3UB). To a lesser extent, other wetland types, including herbaceous riparian, lowland grasslands, and bare sand (PEM), have been converted to open river channels.

3.7.2 Impacts from the Proposed Action

Under the Proposed Action, the nature and type of impacts on wetlands would be the same as described in the 2006 Final EIS (Reclamation and Service 2006). In general, the acres of wetlands in the area of analysis would increase as Program management is carried out. This would result from converting Program lands with woodlands or agricultural areas to wet meadows for target species habitat improvement.

In some cases, wetlands on Program Assets may be converted to non-wetland habitat for target species habitat improvement. In these cases, acres of site-specific wetland habitat would decrease from removing wooded and shrub-dominated wetlands on river islands. In these cases, acres of open river channel, and channel width, would increase.

Wetlands may also be affected by conversion from one wetland type to another for target species habitat improvements. For example, wooded or shrubby riparian wetlands may be removed and converted to herbaceous, wet meadow wetlands; however, net acres of wetland habitat would not decrease where such management occurred.

Restoration work that involves temporary vegetation removal or ground disturbance (e.g., from vehicle access or recontouring) may increase the potential for noxious weed infestations. Noxious weed infestations may reduce wetland function, effectively reducing the acres of functioning wetlands. Under the Proposed Action, Program management for purple loosestrife, tamarisk, common reed, and other noxious weeds that may colonize wetland areas would continue, as described in the 2006 Final EIS. Restoration activities would be closely monitored for weed establishment, and mechanical or chemical means would be used to control infestations, reducing the potential for this impact.

All Program management would comply with the environmental commitments listed in **Chapter 4**, as applicable, including obtaining regulatory approvals from the U.S. Army Corps of Engineers (Corps) prior to initiating work in jurisdictional wetlands. All mitigation measures determined by the Corps would be strictly adhered to, minimizing impacts on wetlands. Residual impacts on wetlands following consideration of environmental commitments would be minimal.

3.7.3 Impacts from the No Action Alternative

When the Program ends in 2019, until Program Assets are sold, impacts on wetlands would include overall gains in wetland habitat in the project area, brought about by converting woody riparian areas and agricultural lands to wet meadows to improve target species habitat. If Program Assets are purchased by signatories that would continue to manage Program Assets to provide habitat for the target species, these impacts would also continue as described above.

Program Assets could be sold without the condition that they be managed to provide habitat for the target species; in this case, changes in the acres of wetlands may occur, depending on how the purchaser decides to manage Program Assets. Further, the potential for reduced wetland function from noxious weed establishment and spread may increase if the purchaser does not continue active monitoring and management of these species on Program Assets.

3.8 Whooping Cranes

3.8.1 Affected Environment

This section serves two purposes: first, it describes the affected environment of the whooping crane and documents potential effects of implementing the Proposed Action and No Action Alternative for NEPA documentation, and second, it is also intended to meet the needs of a BA under the ESA; therefore, this section has been organized to describe the species status and critical habitat, document baseline conditions, and communicate potential environmental effects. Potential cumulative effects are also described at the end of the section.

Source: Service
*Whooping crane (*Grus Americana*)*

Status of Species and Critical Habitat

The whooping crane is one of the world's most imperiled species and is a symbol of national efforts to recover endangered species. This bird, which was listed as endangered on March 11, 1967, was one of the very first species listed under the ESA. Critical habitat for the whooping crane along the Platte River was designated in 1978 and covers a stretch roughly 3 miles on each side of the river from Lexington to Shelton, Nebraska. The population estimate for the migrating Aransas-Wood Buffalo whooping crane population has increased from approximately 174 birds in 2001 to approximately 431 whooping cranes observed during the winter of 2016–2017 (Butler and Harrell 2017). The population has steadily increased by approximately 4 percent per year from 1938 to 2017; however, despite intensive management efforts, the whooping crane remains one of the rarest birds in North America, the only continent on which it occurs (Urbanek and Lewis 2015).

Distribution. Whooping cranes currently exist in four distinct populations: Aransas-Wood Buffalo population, Louisiana population, eastern migratory population, and Florida population. The Aransas-Wood Buffalo population is the only remaining wild and self-sustaining population that also migrate. The Aransas-Wood Buffalo population nests in or near Wood Buffalo National Park in the Northwest Territories and adjacent areas of northeastern Alberta, Canada, and it winters in Aransas National Wildlife Refuge on the Texas coast (Urbanek and Lewis 2015). Wintering habitat for the Aransas-Wood Buffalo population consists of estuarine marshes, shallow bays, and tidal flats, while nesting habitat consists of shallow wetlands separated by ridges that support narrow stands of spruce and willow (Urbanek and Lewis 2015). During migration, whooping cranes travel through portions of Canada, North Dakota, South Dakota, Nebraska, Oklahoma, Kansas, and Texas when using the Central Flyway.

Life history. The whooping crane, which has snowy white plumage with black markings on its head and the tip of its wings, has a very distinctive call. This wading bird is the tallest bird species in North America with males approaching 5 feet in height. Whooping cranes of the Aransas-Wood Buffalo population leave the nesting grounds in Canada in September and October and arrive at the Texas wintering grounds in October and November. Whooping cranes return to their nesting grounds in the spring, leaving the Texas coast in March and arriving in Alberta and the Northwest Territories in April and May.

During the twice-yearly migration across the Great Plains states, individuals of the Aransas-Wood Buffalo whooping crane population stop over at the central Platte River for periods of a few days to several weeks (Reclamation and Service 2006). The primary migration corridor, encompassing 95 percent of known sightings of whooping cranes, is about 2,400 miles long and 220 miles wide (Service 2017a). At its intersection with the Platte River, this migration corridor generally occurs between the cities of North Platte and Columbus, Nebraska. For whooping cranes, successful completion of migration requires suitable sites for birds to rest and reside for one or more nights; these sites are generally referred to as stopover sites (Pearse et al. 2015).

Whooping cranes are monogamous, forming pairs as early as 3 years of age, although most pairs begin breeding around 5 years of age. They frequent the same breeding territories year after year and spend nearly a month incubating their eggs until they hatch, usually in late May to early June. Whooping cranes lay two eggs on average per pair, but the survival rate of chicks per pair is generally less than one chick annually. This slow reproductive potential has been an important issue in trying to recover whooping crane populations.

Migratory stopover habitat. Suitable stopover habitat is necessary for whooping cranes to complete their migration in good condition (Pearse et al. 2015). During their migration, whooping cranes use a variety of habitats closely associated with river bottoms, prairie grasslands, and seasonally or semi-flooded palustrine wetlands; they use undisturbed, submerged sandbars commonly found in river channels to forage for food and to roost (or rest). When whooping cranes roost, they prefer to stand in shallow bodies of water, such as channel areas with fine sand and a shallow slow flow, having large unobstructed views (Reclamation and Service 2006). These habitat characteristics are thought to provide the cranes a barrier from predators and an opportunity to take flight to escape predators, if necessary.

Diet. Whooping cranes eat invertebrates, small vertebrates, and plant material, which they find on the ground and in shallow water. They also eat insects, berries, and seeds from low vegetation and take prey from the soil surface, using their bills to stab larger prey. During migration, whooping cranes primarily feed on frogs, fish, insects, and various types of plants often found in submerged or wetland areas (Service 2017a). Whooping cranes also eat waste grains, such as barley, wheat, and corn, from harvested fields during migration.

Threats. Major threats to whooping cranes during migration include collisions with power lines and poaching (Stehn and Strobel 2011; Urbanek and Lewis 2015). Collison with power lines is the greatest known source of mortality for fledged whooping cranes in the Aransas-Woods Buffalo population, representing 38 percent of all known mortalities to this population since 1956 (Stehn and Wassenich 2008). More recent findings of Stehn and Haralson-Strobel (2014) indicate that 20 percent of known mortalities for fledged whooping cranes from the Aransas-Wood Buffalo population are a result of collision (e.g., transmission lines and wind turbines), and 20 percent are from shooting. Mortality resulting from collision with power lines is most likely to occur during spring and fall migrations (Stehn and Wassenich 2008).

The impacts of climate are also a potential threat to whooping cranes during migration. Previous analyses have suggested whooping crane migration was seasonally constant in spring and fall; however, new analyses of observations from 1942 through 2016 demonstrate whooping cranes now migrate earlier in spring by approximately 22 days and later in fall by approximately 21 days; this change is a result of warming temperatures (Jorgensen and Brown 2017).

Spring temperatures have increased along the migration corridor; however, there is no apparent temperature pattern during the fall (Jorgensen and Brown 2017). Warmer temperatures in the spring are likely to make certain food resources available earlier in the season, because wetland habitat and cultivated fields may thaw sooner than in previous years.

Other threats to this species are habitat loss and degradation from draining wetlands, converting prairie habitat to croplands (Urbanek and Lewis 2015), and modifying river hydrology. Hurricanes on the Gulf Coast also degrade wintering grounds.

3.8.2 Environmental Baseline

Population Estimates

The whooping crane population has steadily increased by approximately 4 percent per year from 1938 to 2017. As can be gleaned from **Table 3-7** and **Chart 3-18**, whooping crane use of the central Platte River during the spring migration season has increased substantially (2001–2017), while use during the fall has increased slightly. The lowest spring and fall combined count, which was only 5 individuals, occurred in 2005; the highest count occurred in 2017, when 94 birds were observed.

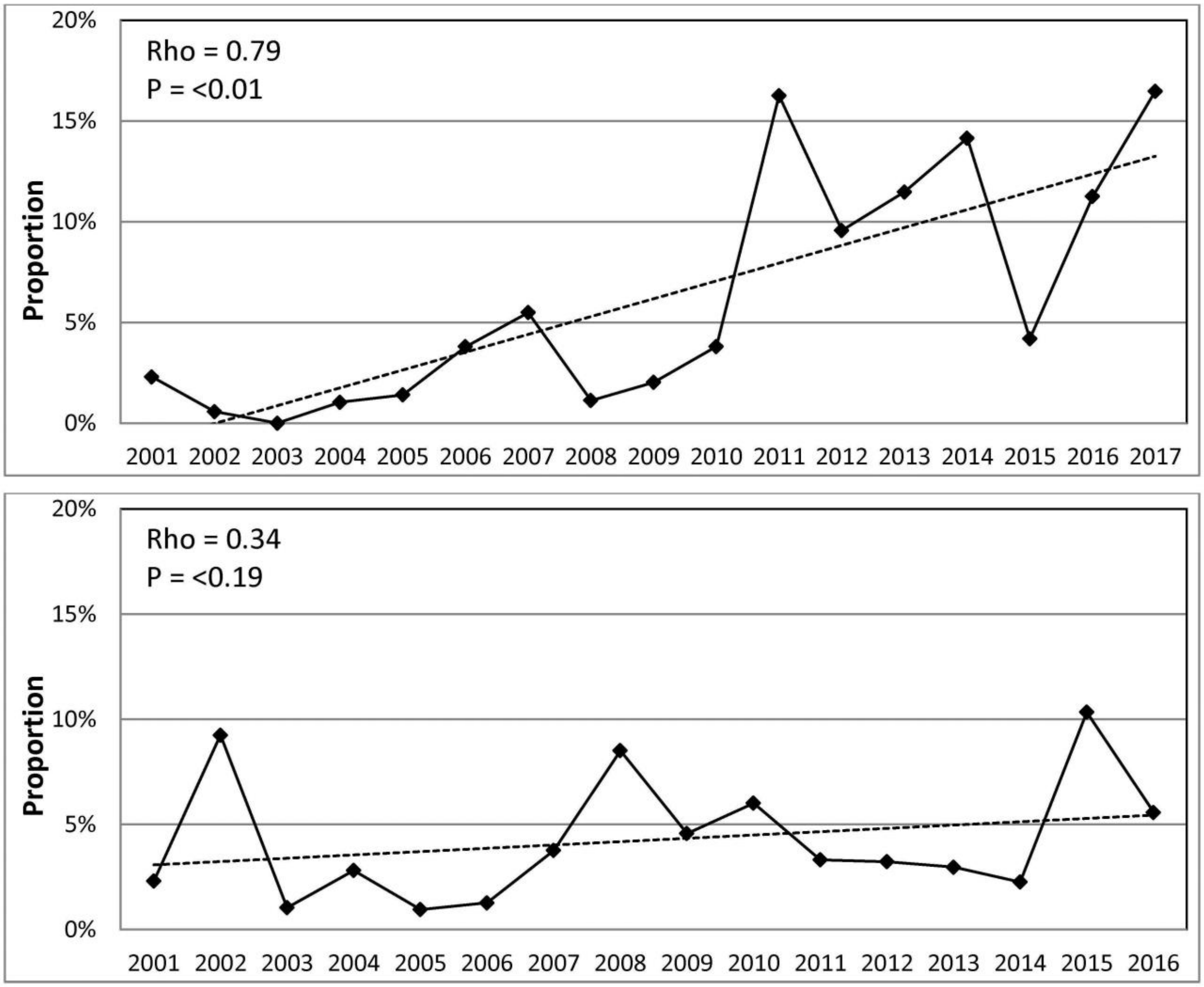
Table 3-7. Whooping Crane Use of the Program's Associated Habitat Reach (Lexington to Chapman) Along the Central Platte River (2001–2017)

Year	Number Observed within the AHR during the Spring Migration Season	Number Observed within the AHR during the Fall Migration Season	January Population Size at the Aransas National Wildlife Refuge	Proportion Observed within the AHR during the Spring Migration Season	Proportion Observed within the AHR during the Fall Migration Season
2001	4	4	174	2.30%	2.30%
2002	1	17	174	0.57%	9.24%
2003	4	2	184	2.17%	1.04%
2004	2	6	193	1.04%	2.80%
2005	3	2	214	1.40%	0.95%
2006	8	3	211	3.79%	1.27%
2007	13	10	237	5.49%	3.76%
2008	3	21	266	1.13%	8.50%
2009	5	12	247	2.02%	4.56%
2010	10	17	263	3.80%	6.01%
2011	46	9	283	16.25%	3.31%
2012	26	9	272	9.56%	3.23%
2013	32	9	279	11.47%	2.96%
2014	43	7	304	14.14%	2.26%
2015	13	34[1]	310	4.19%	10.33%
2016	37	24	329	11.25%	5.57%
2017	71	23	431	16.47%	NA

Source: Service 2017a

[1]Includes a 6-bird whooping crane group that was observed just downstream of the Chapman Bridge (i.e., outside the AHR).

Chart 3-18. Proportion of the Migrating Whooping Crane Population Observed Using the Program's Associated Habitat Reach (Lexington to Chapman) During the Spring (top) and Fall (bottom) Migration Seasons (2001–2017)



Source: Service 2017a
RHO=statistical dependence between the rankings of two variables
P=significance
Note: The fall of 2015 migration season includes a 6-adult whooping crane group that was observed just downstream of the Chapman Bridge (i.e., outside the AHR).

Service staff report that the actual number of whooping cranes using the central Platte River AHR during any one migration season is thought to be higher than those actually observed, based on results of recent decoy studies and an inability to perform the survey (flights) on many days throughout the migration season. From the spring of 2010 to spring 2017 a total of 1,222 survey flights were scheduled within the AHR to document the presence of whooping cranes; but only 76 percent were actually conducted. The others were cancelled because of inclement weather (Program 2018). Additionally, from the spring of 2010 to the spring of 2017 only 64 percent of a total of 149 decoys were randomly placed within the Platte River channels >100 meters wide during days when flights occurred of which only 64 percent were detected. Based on this information, Service staff believe that as many as half of the whooping cranes using the

Platte River as a stopover location may not be detected during their migration use of the Platte River as a stopover location.[1]

Proportions presented in **Table 3-7** were calculated as the number observed within the AHR during the migration season divided by the nearest annual Service population estimate obtained at the Aransas National Wildlife Refuge. Fall proportions are based on the subsequent year's population estimate.

Trends in whooping crane use of the central Platte River from spring 2001 to spring 2017 were analyzed for the Program. To account for the increase in the Aransas-Wood Buffalo population of migrating cranes that could potentially use the central Platte River, the proportion of the population using the central Platte River was determined (see **Chart 3-18**). Results of this analysis determined that the proportion of the crane population using the Program's AHR during the spring is increasing faster than the population overall; however, the fall use trend indicates use was only slightly increasing more than the overall crane population increase (see **Chart 3-18**).

Management Strategies for Developing and Maintaining Whooping Crane Habitat

The Program has two primary management strategies to achieve the objective of improving roosting and feeding habitat for whooping cranes during migration—MCM and FSM (Program 2017e). Presented below are the results of implementing these strategies and the associated performance monitoring and research issues investigated by the Program during the First Increment. Result summaries are in part extracted from the 2015 State of the Platte Report (Program 2017f). This report was prepared by and represents the opinions of the Program's Executive Director's office. Information presented below consists of a brief description of the issue, a summary of scientific findings, and notes on implications for the proposed extension.

Mechanical creation and maintenance. The MCM strategy focuses on ways to mechanically create and maintain both in- and off-channel habitats for whooping cranes. It includes channel widening through management activities (e.g., in-channel and bank-line vegetation removal), acquiring and restoring off-channel wetland habitat, and creating and preserving wet meadow habitat (Program 2017e). While the ability to mechanically create and maintain wide, open channels for whooping cranes has been clearly demonstrated, uncertainties remain regarding: 1) the most economical means of creating and maintaining these habitat types, and 2) the characteristics that influence whooping cranes to use these habitats (Program 2017e).

- Summary of scientific findings for MCM strategy (Program 2017f):
  - Locations that are mechanically maintained through herbicide application and disking have a higher probability of being a suitable width for whooping crane roosting.
  - Common reed is extremely erosion resistant; consequently, natural high flows are only sufficient to scour the very weakest individual plants.

[1]Matt Rabbe, Senior Wildlife Biologist, U.S. Fish and Wildlife Service, personal communication with EMPSi, December 2017.

   - The beneficial effects of mechanical management actions are largely limited to only the locations where they are implemented. These mechanical actions do not provide the system-scale beneficial effects typically associated with flow and sediment management actions.

- Anticipated program management actions for extension of the First Increment:
   - Herbicide application, disking, and mature tree removal are necessary at Program habitat complexes in most years to maintain suitably wide, open channel habitat.

Flow-sediment, mechanical. The FSM strategy is based on increasing and augmenting river flows to restore channel width and improve historical river channel conditions (i.e., a braided channel morphology with unobstructed channel width) and to improve sediment supply (Program 2017e). The FSM strategy is rooted in the view that the historical AHR once provided abundant stopover habitat conditions necessary for whooping crane survival and that the current conditions are insufficient to meet this need (Program 2017e); however, the difficulty of implementing these actions, particularly flow consolidation, because of regulatory permitting constraints and downstream flooding concerns, makes it challenging to implement this strategy (Smith 2011).

- Summary of scientific findings for FSM strategy (Program 2017f):
   - During wet years, the much greater magnitude and duration of natural peak flow events may eclipse any positive benefit of short-duration, high-flow managed releases.
   - Mechanical clearing and leveling are likely necessary to create suitable channel configurations and facilitate channel adjustments to changes in flow and sediment.
   - Mature common reed plants or plant patches that obstruct channel widening have a very low probability of being eroded at the highest flow magnitudes and velocities.
- Anticipated Program management actions for extension of the First Increment:
   - Data gathered by the Program suggests that implementation of the FSM strategy may not create or maintain suitable habitat for whooping cranes, although additional study is needed for a final determination.
   - Ongoing mechanical maintenance may be necessary to maintain suitable open channel habitat at Program complexes.

Additional Whooping Crane Habitat Issues

The two additional issues investigated by the Program during the First Increment related to creating and maintaining suitable stopover habitat for whooping cranes were: 1) the need to augment sediment in the river to maintain historical river conditions, and 2) additional knowledge on actual roosting habitat requirements.

Sediment augmentation. The Program has observed that portions of the central Platte River (south channel reach from the J2 Return to the Overton Bridge) is incising and narrowing because of degradation from clear-water hydropower returns (Program 2017f). This degradation has resulted in a portion of that reach transitioning from a wide, braided configuration into a narrow, wandering form, which is less suitable for whooping crane use. The prevailing hypothesis is that sediment augmentation is necessary to: 1) slow incision and narrowing, and 2) prevent degradation from progressing downstream (past the Overton Bridge).

- Summary of scientific findings for sediment augmentation (Program 2017f):
  - Narrowing and associated change in the south channel results in a channel configuration that is not suitable for use by the Program’s target species, including whooping cranes.
  - In absence of sediment augmentation to offset the south channel deficit, incision and narrowing would progress downstream past the Overton Bridge and negatively affect habitat suitability at the Program’s Cottonwood Ranch complex.
  - Augmentation of 80,000 tons of sand annually downstream of the J2 Return should be sufficient to allow the benefits of augmentation to be evaluated.
- Anticipated Program management actions for extension of the First Increment:
  - If the south channel sediment deficit persists, incision and narrowing will progress downstream past the Overton Bridge, negatively influencing migrating whooping crane habitat suitability for an increasingly larger portion of the AHR.
  - Full-scale sediment augmentation may be effective in halting the long-term trend of incision and narrowing. The beneficial effects of augmentation need to be assessed through 5 to 7 years of implementation and effectiveness monitoring. (Note: This activity started in the fall of 2017.)
  - Measuring augmentation effectiveness would require an assessment of changes (or lack thereof) in channel slope, volume, width, and bed material and will be challenging to quantify.

Whooping crane habitat selection. The Program’s goal of providing suitable habitat conditions for whooping cranes was studied during the First Increment to: 1) analyze in-channel habitat selection by whooping cranes in the central Platte River, and 2) assess trends in whooping crane habitat use (Howlin and Nasman 2017). Program researchers monitored whooping crane group use in the central Platte River through daily systematic aerial surveys during spring and fall migrations. Study results, which provide information that can be used in determining habitat characteristics associated with the highest selection ratios by whooping cranes, will help to inform future management actions implemented under the Program during the proposed extension of the First Increment (Howlin and Nasman 2017).

- Summary of scientific findings for habitat selection (Program 2017f):
  - Whooping cranes prefer unobstructed channels of widths of approximately 600–700 feet and unforested corridor widths of approximately 1,100 feet.
  - During the day, whooping cranes use cornfields close to the previous night's roost with limited potential for human disturbance (Howlin and Nasman 2017).
  - Habitat availability (wide unobstructed sections of river at suitable depth) increased during the First Increment. As a result, overall use of the central Platte AHR has increased (more in the spring than in the fall).
  - During the day, whooping cranes are more likely to choose riverine habitat over corn cover and choose corn cover more than grassland, soybean, and wet meadow cover (Howlin and Nasman 2017).
- Anticipated program management actions for extension of the First Increment:
  - Based on the findings of the habitat selection analysis, the Program should continue to provide unobstructed channel widths that are ≥600 feet and unforested channel widths that are ≥1,100 feet.

During implementation of the First Increment, a companion study was conducted to collect information regarding the characteristics of crane nocturnal roost sites, information that until recently has been limited and largely based on incidental observations (Pearse et al. 2017). The study was designed to characterize sites used by cranes as either roost or day-use sites to assist the Program in designing more suitable habitat. Data for the study were collected from radio-tagged whooping cranes at 504 roost sites and 83 day-use sites in Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Minnesota, and Montana (Pearse et al. 2017).

An important determination from this study is that the habitat criteria thresholds for roost sites initially conceived by the Program are different from those used by cranes over a large portion of their migration route. The study found that whooping cranes are apparently able to tolerate a wider range of habitat conditions than those initially used by the Program to develop the habitat criteria thresholds. The one exception was the Program's metric for distance to the nearest disturbance feature; the collected data suggested whooping cranes are less tolerant than the Program's criteria thresholds (Pearse et al. 2017).

The information discussed in the paragraph above represents new scientific learning, currently undergoing review for publication, that would be presented to the Governance Committee for action during the extension of the First Increment, with regard to altering habitat criteria thresholds. Once this new information has been presented, the Governance Committee could consider whether changes to the metrics are warranted or that, despite new information, the habitat criteria and metrics are still appropriate.

Incidental Take

The total allowable take of whooping cranes that would remove an individual from the population is one individual during the 13 years of the First Increment from monitoring and research activities. As of November 30, 2017, the Program has not resulted in take (e.g., lethal, crippling, harm, or harassment,) of any whooping cranes (Program 2017g). Given the programmatic nature of the Program and the associated BO, if an individual measure of allowable take for whooping cranes were exceeded, consultation under the ESA would begin on that aspect of the federal action resulting in that take, rather than the federal action as a whole.

3.8.3 Impacts from the Proposed Action

One of the goals of the International Whooping Crane Recovery Plan is to ensure the protection of key stopover locations along the Central Flyway because they have the highest use by whooping cranes (Service 2007). The string of protected areas along the north-south migration route assists the species by decreasing the distance between stopover locations. Cranes use these stopover habitats to meet their immediate needs for food and rest and can spend up to several days while waiting for appropriate weather conditions to continue their migration (Service 2007). The central Platte River is one of these protected stopover locations. Protecting stopover habitat and reducing mortality are critical to achieving the objectives of the International Whooping Crane Recovery Plan. An important element of this plan is to maintain and enhance critical habitat along the central Platte River.

Extension of the Program's First Increment would allow continued improvement and enhancement of habitat for whooping crane use of the central Platte River as a stopover location. Habitat improvement would also accommodate an increasing Aransas-Wood Buffalo whooping crane population by meeting the growing demand for suitable roosting and feeding habitat. Extending the First Increment would contribute to achieving the primary goal of the International Whooping Crane Recovery Plan—to allow the overall whooping crane population to reach a level of ecological and genetic stability so that it can be reclassified to threatened status (Service 2007). A study completed in 2015 (Pearse et al. 2015) found a large portion of the whooping crane migration range is under some measure of land protection (27 percent). Continuation of the Program helps to maintain this level of protection.

All the First Increment habitat management efforts implemented to benefit whooping cranes would continue under the extension. These efforts include, but are not limited to, removing trees and bank-line disking to increase unobstructed view widths, channel disking and widening to increase unobstructed channel widths, and releasing flows and augmenting sediments to improve habitat conditions related to increasing river braiding and areas of suitable depth for whooping crane roosting. Continued purchase or lease of additional lands bordering key roosts would protect these sites from human disturbance and provide additional wet meadow habitat that supplies an important source of food for the growing whooping crane population. Continuation of the Program's adaptive management approach would allow data gaps to be filled with new knowledge and creation of improved habitat conditions both in-channel and off-channel for whooping cranes.

When all the Program elements are implemented, should the First Increment extension be approved, these elements may affect, and are likely to adversely affect, whooping cranes and their designated critical Platte River habitat (see **Appendix A**). A summary of these potential adverse impacts on whooping cranes, including water management activities, are as follows:

- Decrease in late spring river elevations and peak flow in the wettest years that would negatively affect groundwater elevations that sustain wetland habitats and crane food sources
- Decrease in short-duration peak flows that create overbank flows into wet meadows and facilitate surface water connections between meadows
- Changes to system hydrology that further decrease and negatively affect the river's natural sediment transport processes

Given Program monitoring and research and that land restoration and management would continue at existing or higher levels, the Service anticipates adverse impacts are likely from these activities. No incidental take was documented for whooping crane from these activities during the First Increment; nevertheless, the adverse impacts anticipated in the 2006 Final EIS (Reclamation and Service 2006) and the 2006 BO (Service 2006) are expected to continue for the extension of the First Increment, at levels previously described in the BO. These adverse impacts are lethal or crippling harassment, due to land management, restoration, monitoring and research activities, that could cause take.

The whooping crane would be affected beneficially from the increased availability of suitable stopover habitat. This would come about as the Program continues to mechanically develop suitable roosting habitat and acquire and restore blocks of land to protect cranes from human disturbance. This would be combined with natural improvements to the riverine processes that contribute to improved habitat conditions.

Following is a summary of potential beneficial impacts on whooping cranes by extending the First Increment:

- Increase in the amount and distribution of wide channels for roosting in deteriorated (i.e., narrowed) sections of the river
- Increase in the ability to sustain restored riverine habitats upstream of Kearney, Nebraska, by mechanically adding sediment
- Increase in the amount of grasslands and wet meadows available for crane foraging
- Minor increase in early-spring (mid-February to mid-March) water surface elevations in normal years to potentially improve groundwater levels and related improvements in wetlands maintenance during years with normal river flows (would generally benefit the lowest and wettest meadows)
- Increase in the length of stream bank and adjacent land area protected to minimize disturbance

Given the science to date on sediment, the Service believes the sediment deficit issue is highly correlated to the J-2 return. It anticipates that Program sediment augmentation at the J-2 return may reduce further adverse impacts at that location, preventing some of the adverse impacts on the river's natural transport processes.

Cumulative Effects

Cumulative effects include effects of future state, local, or private (nonfederal) actions that are reasonably certain to occur within the area of analysis. Two areas of concern related to cumulative impacts for whooping crane stopover habitat are construction of utility infrastructure (distribution and high-voltage transmission lines) and increased human disturbance.

Utility infrastructure, such as high-voltage electric transmission lines and wind farms consisting of numerous wind turbines, are scheduled to be constructed within the Central Flyway throughout Nebraska. This utility infrastructure poses an ongoing threat to migrating whooping cranes and represents the primary source of mortality for this species during migration. An estimated 80 percent of whooping crane mortality may occur during migration and primarily results from collisions with utility infrastructure (blades of wind turbines and shield wires associated with transmission lines) (Stehn and Strobel 2011).

Disturbance of roosting and feeding whooping cranes associated with human interaction, particularly associated with recreational activity, can increase stress to individual cranes and increase migration mortality.

Extension of the Program’s First Increment would allow continued improvement and enhancement of habitat for whooping crane use of the central Platte River as a stopover location. Habitat improvement would also accommodate an increasing Aransas-Wood Buffalo whooping crane population by meeting the growing demand for suitable roosting and feeding habitat.

3.8.4 Impacts from the No Action Alternative

Selection of the No Action Alternative would put at risk the ability of the central Platte River to provide suitable stopover habitat for migrating whooping cranes and keep pace with the increasing Aransas-Wood Buffalo population. Elimination of the following Program elements would decrease available habitat for migrating whooping cranes and increase mortality, jeopardizing the recovery of this iconic species:

- The spread of common reed would go unabated and reduce the amount of open channel habitat along the Platte River, negatively influencing potential whooping crane roosting areas for a large portion of the AHR.
- South channel sediment deficit would persist, and incision and narrowing would progress downstream past the Overton Bridge, negatively influencing migrating whooping crane habitat suitability for an increasingly larger portion of the AHR.
- Locations that have historically been mechanically maintained through herbicide application and disking would no longer be managed to provide roosting habitat.
- Flow protection and enhancement that aids in maintaining or providing suitable roosting habitat would decrease or be eliminated.

Whooping cranes require two basic ecological needs at stopover locations during their migration: food and a resting place safe from natural predators and disturbance. The central Platte River has historically filled both needs. Because most deaths of whooping cranes occur during migration, mortality may be linked to the quality and/or quantity of stopover habitat. While the annual migration of whooping cranes only involves 20 percent of their annual cycle, up to 80 percent of yearly mortality may occur during this period (Stehn and Strobel 2011); however, a recently completed whooping crane telemetry study suggests, based on a relatively small sample size, that mortality during migration may have been previously overestimated.

If the Platte River were no longer able to meet the increasing demand for suitable roosting and feeding habitat, whooping cranes would most likely shift their stopovers to other habitats in Nebraska; however, in 2005, a scientific committee of the National Research Council (NRC) determined that few, if any, suitable alternatives are available in Nebraska to replace the central Platte River in its function as stopover habitat for migrating whooping cranes (NRC 2005). Generally, about 7 percent, but up to 16 percent (2017 Service database), of migrating whooping cranes were documented using the central Platte River as a stopover location during an individual migration season; however, there was and still is great fluctuation from year to year (NRC 2005); however, an unknown additional number are likely using the Platte River but are undetected.

The NRC concluded that the loss of the Platte River habitat "…would have potentially serious consequences for the species" and further stated that if mortality were to increase by only 3 percent (which the committee felt was a likely scenario if the Platte River habitats should become unavailable), the entire migrating population would likely become unstable. Thus, implementing the No Action Alternative could contribute to increased mortality and an unstable whooping crane population because of the central Platte River's inability to accommodate an increasing Aransas-Wood Buffalo migrating population.

The Service has developed a numerical grading system for gaging the recovery potential of endangered species and has assigned a rating of 2C (i.e., high degree of threat and high recovery potential) for the whooping crane. While threats to the whooping crane population are currently high, the management techniques outlined in the International Whooping Crane Recovery Plan have facilitated continued growth of the whooping crane population; however, not granting an extension for the Program's First Increment could jeopardize this species' recovery and change the recovery priority categorization to a 5C (i.e., high degree of threat and low potential for recovery; Service 2011).

The Program satisfies the ESA's "reasonable and prudent alternative to avoid jeopardy" for previously completed consultations for federal actions. The Program functions as an offsetting measure to previous actions and is required to provide benefits to target species (e.g., whooping crane). Without extending the First Increment, if a state continues to carry out the responsibilities it had under the Program, such actions would be sufficient to provide ESA compliance with respect to all water-related activities in that state until any reinitiated consultations have been completed.

In addition, to the extent the states respective contributions of cash, water (through the initial Program water projects), and land continue to benefit the target species beyond termination of the Program, the states would retain the right to argue that such future benefits resulting from their contributions should be considered in any reinitiated consultations.

However, if the Program dissolves and the states do not continue to carry out their responsibilities under the Program, each water project or activity in the basin that required federal approval, permitting, or funding would be required to undergo separate ESA Section 7 consultation. Also, separate mitigation measures would be implemented.

Without extension of the First Increment, implementation of the Program's AMP would terminate. The adaptive management program provides for collaborative monitoring and research of habitat restoration efforts, which, in turn, allows for scientific evaluation of actions and improvement of those actions through an adaptive management approach. The commitment of all Program parties to an adaptive management approach means that the Program's effectiveness can be increased as more knowledge and experience are gained. This cooperative effort would not occur if the No Action Alternative were to be selected and separate ESA consultations would be initiated.

The scientific community recognizes the importance and benefits of long-term monitoring to reach conclusions about whooping crane use of the central Platte River. Because of the annual fluctuations in hydrological conditions and whooping crane use of the river, trends of only a few years are not likely to be as informative as long-term (dozens of years) trends that are monitored and analyzed. These data and new understandings are needed to improve analyses and understandings of whooping crane habitat requirements. Selection of the No Action Alternative would not allow these long-term data to be collected so that data gaps could be filled regarding habitat needs and would decrease the effectiveness of the designated critical habitat along the central Platte River.

Cumulative Effects

As described above under the Proposed Action *Cumulative Effects* section, other actions can impact whooping crane stopover habitat (e.g., construction of utility infrastructure) and disturb roosting and feeding whooping cranes due to increased human disturbance. Not extending the Program's First Increment would put at risk the continued improvement and enhancement of habitat for whooping crane use of the central Platte River as a stopover location, and the habitat necessary to accommodate an increasing Aransas-Wood Buffalo whooping crane population by not meeting the growing demand for suitable roosting and feeding habitat.

3.9 Piping Plovers and Interior Least Terns

3.9.1 Affected Environment

This section serves two purposes: first, it describes the affected environment of the interior least tern and piping plover and documents potential effects of implementing the Proposed Acton and No Action Alternative for NEPA documentation purposes. Second, this section also meets the needs of a BA under the ESA; therefore, this section has been organized to provide a description of the species status and critical habitat, document baseline conditions, and communicate potential environmental effects. Potential cumulative effects are also described at the end of the section. Because this section evaluates potential impacts on two protected

Source: Nebraska Game and Parks Commission
*Interior least tern (*Sternula antillarum*)*

species, the species status and critical component is separated into two parts to accommodate both species.

Status of Least Tern and Critical Habitat

The interior least tern was listed as endangered in 1985; no critical habitat was ever designated for this species. In the initial listing, the interior population was defined as any least tern that nested more than 30 miles from the coast. On September 19, 1990, the Service approved the recovery plan for interior least terns. The recovery plan estimated the interior least tern population at 5,000 adults (1990) and established a recovery goal of 7,000 adults. This level would need to be maintained for 10 continuous years before the species could be considered for delisting. In 2006, Lott reported a population of 17,591 adult least terns in 2005 from 489 colonies in 68 distinct geographic locations (Lott 2006).

In 2013, the Service completed a 5-year status review and recommended delisting the interior least tern because of its biological recovery. The Service is in the process of establishing conservation agreements, population models, and range-wide monitoring plans in hopes of moving forward with a delisting soon (Service 2017b).

Distribution. The interior least tern historically bred along the Mississippi, Missouri, Arkansas, Red, Rio Grande, and Ohio River drainages. The range extended from Texas to Montana and from eastern Colorado and New Mexico to southern Indiana (Service 2006). While the interior least tern continues to breed in most of its historical breeding range, its distribution is generally restricted to less-altered river segments (Service 2006). Least terns are believed to winter primarily along coastal areas adjacent to the Pacific and Atlantic Oceans.

Life history. The interior least tern is the smallest member of the tern family, measuring approximately 8 to 9 inches in length. The least tern has a black “crown” on its head, a white underside and forehead, grayish back and wings, orange legs, and a yellow bill with a back tip (Service 2006). Least terns arrive at breeding areas from late April to early June and typically spend 4 to 5 months at their breeding sites (Service 2006). Least terns nest in colonies, and the distance between nests varies widely. The nests can be as close as a few feet or widely scattered. Nests are generally shallow and inconspicuous depressions in an open sandy or gravel area. Small stones or twigs are usually nearby.

Egg laying begins in late May, and incubation generally lasts 20 to 25 days (Service 2006). Fledging occurs 3 weeks after egg hatching. Both juveniles and adults leave the nesting colonies by early September for their wintering grounds.

Nesting habitat. Least terns are colonial, and their preferred nesting habitat is open, sparsely vegetated sand and gravel substrates that can be used for both nesting and brood rearing. Historically, least terns made extensive use of sandbar habitat along major rivers (Service 2006). Interior least terns nest on the open ground near shallow water feeding areas. Other nest sites used by the least terns include dry alkali lakes, sandpits, industrial ponds, and gravel mining operations.

Diet. The least tern forages for fish in shallow water (e.g., the Platte River floodplain). Typical prey species include the emerald shiner (*Notropis atherinoides*) and sand shiner (*Notropis* *stramineus*; Service 2006). The least tern catches food in its bill by swooping down to the water surface or by diving. It frequently hovers prior to diving.

Threats. The 1988 Least Tern Recovery Plan lists the loss of riverine sandbar habitat as the central threat to least terns; however, the species has proven to be resilient to the loss of this habitat type.

Climatic conditions that influence Platte River hydrology are a major factor influencing the quality of least tern nesting habitat throughout the basin. During periods of high rainfall, sandbars are scoured, which replenishes sand and removes vegetation, and new sandbars are created. During periods of drought, spring flows that form and maintain sandbars are reduced or absent. During these low-flow periods, vegetation increases on sandbars, reducing their quality for nesting terns.

Summer temperatures are projected to potentially increase, by 5°F to more than 10°F, by the end of the century. This will depend on future emissions from fossil fuel sources across the range of the least tern. Northern areas of the Great Plains are projected to experience a wetter climate by the end of this century. Most references agree that there will be less mountain snowpack accumulation and more winter precipitation falling as rain and that stream flows will increase in the future. Across the U.S. range of the piping plover and least tern, spring precipitation is expected to increase between 0 and 15 percent under a lower emissions scenario and between 0 and 40 percent under a higher emissions scenario. This shift in temperature and moisture could have negative impacts on piping plover and least tern nesting habitat. This would depend on wet-dry cycles to keep habitat clear of vegetation (Corps 2016).

Additionally, changing precipitation patterns, such as the timing of rainfall and snowmelt, are expected, with rain occurring later in the year and snowmelt occurring earlier in the spring. Extremes in climate, such as flooding and droughts, are expected to increase in magnitude in the future. This will magnify periods of wet or dry weather and will result in longer, more severe droughts and larger, more extensive flooding. The potential for an increase in floods could create nesting habitat, and an increase in droughts could expose more habitat. These conditions could be beneficial, because of the increased nesting habitat from flood-deposited sandbars and an increase in exposed sandbars under drought conditions (Corps 2016). Remaining threats are regional (e.g., water table and flow declines) and local (e.g., predation, vegetation encroachment on breeding and wintering habitat, and human disturbance). Natural disasters, such as floods and droughts, can also affect least tern nesting success.

Status of Northern Great Plains Piping Plover and Critical Habitat

The Northern Great Plains population of the piping plover was listed as threatened in January 1986. Critical habitat was designated on the Northern Great Plains piping plover breeding grounds in September 2002 (Service 2015a), and critical habitat was designated for all populations of piping plovers on the wintering grounds in 2001 and re-designated in 2008 and 2009 (Service 2015a). In 2009, the Service completed a 5-year status review of the piping plover and recommended retaining its classification of threatened (including the three states within the Program study area). The review indicated that while the piping plover’s population has increased, numbers remain below the recovery goals established in the 1988 recovery plan (Service 2009a).

Every 5 years, an International Piping Plover Census is conducted for both the breeding grounds and wintering grounds. This census began in 1991 (Service 2015a), and results of the first census in the Northern Great Plains Region observed 3,469 adults. A population decline was observed during the next 2 census years with 3,286 birds in 1996 and 2,953 in 2001; however, this downward trend was dramatically reversed in 2006 when 4,662 adults were counted. Because of the extreme flooding in 2011, only 2,249 adults were observed in the Northern Great Plains.

Source: Service
*Piping plover (*Charadrius melodus*)*

Distribution. Piping plovers generally breed in three distinct regions of North America: 1) along the Atlantic coastline from South Carolina to Newfoundland, 2) along the shorelines of the Great Lakes, and 3) in wetlands and along rivers of the Northern Great Plains (Service 2006). The breeding population of the Northern Great Plains piping plover extends from Nebraska north along the Missouri River through South and North Dakota into Montana and Canada. Wintering grounds for the species include the south Atlantic coastline, the Gulf Coast from Florida to Mexico, and the Caribbean.

Life history. The piping plover is a small migratory shorebird with an average body length of 6 to 7 inches (Service 2006). Throughout the year, adults have sand-colored upper bodies, white undersides, and orange legs. Piping plovers only spend a short portion of their lives on their breeding grounds (e.g., Platte River), and those that breed in the Great Plains typically winter along the Gulf Coast from Florida to Texas.

Piping plovers arrive at the breeding grounds in early April, and courtship and nesting begin in mid-late April (Service 2006). Male birds create a shallow depression on the ground that both adults line with small pebbles. The average clutch size is four eggs. Incubation duties last approximately 25 to 28 days and are shared by both adults. Hatching begins in late May to early June and generally peaks in June to early July. Chicks fledge 25 to 29 days after hatching. Piping plovers generally only raise one brood during the nesting season, but will re-nest if the earlier nest fails. By July thru August, piping plovers begin the fall migration with adults leaving first followed by the juveniles a few weeks later (Service 2006).

Nesting habitat. Piping plovers are semi-colonial, and their breeding habitat preference is for open, sparsely vegetated sand and gravel substrates that can be used for both nesting and brood rearing. Historically, piping plovers made extensive use of sandbar habitat along major rivers (Service 2006). While much of the historically used areas have been altered by impoundments and hydrologic alterations, piping plovers still nest on rivers in many areas. While data suggest that habitat use of plovers is dynamic (Service 2006), alkali reservoirs and wetlands associated with the Prairie Pothole Region appear to support a large portion of the Great Plains piping plover population (Service 2006). Remaining nest sites used by the piping plover include dry alkali lakes, sandpits, industrial ponds, and gravel mining operations. Open, wet, sandy areas provide feeding habitat for the birds on river systems and throughout most of the bird's nesting range (Service 2006).

Diet. The piping plover has been observed feeding on a variety of invertebrates, including worms, fly larvae, beetles, grasshoppers, crustaceans, and mollusks. Fecal evidence suggests that the piping plover selects prey at roughly the same rate as its availability (Service 2015a).

Threats. Reservoirs, channelization of rivers, and modification of river flows have been identified in the 2016 Draft Piping Plover Recovery Plan as major continuing threats because they reduce sandbar riverine habitat, increase flooding of remaining breeding habitat during the nesting season, and promote vegetation growth on sandbars seldom scoured by high flows (Service 2015a).

Predation by birds and mammals is also a major threat to piping plover productivity throughout the species' breeding range. Predation reduces egg-to-chick survival and chick-to-fledgling survival with the more mobile and experienced adults facing a much smaller impact. Predation has also been observed to be more prolific when habitat is limited, and nest densities are higher.

Climatic conditions influencing the quality of piping plover nesting habitat are similar or the same as those described previously for the least tern.

3.9.2 Environmental Baseline

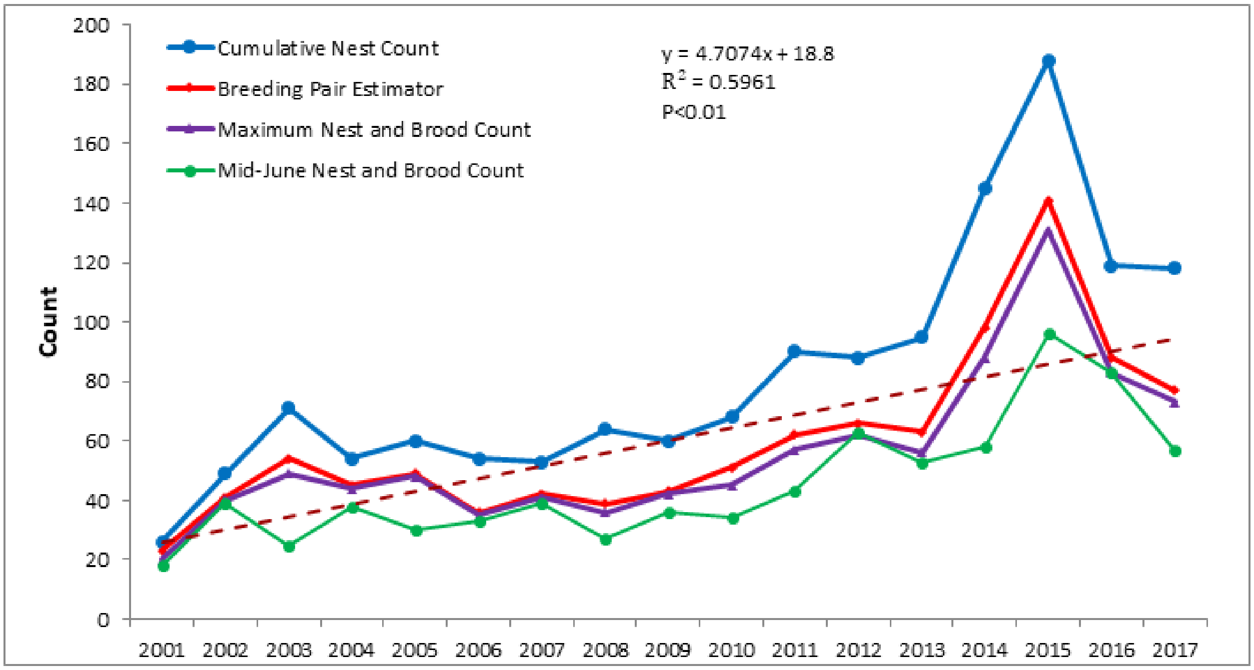
Presented below is a baseline description of conditions within the central Platte River AHR for the least tern and the piping plover. These topics are combined for both species. Topics discussed include:

- Breeding pair counts
- Nesting success
- Sandbar habitat creation
- Availability of suitable nesting habitat
- Habitat selection and use
- Forage habitat availability (least tern)
- Incidental take

Breeding Pair Counts

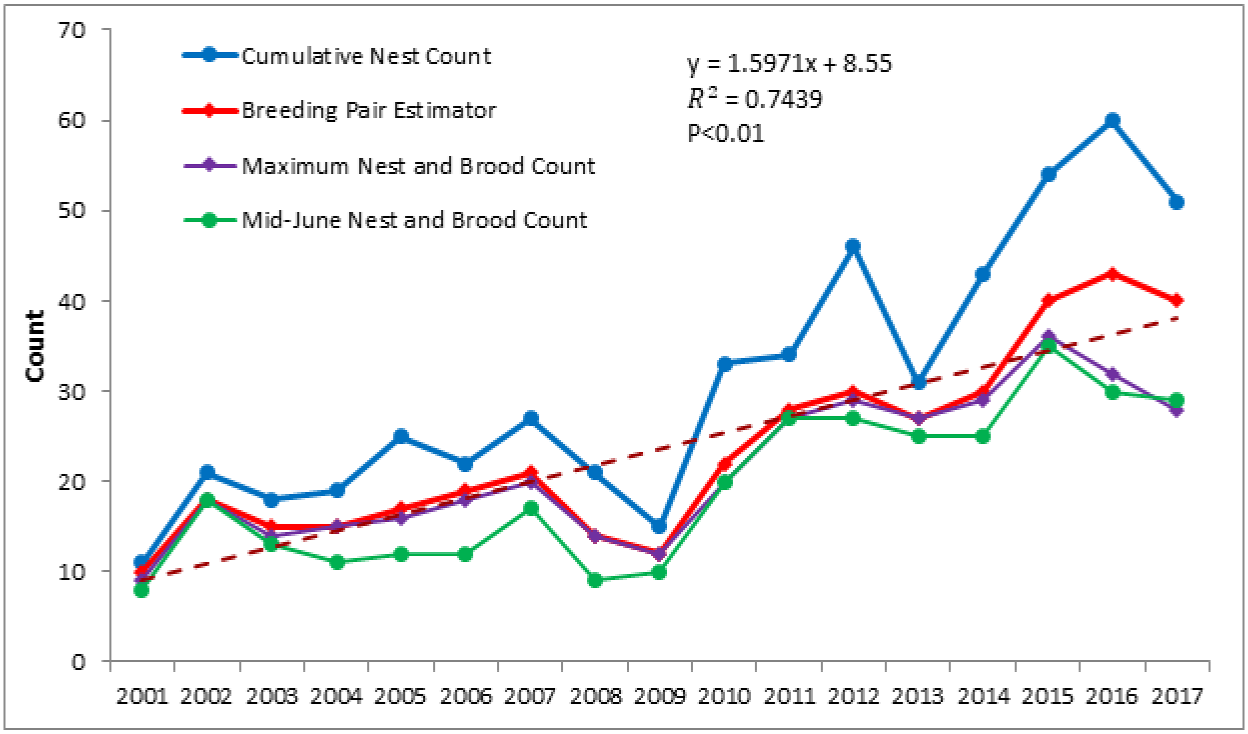
The total number of breeding pairs of least terns and piping plovers has increased for both species during the First Increment of the Program (**Chart 3-19** and **Chart 3-20**). In 2016, a total of 88 breeding pairs of terns and 43 breeding pairs of plovers was observed in the AHR. Piping plover breeding pair counts increased slightly from 2001 to 2007, declined during 2008 and 2009, and have increased since that time. The Program observed a decrease in least tern breeding pairs in 2016; however, these counts are still above the counts during the years prior to Program implementation. Though nesting has occurred on riverine sandbars and has an increase during 2015, off-channel sandpits have provided the most consistent nesting habitat for both species.

Chart 3-19. Least Tern Breeding Pair Counts on the Central Platte River AHR (2001-2016)



Source: Keldsen and Baasch 2016
y=regression
R^2=coefficient of determination
P=significance

Chart 3-20. Piping Plover Breeding Pair Counts on the Central Platte River AHR (2001-2016)



Source: Keldsen and Baasch 2016
y=regression
R^2=coefficient of determination
P=significance

Nesting Success

As can be gleaned from **Table 3-8**, **Table 3-9**, **Chart 3-21**, and **Chart 3-22**, nesting success for the least tern and piping plover has been on a steady increase since implementation of the First Increment in 2007. Not only have nest, chick, and fledgling counts increased greatly (primarily because of off-channel availability), but hatch ration has increased, while fledglings ratios have remained steady.

Sandbar habitat creation. The Program has two primary management strategies to achieve the objective of developing nesting habitat for least turns and piping plovers—MCM and FSM (Program 2017f). The MCM strategy focuses on ways to mechanically create and maintain both in- and off-channel habitats for the least tern and piping plover. It includes channel widening through management activities (e.g., on-channel and bank-line vegetation removal), acquiring and restoring off-channel wetland habitat, and creating and preserving wet meadow habitat (Program 2017f). The FSM strategy is based on increasing and augmenting river flows to restore channel width and improve historical river channel conditions (i.e., a braided channel morphology with unobstructed channel width) and to improve sediment supply (Program 2017f).

Table 3-8. Summary of Least Tern Reproductive Success at Off-Channel and On-Channel Nesting Sites on the AHR Portion of the Central Platte River in Nebraska (2007–2016)

Reproductive Parameter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Adults Observed	132	80	97	123	125	116	136	166	224	157
Breeding Pairs	39	37	42	53	60	64	58	98	141	88
Total Nests	53	64	60	76	90	88	95	145	188	119
Successful Nests (at least one egg)	22	27	37	43	52	63	51	80	116	74
Apparent Nest Success	0.42	0.42	0.62	0.57	0.58	0.72	0.54	0.55	0.62	0.62
Chicks Observed (less than 15 days)	50	54	71	105	124	144	118	180	258	170
Hatch Ratio (Chicks/Nest)	0.94	0.84	1.18	1.38	1.38	1.64	1.24	1.24	1.37	1.43
Fledglings (21 days)	—	—	—	64	89	84	64	91	146	80
Fledge Ratio (21-day Chicks/Nest)	—	—	—	0.84	0.99	0.95	0.67	0.63	0.78	0.67

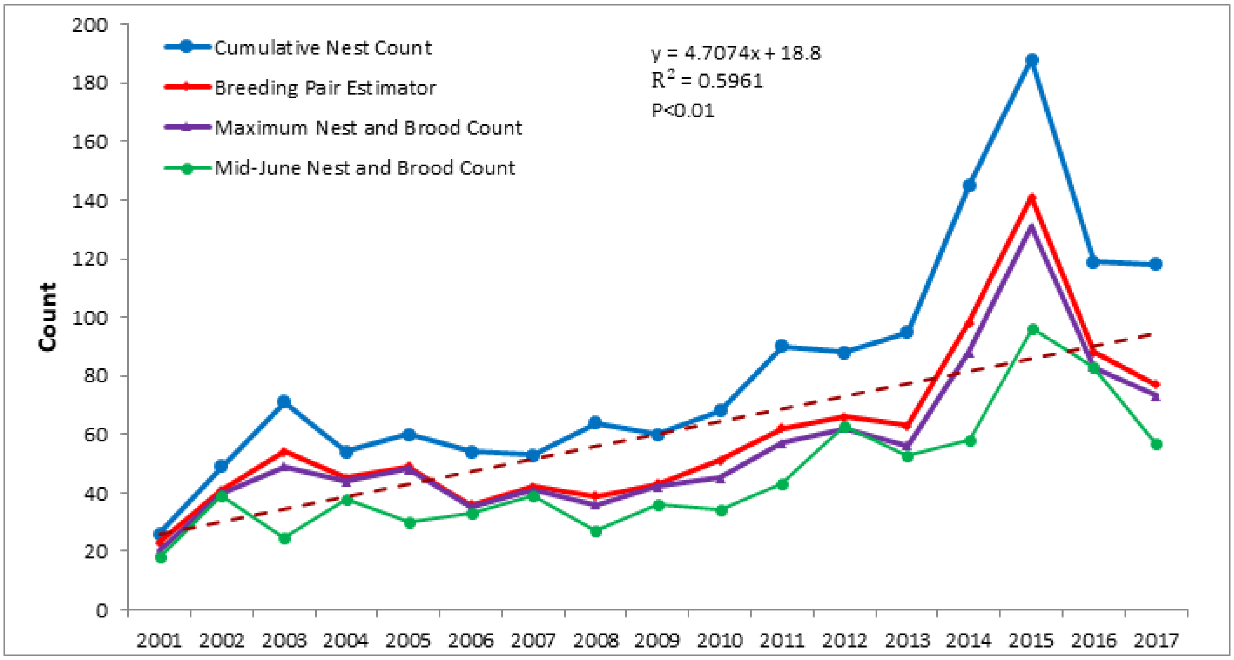
Source: Keldsen and Baasch 2016
Note: — indicates these data were not reported.

Table 3-9. Summary of Piping Plover Reproductive Success at Off-Channel and On-Channel Nesting Sites on the AHR Portion of the Central Platte River in Nebraska (2007-2016)

Reproductive Parameter	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Adults Observed	52	23	31	46	55	60	68	69	74	64
Breeding Pairs	19	13	12	20	27	30	27	30	39	43
Total Nests	27	21	15	33	34	46	31	43	54	60
Successful Nests (at least one egg)	15	8	9	21	27	32	23	34	34	40
Apparent Nest Success	0.56	0.38	0.60	0.64	0.79	0.70	0.74	0.79	0.63	0.68
Chicks Observed (less than 15 days)	44	26	27	76	87	99	80	116	119	120
Hatch Ratio (Chicks/Nest)	1.63	1.24	1.80	2.30	2.56	2.15	2.58	2.70	2.2	2.00
Fledglings (28 days)	—	—	—	42	45	59	28	55	52	55
Fledge Ratio (28-day Chicks/Nest)	—	—	—	1.27	1.32	1.28	0.90	1.28	0.96	0.92

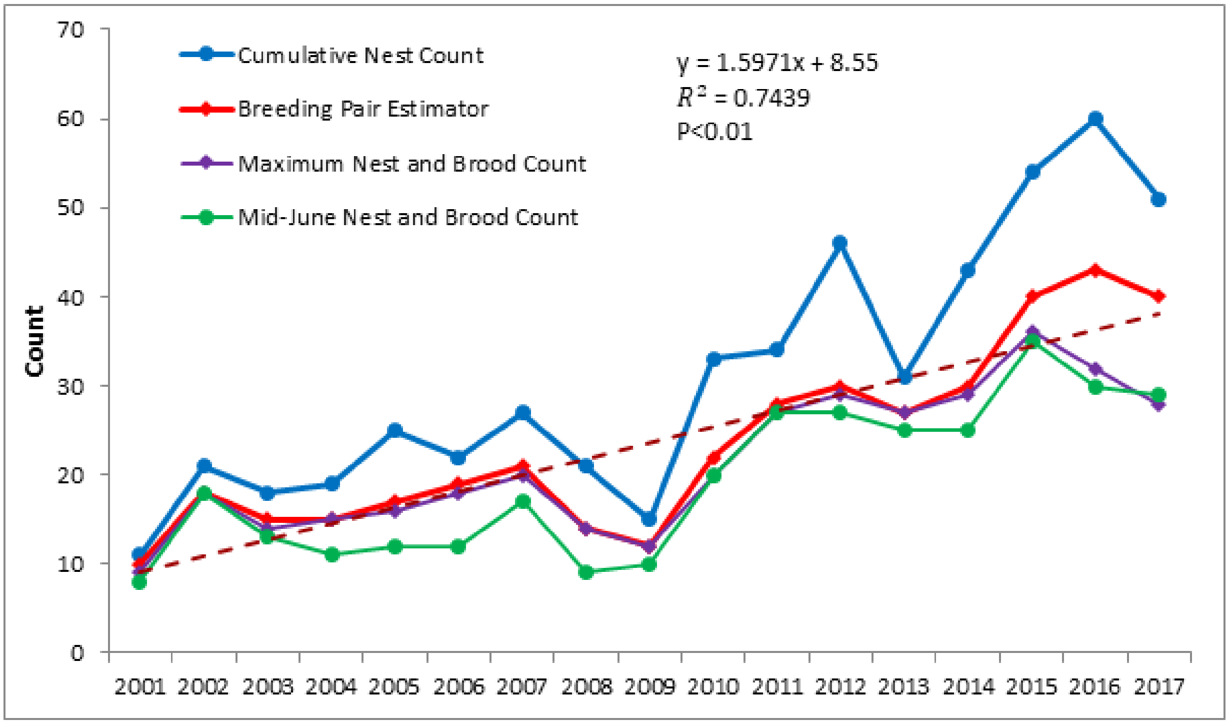
Source: Keldsen and Baasch 2016
Note: — indicates these data were not reported.

Chart 3-21. Comparison of Numbers of Least Tern Cumulative Nests, Program-Defined Breeding Pairs, Maximum Nest and Brood Quantities, and the Mid-June Nest and Brood Quantities Observed within the Program AHR (2001–2016)



Source: Keldsen and Baasch 2016
y=regression
R^2=coefficient of determination
P=significance

Chart 3-22. Comparison of Numbers of Piping Plovers Cumulative Nests, Program-Defined Breeding Pairs, Maximum Nest and Brood Quantities, and the Mid-June Nest and Brood Quantities Observed within the Program AHR (2001-2016)



Source: Keldsen and Baasch 2016
y=regression
R^2=coefficient of determination
P=significance

The FSM strategy is rooted in the view that the historical AHR once provided abundant emergent sandbar nesting habitat for the least tern and piping plover and that the current conditions are insufficient to meet this need. Targeted short-duration, high-flow releases are one component of the FSM strategy; however, one of the original hypotheses to be tested under the Program during the First Increment was whether these targeted short-duration, high-flow releases would produce suitable habitat for least terns and piping plovers on an annual or nearly annual basis. While the Program has not been able to implement short-duration, high flow releases, learning from natural events and success of tern and plover reproduction on both the river and off-channel has helped to inform the Program on how to provide suitable habitat and increase tern and plover productivity.

- Summary of scientific findings for sandbar habitat creation (Program 2017f):
  - The original analysis of targeted high-flow release performance assumed sandbars would be built to the water surface during peak flow events; the median height of sandbars formed during natural high-flow events in 2010, 2011, 2014, and 2015 was 1.2 to 2.3 feet below peak stage (Program 2016b).
  - Four peak flow events—in 2010, 2011, 2013, and 2014—exceeded the proposed short-duration, high flow releases in terms of magnitude and

duration, but did not produce sandbar habitat exceeding the minimum height criterion established under the Program.

  - Sandbars created by a full short-duration, high-flow magnitude of 8,000 cfs would be 0.5–1.0 foot lower than the minimum height criterion and would be inundated at flows experienced in the AHR during most nesting seasons.
  - A peak flow magnitude of 15,000 cfs of a sufficient duration would produce sandbars that exceed the minimum height criterion.
  - Even at a discharge magnitude of 15,000 cfs, the total suitable sandbar area would be well below the Program's adaptive management plan goal of 10 acres per river mile.

- Anticipated Program management actions for extension of the First Increment:
  - The Program intends to continue implementing alternative methods to mechanically create and maintain on- and off-channel nesting habitat for the piping plover and least tern during the proposed First Increment extension.

The Governance Committee has agreed to mechanically maintain up to 10 acres of on-channel habitat to ensure suitable habitat is available for the least tern and piping plover and to avoid releasing water solely for least tern/piping plover nest initiation. The Program's Governance Committee has used the knowledge gained, as discussed above, as information needed to inform the Program that flows in the range of short duration, high flow releases are unlikely to create the necessary nesting habitat for the least tern and piping plover as originally hypothesized.

Additionally, the frequency of flows believed to create on-channel nesting habitat (approximately 15,000 cfs) occurs infrequently enough that additional habitat creation and management actions are necessary to achieve the stated goals of improving habitat and reproductive success of terns and plovers; however, the Program is committed to implementing at least one field test of short-duration, high flow releases once the capacity to release 5,000 cfs is gained during the proposed First Increment extension. The Program's Governance Committee has agreed to implement management actions using information gained from naturally occurring high flows and has successfully implemented alternative tern and plover habitat creation.

Availability of suitable nesting habitat. The Program used the best available scientific data to aid in implementing actions that would increase the amount of tern and plover habitat available. For example, during the First Increment, the Program implemented management actions designed to increase nesting habitat (bare sand) and the reproductive success of least terns and piping plovers within AHR. These actions were conducted at on- and off-channel sites. Management activities have generally been site specific and have included using mechanical means, such as dozers, scrapers, and backhoes, to create nesting habitat; using mechanical actions, such as disking, removing trees, and mowing, to improve nesting conditions and remove vegetation cover; applying chemical herbicides during the spring or fall to kill or prevent the emergence of vegetation; and using fencing and trapping to control predators. The numbers of acres of constructed habitat by the Program and its partners annually for both off-shore and on-shore habitat are listed in **Table 3-10**.

Table 3-10. Constructed On- and Off-Channel Habitat in the AHR Within the Central Platte River by Year (2007–2016)

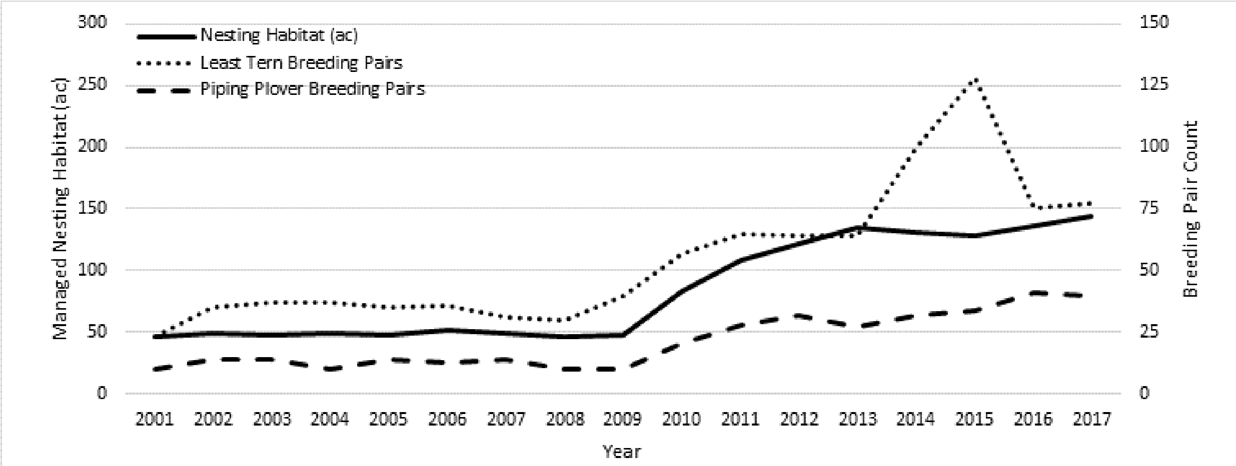
Year	On-Channel Habitat (Acres)			Off-Channel Habitat (Acres)		
	Program	Others	Total	Program	Others	Total
2007	0	24	24	0	48	48
2008	0	21	21	0	48	48
2009	0	15	15	0	48	48
2010	0	5	5	32	48	80
2011	0	5	5	60	48	108
2012	0	0	0	72	48	120
2013	55	0	55	72	48	120
2014	19	0	19	80	48	128
2015	47	0	47	90	48	138
2016	4	0	4	87	61	149
Mean	**12.5**	**7.0**	**19.5**	**48.8**	**49.9**	**98.7**

Source: Keldsen and Baasch 2016

- Summary of scientific findings for availability of suitable nesting habitat (Program 2017f):
  - Habitat availability (nesting habitat) has increased during the First Increment (see **Chart 3-23**). As a result, overall numbers of least tern and piping plover breeding pairs within the AHR have increased. This has corresponded to an increase in reproductive success (e.g., number of nests and fledglings). A high, positive correlation between least tern and piping plover breeding pair counts and habitat availability has been observed throughout the First Increment period. Program data also indicate that breeding pair counts have increased as habitat availability has increased.
  - Reproductive success, as measured by fledglings/breeding pairs, has remained high and generally above Program objectives for maintaining stable-to-increasing populations within the AHR.
  - A high correlation exists between habitat availability and breeding pair counts, and as the Program increases suitable off-channel nesting habitat, numbers of least tern and piping plover breeding pairs within the AHR should increase until habitat availability exceeds population demands.
- Anticipated Program management actions for extension of the First Increment:
  - The Program will continue to increase on- and off-channel habitat availability at agreed upon levels or until numbers of least terns and piping plovers within the AHR no longer continue to increase.

Because of Program efforts to increase available nesting habitat during the First Increment, least tern and piping plover populations on the central Platte River have increased proportionately to the increased habitat availability.

Chart 3-23. Least Tern and Piping Plover Use of Available Habitat (2001-2017)



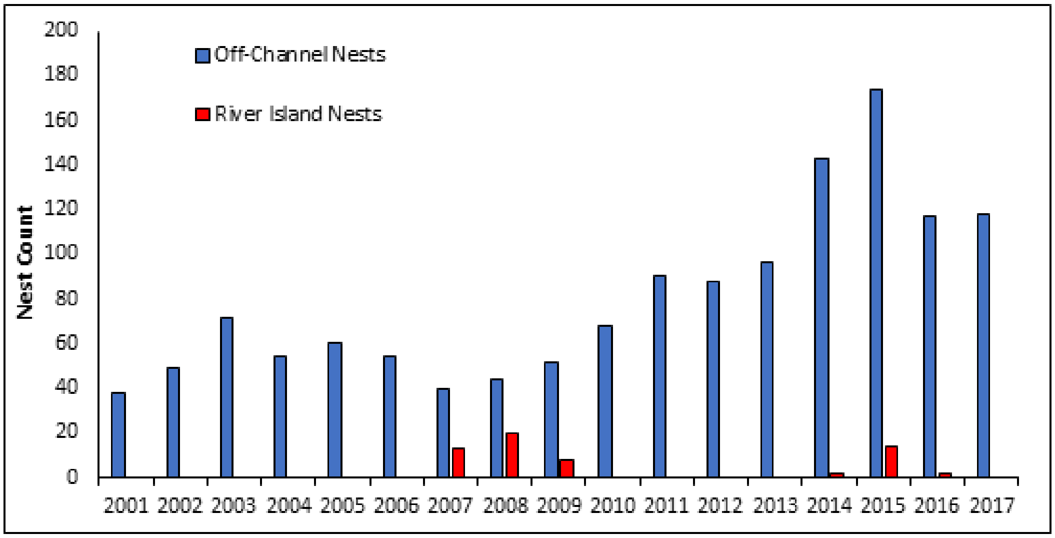
Source: Keldsen and Baasch 2016
Ac=acre

Habitat Selection and Use by Least Terns and Piping Plovers

During the First Increment, both suitable on-channel and off-channel habitat were created by the Program. Approximately 48 acres of managed off-channel nesting habitat were present in the AHR at the beginning of the First Increment (**Table 3-10**). The Program began acquiring and restoring off-channel sites in 2009, and the total off-channel habitat in the AHR increased to 138 acres during the period from 2009 through 2015 (Keldsen and Baasch 2016). The limited amount of on-channel nesting observed at the beginning of the First Increment declined because on-channel habitat was lost during high-flow events (**Table 3-10**). For example, only two on-channel riverine sites had nesting habitat available during the 2016 monitoring season. During the First Increment, monitoring and research were conducted to inform the Program how these two habitat types functioned to increase use and reproductive success of least tern and piping plover populations.

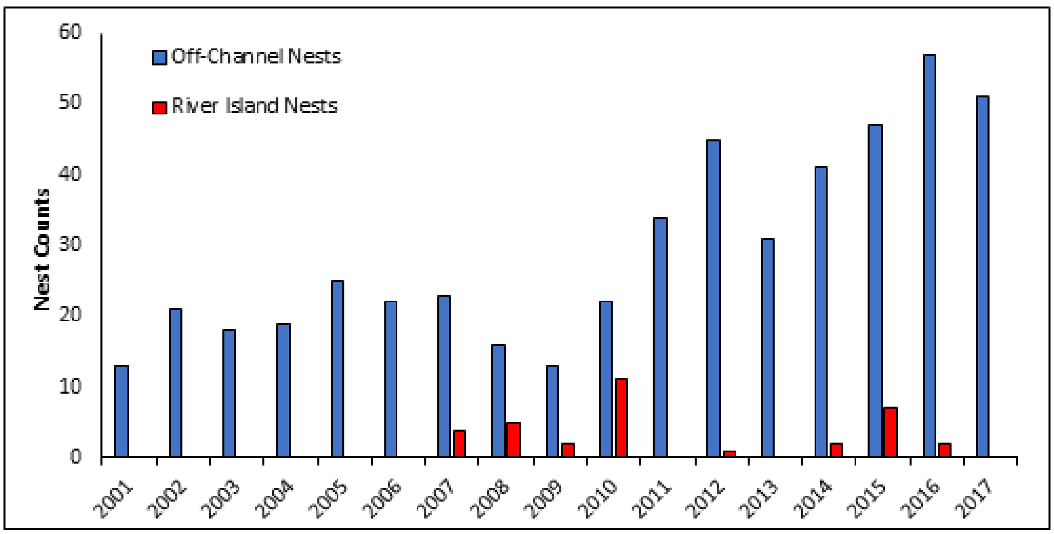
- Summary of scientific findings for habitat selection and use (Program 2017f):
  - The Program and partners created in-channel (sandbars) and off-channel (sandpits) nesting habitat to evaluate relationships between in- and off-channel habitat availability and selection by least terns and piping plovers. (Note: Early Program efforts largely focused on off-channel nesting sites, as flows and permitting challenges precluded construction of in-channel nesting islands.)
  - Creating and maintaining off-channel nesting habitat has resulted in substantial use and productivity of least terns and piping plovers since 2001 (see **Chart 3-24** and **Chart 3-25**). During this same time frame, in-channel habitat availability and least tern and piping plover nesting and productivity have been sporadic and at low levels. In-channel habitat availability under Program implementation has only contributed marginally to the maintenance of the central Platte River least tern and piping plover populations.

Chart 3-24. Comparison of Least Tern Off-Channel (blue bars) and On-Channel (red bars) Nests within the Program AHR (2001–2017)



Source: Keldsen and Baasch 2016

Chart 3-25. Comparison of Piping Plover Off-Channel (blue bars) and On-Channel (red bars) Nests within the Program AHR (2001-2017)



Source: Keldsen and Baasch 2016

    - While populations of both species have increased within the central Platte River AHR, increases of similar magnitude have not been observed throughout the species' range.
    - Efforts to create suitable on-channel nesting habitat have necessarily been opportunistic but were met with numerous challenges.
    - The probability of interior least tern and piping plover use of available nesting habitat was maximized when distance to the nearest wooded area was ≥150 meters, distance to water habitat was ≥30 meters, and elevation above the waterline was ≥3 meters.
- Anticipated Program management actions for extension of the First Increment:
    - The Program is anticipated to continue to increase and maintain off-channel nesting habitat, while providing a small amount of in-channel habitat, where possible, to continue improvement of least tern and piping reproductive success.
    - During extension of the First increment, construction and maintenance should include removal of potential predator perches less than or equal to 150 to 200 meters from off-channel nesting areas.

During the Program's First Increment, the observed increase of least tern and piping plover populations on the central Platte River resulted primarily from the use of and productivity of off-channel nesting habitats (Program 2017f); however, monitoring data indicate the river is a valuable source of forage for both species because forage abundance appears to be lower on off-channel habitats (Program 2017f). Thus, off-channel nesting habitat appears to be an effective management strategy capable of supporting least terns and piping plovers in the central Platte River. Combined with the small amount of on-channel habitat currently being created and maintained on an annual basis, this approach is anticipated to contribute to stabilizing and increasing least tern and piping plover populations.

During the First Increment, the Program evaluated 15 years of data to assess the influence that various physical site attributes and inter- and intra-specific interactions have on off-channel nest site selection by interior least terns and piping plovers. The Program found nest site selection by interior least terns and piping plovers was influenced by factors that could be managed by the Program, such as distance to predator perch and elevation above waterline, as well as some factors that cannot be managed. The Program found inter- and intra-specific interactions influenced nest site selection by both species. For example, piping plovers avoid nesting in proximity to each other, while interior least terns, being colonial, select nest sites in proximity to each other.

The Program also identified several parameters that can be used to improve nesting success through improved habitat management. As such, habitat management activities considered during the extension of the First Increment at off-channel sites would include removing potential predator perches less than or equal to 150 to 200 meters from off-channel nesting areas, and any constructed habitat provided to maximal amounts of elevated nesting habitat distant to water.

Forage Habitat Availability (Least Tern)

Foraging habitat for least terns includes side channels, sloughs, tributaries, and shallow-water habitats adjacent to sand islands associated with the main river channels (Dugger 1997). To successfully reproduce, productive foraging habitat must be located within a short distance of least tern nesting habitat (Dugger 1997). During the First Increment, studies were undertaken to determine whether the availability of forage fish in the central Platte River is sufficient to ensure least tern reproductive success.

- Summary of scientific findings for forage habitat availability (Program 2017f):
  - Forage availability does not limit least tern productivity on the central Platte River.
  - The Program found no relationship between least tern productivity and flow volumes during the nesting and brood rearing season (Baasch et al. 2017).
  - Although in-channel nesting habitat has contributed little to the sustainability of both populations during the First Increment, ephemeral islands and river channels appear to provide an important source of forage for both the least tern and the piping plover. This abundant forage base provided by the river has likely contributed to the high productivity observed at off-channel nesting sites since 2001.
- Anticipated Program management actions for extension of the First Increment:
  - Data analyses indicate least terns are unlikely to be affected because forage fish availability is lacking under most circumstances (e.g., flows in the range of 200 to 600 cfs).

Foraging habitat is needed in the central Platte River to sustain nesting least terns, but data analyses indicate that availability of small forage fish is sufficient during most flow levels during the summer nesting season to meet this need.

Incidental Take

The total allowable take (i.e., lethal, crippling, harm, and harassment) of either least terns or piping plovers as defined by the Program's BO (Program 2017g) is presented in **Table 3-11**, along with the observed results. Given the programmatic nature of the Program and the associated BO, should the allowable take for least tern or piping plover be exceeded, Reclamation would again begin ESA consultation on only that aspect of the federal action resulting in that take, rather than the federal action as a whole.

Table 3-11. Incidental Take During Implementation of the First Increment

Allowable Take	Observed Take
Inundating Flow: Take is allowed during 4 of 5 years associated with inundating flow release from the Service's environmental account.	No flow-related take caused by the Service's environmental account releases has been observed.
Sandpits (Off-Channel Habitat): Incidental take may be occurring if there is repeated catastrophic losses of nests and chicks due to predation at individual sites. Catastrophic losses are defined to be the loss of 70 percent of nests or 80 percent of chicks to predation in	As of December 31, 2016, a very limited amount of predation mortality at any of the off-channel sites the Program owns or manages has been observed and has not exceeded the Service's threshold any year.

Table 3-11. Incidental Take During Implementation of the First Increment

Allowable Take	Observed Take
3 of 5 years for sites that average at least 5 least tern nests or at least 3 piping plover nests. For sites that average less than 5 least tern nests or 3 piping plover nests, the Program is allowed take related to predation of 100 percent in 4 of 5 years.	
Habitat Restoration and Land Management Activities: One incidence of take in the form of harassment is exempted per site owned or managed by the Program during the Program's First Increment. The amount of take in the form of harm is limited to three least tern nests or broods and three piping plover nests or broods.	As of December 31, 2016, the Program observed the take of one piping plover chick and no least terns.
Research and Monitoring Activities: The Program is allotted take in the form of mortalities of three least tern eggs or chicks and four piping plover eggs or chicks during 2015 to 2020.	Prior to December 31, 2014, the Program observed a total of two research-related piping plover mortalities during 2011 and 2013. As of December 31, 2016, the Program has observed take of two least tern eggs due to monitoring or research activities under the existing permit.

Source: Program 2017g

3.9.3 Impacts from the Proposed Action

Selection of the Proposed Action would allow the Program to continue to increase and maintain both off-channel and on-channel nesting habitat for the least tern and piping plover at the same levels as agreed to through the end of 2020. These actions would include using dozers, scrapers, and backhoes to create nesting habitat; using mechanical actions, such as disking, removing trees, and mowing, to improve nesting conditions and remove vegetation cover; applying chemical herbicides during the spring or fall to kill or prevent the emergence of vegetation; and using fencing and trapping to control predators. During the extension of the First Increment, construction and maintenance activities would remove potential predator perches less than or equal to 150 to 200 meters from off-channel nesting areas.

The Program is scheduled to mechanically maintain up to 10 acres of on-channel habitat to ensure suitable nesting habitat is available on the river and to avoid releasing water solely for least tern/piping plover nest ignition. Up to 60 acres of additional off-channel habitat would be acquired. The Governance Committee has agreed to continue this initiative through 2019; for the purposes of this effects analysis, Reclamation has assumed that this action would continue through the extension of the First Increment.

As experienced during the First Increment, least tern and piping plover populations have been growing proportionately to increases in available habitat. This trend is anticipated to continue during extension of the First Increment until the habitat increases/creation stabilizes and the population of the least tern and piping plover using this available habitat correspondingly stabilizes. This increase in least tern numbers would support the potential delisting of the least tern by improving reproductive success and the overall population of the least tern.

The targeted short-duration, high-flow release (5,000 cfs) is scheduled to be implemented during the extension of the First Increment and should provide data on how mechanically created habitat is affected by these releases.

Least terns and piping plovers have been observed to nest on lands off the river and outside the central Platte River AHR (Service 2006). Least tern and piping plover may be affected by Program activities on Reclamation's North Platte Project in Nebraska from nests or chicks flooded or displaced on the shorelines of inland lakes, such as Lake Minatare (Service 2006); however, the levels of potential take of least terns and piping plovers on the shorelines of inland lakes are expected to be low. In the 2006 Program BO, the Service determined that the amount of nesting that could occur at the inland lakes during the First Increment would be up to two nests each year (Service 2006). Because past nesting had not been successful in the years before 2006, the Service determined that the amount of exempted take would be 26 total nests during the First Increment of the Program (13 years).

The analysis of impacts undertaken for this EA assumes that the same level of nesting and presumed take would occur under an extension of the First Increment; however, areas in the North Platte River basin outside the central Platte River AHR, Program activities are not considered to be important for the recovery of these species. This is due to the limited number of incidences of observed nesting (Service 2006). The Service stated in the 2006 BO that the adverse impacts and mortality that could occur from Reclamation operations would be a small proportion of the piping plover or least tern populations and would, therefore, not result in a population-level impact on these species (Service 2006).

Under the proposed extension, the Program would continue to serve as the ESA Reasonable and Prudent Alternative to Avoid Jeopardy determinations for consultations for federal actions subject to the ESA. The Program functions as an offsetting measure to previous actions and is required to provide benefits to the target species.

Another important aspect of extending the First Increment is the undertaking of additional research mentioned above that would improve understanding of the nesting patterns of both least terns and piping plovers and improve reproductive success.

When all the Program elements are implemented, should extension of the First Increment be approved, these elements may affect, and are likely to adversely affect, the least tern and piping plover (see **Appendix A**). However, the least tern and piping plover may be affected in a positive manner from increased availability of suitable nesting and foraging habitat.

A summary of beneficial and adverse impacts from extending the First Increment is provided below.

- Summary of continued beneficial impacts from extending, through water management and sediment augmentation
  - An 53,000-foot increase in the length of braided channel in the central Platte River

    - Increased nesting substrate available at Lake McConaughy and managed sandpits
    - A slight increase in July flows at Grand Island, Nebraska, resulting in decreased probability of water temperatures dangerous to fish; this would be a slight benefit to least terns food resources
- Summary of adverse impacts from extending the First Increment (Service 2006)
    - A substantial reduction in the frequency of and a significant reduction in the magnitude of spills from Lake McConaughy, which would exacerbate the decline of ecosystem processes maintained by a normative hydrologic regime and sediment transport through the system
    - An increased probability of continued channel narrowing and habitat degradation from North Platte to Lexington, Nebraska, that may negatively affect the availability of resources to piping plovers and interior least terns that use that reach of the Platte River
    - A slight increase in the possibility of inundation of least tern or piping plover nests downstream of Chapman through slightly elevated July flows at Grand Island, Nebraska

However, some of the anticipated adverse and beneficial impacts may change, based on the results of FSM consideration. If the FSM is successful in improving channel conditions to an acceptable level, these adverse impacts would remain. The FSM could be abandoned in favor of a strategy that protects higher peak flows or higher summer base flows, which is a strategy that is commonly discussed. If this were to happen, the list of anticipated positive or negative impacts would change accordingly, which would improve natural riverine processes.

Cumulative Effects

Cumulative effects include effects of future state, local, or private (nonfederal) actions that are reasonably certain to occur within the area of analysis. Two areas of concern related to cumulative impacts for least tern and piping plover nesting are human disturbance during recreational activities and continued sand and gravel mining along the central Platte River.

Disturbance to nesting least terns and piping plovers associated with human interaction, particularly associated with recreational activity, can decrease nesting success. Nests may be lost to direct mechanical disturbance, such as trampling or through indirect means if the parent birds are away from the nest for long periods. Human restriction measures, such as posting signs that restrict access to breeding areas, placing barricades to exclude human access, and conducting outreach efforts, can help to reduce human disturbance during the nesting season.

Sand and gravel mining occurs throughout Nebraska and is expected to continue within the foreseeable future along the central Platte River AHR. Existing mining is anticipated to continue expanding, and new mines are anticipated to be developed. If actively managed for least tern and piping plover conservation, this could supplement existing nesting habitat being created by the Program. Piping plovers and least terns have demonstrated a positive repose to the creation of additional habitat; however, if not managed for the benefit of the two species, this could be a source of disturbance and lethal take.

Extension of the Program's First Increment would continue to increase and maintain both off-channel and on-channel nesting habitat for the least tern and piping plover, increasing the availability of suitable nesting and foraging habitat.

3.9.4 Impacts from the No Action Alternative

Under the No Action Alternative, off-channel nesting habitat developed and managed by the Program would no longer be maintained, and, over time, the number of breeding pairs of least terns and piping plovers on the central Platte River would decline; however, another entity could voluntarily resume management of nesting habitat currently maintained by the Program; under this scenario the only direct impact would be the loss of future land acquisitions and the creation of additional nesting habitat.

One effect that would not change under the No Action Alternative is the availability of the least tern forage fish base, which was found not be a limiting factor for least tern nesting success during the First Increment. Most of confirmed mortalities have been attributed to adverse weather and predation.

Additionally, proposed research into least tern and piping plover habitat colonization patterns, re-nesting events, and comparisons of use and reproductive success of riverine versus off-channel sand and water habitat would not be conducted. This would reduce the ability of the scientific community to benefit from this new learning and develop even more suitable nesting habitat for breeding least terns and piping plovers, and potentially affecting the proposed delisting of the least tern.

The Program serves as the ESA Reasonable and Prudent Alternative to Avoid Jeopardy for previously completed consultations for federal actions subject to ESA consultation that would have received a "jeopardy" biological opinion. The Program functions as an offsetting measure to previous actions and is required to provide benefits to the target species, such as least tern and piping plover. Without extension of the First Increment, such actions would be sufficient to provide ESA compliance with respect to all water-related activities in that state until any reinitiated consultations have been completed.

In addition, to the extent the states' respective contributions of cash, water (through the initial Program water projects), and land continue to benefit the target species beyond the Program, the states would retain the right to argue that such future benefits from their contributions should be considered in any reinitiated consultations; however, if the Program were to dissolve and the states do not carry out their responsibilities, each water project or activity in the basin requiring, federal approval, permitting, or funding would have to undergo separate ESA Section 7 consultation. Also, separate mitigation measures would be required.

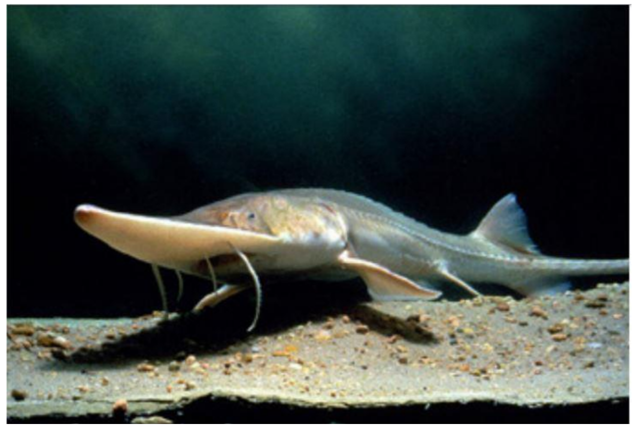
Cumulative Effects

As described above under the Proposed Action *Cumulative Effects* section, other actions can impact least tern and piping plover habitat (e.g., gravel mining) and disturb least terns and piping plovers due to increased human disturbance. Not extending the Program's First Increment would stop maintenance of off-channel nesting habitat developed and managed by the Program, and, over time, the number of breeding pairs of least terns and piping plovers on the central Platte River would decline; however, another entity could voluntarily resume management of nesting habitat currently maintained by the Program; under this scenario the only direct impact would be the loss of future land acquisitions and the creation of additional nesting habitat.

3.10 Pallid Sturgeon

3.10.1 Affected Environment

This section serves two purposes: first, it describes the affected environment of the pallid sturgeon and documents potential effects of implementing the Proposed Action and No Action Alternative for NEPA documentation, and second, it is also intended to meet the needs of a BA under the ESA; therefore, this section has been organized to describe the species status and critical habitat, document baseline conditions, and communicate potential environmental effects. Potential cumulative effects are also described at the end of the section.



Source: Service
*Pallid sturgeon (*Scaphirhynchus albus*)*

Status of Species and Critical Habitat

The pallid sturgeon was listed as endangered on September 6, 1990 (55 Federal Register [FR] 36641–36647). Critical habitat has not been designated for pallid sturgeon (Service 2014). A recent revision of the species recovery plan notes the species status has improved and is currently stable because of artificial propagation and stocking efforts under the Pallid Sturgeon Conservation Augmentation Program (Service 2014); however, the revised recovery plan also notes that if the stocking were to cease, pallid sturgeon would face local extinction in several reaches of the Missouri River (Service 2014).

The Service (2014) defines four pallid sturgeon recovery management units, one of which falls within the geographic scope of the Program. The Central Lowlands Management Unit (CLMU) extends from Fort Randall Dam, South Dakota, downstream to the confluence of the Missouri River with the Grand River, Missouri, including major tributaries such as the Platte River. Reliable population estimates for the entire CLMU are not currently available (DeLonay et al. 2016). Based on an intensive study of a 50-mile reach of the Missouri River below its confluence with the Platte River, Steffensen et al. (2013) estimated 6,000 wild pallid sturgeon and 42,000 hatchery stocked pallid sturgeon may be present in the lower Missouri River downstream of Gains Point Dam.

While natural recruitment of pallid sturgeon within the CLMU probably does not occur (Steffensen et al. 2013) and thus is not a self-sustaining population, the CLMU is considered stable due to the high frequency of stocked pallid sturgeon maintained through the augmentation program (Service 2014). The Service has determined that a self-sustaining genetically diverse population of 5,000 adult pallid sturgeon is needed in each management unit for two generations (20 to 30 years), including the CLMU, before it would reconsider the species for reclassification from endangered to threatened (Service 2014).

With improved sampling methods and increased sampling events, both hatchery reared and wild pallid sturgeon have been observed in increasing numbers in the lower Platte River (i.e., the Loup River Power Canal outlet near Columbus, Nebraska, downstream to the confluence with the Missouri River) since the species was listed (Service 2014). While pallid sturgeon have been frequently observed within the lower-most reaches of this river (i.e., up to the Elkhorn River confluence; Peters and Parham 2008), more recently, observations of pallid sturgeon have increased upstream of the confluence of the Platte and Elkhorn Rivers (Service 2014).

Distribution. Jacobson et al. (2016) describes the natural geographic range of the pallid sturgeon to include the Mississippi and Missouri River basins in which turbid, fast-flowing waters flow over predominately sandy substrates. This range includes the Yellowstone and rivers downstream to the confluence with the Mississippi River and Iowa to the Gulf of Mexico (including the Atchafalaya River system). Also included in the natural range are lower parts of some Missouri River tributaries, including the Milk River in Montana, Niobrara and Platte Rivers in Nebraska, Big Sioux River in Iowa, Kansas River in Kansas, and Grand and Osage Rivers in Missouri (Jacobson et al. 2016). The lower Platte River habitat represents river conditions like the original, unaltered habitat of pallid sturgeon.

Life history. The pallid sturgeon is adapted to large, free-flowing, warm-water, turbid rivers with a high sediment load (Service 2014). The pallid sturgeon has physical features that support turbid, fast-flowing rivers (e.g., lower Platte River), such as a flattened shovel-shaped snout; a long, slender, and completely armored body; barbels;[2] and a protrusible mouth (i.e., capable of being extended and withdrawn from its natural position) that supplement their small eyes in detecting and capturing food (Service 2014). Pallid sturgeon have been documented over a variety of substrates, but are more often associated with sandy and fine bottom materials, preferring that to mud, silt, or vegetated river bottoms (Jacobson et al. 2016).

- *Egg life stage.* Pallid sturgeon eggs are deposited on the bottoms of rivers; they are adhesive and dark colored, adhering to substrate at the spawning site (DeLonay et al. 2016). Currently, it is unknown how substrate characteristics, adhesion, and hydraulic conditions interact to influence survival and development of fertilized eggs (Jacobson et al. 2016).
- *Free embryo/larvae life stage.* An embryo is a developing fish within an egg membrane and covers the period from fertilization to hatching, which typically lasts from 5 to 8 days dependent on water temperature (DeLonay et al. 2016). Once a fish no longer resides within the egg membrane it becomes a free embryo. This stage lasts between 8 to 12 days and ends when the fish begins to feed (DeLonay et al. 2016).

  Drifting free embryos use their yolk sac for nutrition as they develop swimming abilities, after which they settle into habitat that is conducive to feeding and growth. DeLonay et al. (2016) based on a review of existing literature indicates: 1) pallid sturgeon free embryos drift and disperse at a rate slightly less than the mean water column velocity; 2) downstream dispersal and drift occur both day and night; 3) duration of the free embryo drift period depends on water temperature and rate of

[2] A fleshy filament growing from the mouth or snout of a fish.

development; and 4) free embryos can drift and disperse over long distances (greater than 100 miles) during development into feeding larvae. This is a critical period for survival of pallid sturgeon because the larvae must find sufficient food of the correct size and type or it will starve.

- *Juvenile life stage.* Juvenile life stage consists of sexually immature fish and lasts until the fish reach sexual maturity. During the late spring through early fall below Gavins Point Dam, adults tended to be collected in cooler water temperatures than juveniles (Jacobson et al. 2016); however, during this same season juveniles tended to be collected in shallower water with less current than adults. During late fall through early spring, juveniles tended to collect in warmer water than adults. This notable difference in habitat preference between juveniles and adults is most likely explained by differences in diet (Jacobson et al. 2016).
- *Adult life stage.* Pallid sturgeon can be long lived, with females reaching sexual maturity later than males (Service 2014). Based on information collected from wild fish, the estimated age at first reproduction for females is 15 to 20 years and approximately 5 to 7 years for males (Keenlyne and Jenkins 1993). Pallid sturgeon generally spawn from April through May in the CLMU (lower Missouri River, including the lower Platte River; DeLonay et al. 2016). Reproductively ready pallid sturgeon generally follow a pattern of upstream migration before spawning, although males are less regular.

  Migrating pallid sturgeon in the Missouri River selected shallow places in the primary channel with velocities on the low end, indicating selection of migrating pathways that optimize energy expenditure (DeLonay et al. 2016), While spawning has been observed to occur in various environmental conditions, it is not known under what circumstances spawning is successful (DeLonay et al. 2016). Pallid sturgeon do not spawn on a 12-month cycle; males spawning cycles may exceed a year and females more than 2 years (DeLonay et al. 2016).

Diet. The diet of the pallid sturgeon shifts from macroinvertebrates to fish as they grow (Service 2014). Larval pallid sturgeons have been reported to consume the larvae and pupae of midges and mayflies (DeLonay et al. 2016) with the feeding patterns shifting more to fish as the pallid sturgeon mature from juveniles to adult life stages.

Threats. The Service’s Revised Pallid Sturgeon Recovery Plan (Service 2014) described known and potential threats to pallid sturgeon throughout its range with habitat modification described as one of the primary threats. In the Missouri River basin, the primary habitat-related threats include river channelization, bank stabilization, and dam construction. These alterations have potentially affected pallid sturgeon by blocking spawning migrations, isolating populations, limiting genetic exchange, trapping large quantities of sediment, altering larval drift, altering water chemistry (e.g., dissolved oxygen and temperature), minimizing natural flow pulses, minimizing floodwater movement onto the floodplain, and reducing habitat diversity by eliminating riverine habitat (Service 2014).

Although not developed to accommodate navigation, the Platte River has been influenced by anthropogenic alterations that likely affect pallid sturgeon habitat (Service 2014). Upstream water demands for industrial, municipal, and agricultural purposes have led to construction of low-head diversion dams on the upper Platte River as well as large impoundments on the Platte River (Service 2014); however, the availability and quality of pallid sturgeon habitat within the lower Platte River can be affected by water withdrawal in conjunction with periods of drought (NRC 2005).

Because of the continued incidental and illegal harvest of pallid sturgeon, the Service determined it necessary to treat shovelnose sturgeon as threatened under the similarity of appearance provisions of the ESA and thereby reduce harvest of pallid sturgeon. This similarity of appearance rule extends take prohibitions to shovelnose sturgeon, shovelnose-pallid sturgeon hybrids, and their roe.[3] This would be the case where commercial fishing is in areas where pallid sturgeon and shovelnose sturgeon commonly coexist. This rule became effective October 1, 2010.

3.10.2 Environmental Baseline

Present Status of Pallid Sturgeon on the Lower Platte River

The Platte River is a part of the CLMU and does not contain a self-sustaining population of pallid sturgeon but rather is dependent upon annual stocking of the augmentation program (Steffensen et al. 2013). An estimate of 926 pallid sturgeon in the lower Platte River was developed by Hamel in 2013. This is a rough estimate for a dynamic pallid sturgeon population with individuals from the CLMU migrating in and out of the Platte River (DeLonay et al. 2016; Peters and Parham 2008). **Table 3-12** and **Table 3-13** present the results of a recent survey of pallid surgeon presence in the lower Platte River.

Table 3-12. Annual Total Number of Pallid Sturgeon Captures in the Lower Platte River

	Year			
	2009	**2010**	**2011**	**2012**
Segment 1[1]	66	34	14	10
Segment 2[2]	3	5	3	2

Source: Hamel et al. 2014a, as modified by the Service and reported in Service 2016a
[1]Lower Platte River from Elkhorn River confluence to mouth (approximately 32 miles)
[2]Lower Platte River upstream of the Elkhorn River confluence (approximately 66 miles)

Table 3-13. Pallid Sturgeon Captures by Season and Location in the Lower Platte River

	Average Number per Year		Range in Observed Numbers	
	Segment 1[1]	**Segment 2[2]**	**Segment 1[1]**	**Segment 2[1]**
Spring	9.8	1.8	5–21	1–3
Summer	6.5	1.0	1–16	0–2
Fall	14.8	0.5	1–42	0–1

Source: Hamel et al. 2014a, as modified by the Service and reported in Service 2016a
[1]Lower Platte River from Elkhorn River confluence to mouth (approximately 32 miles)
[2]Lower Platte River upstream of the Elkhorn River confluence (approximately 66 miles)

---

[3]Roe refers to the mass of eggs contained in the ovaries of a female fish or shellfish, typically including the ovaries themselves, especially when they ripe and used as food, such as caviar.

Distribution of Pallid Sturgeon in the Lower Platte River

While pallid sturgeon have been captured throughout the entire lower Platte River, they are more abundant downstream of the confluence with the Elkhorn River. Of the 137 individuals collected by Hamel (2013), only 13 individuals were collected upstream of the confluence with the Elkhorn River. This is an important development for extension of the First Increment, as the Program may want to extend the AHR for pallid sturgeon in the lower Platte River upstream of the confluence of the Platte and Elkhorn Rivers.

When the pallid sturgeon was initially listed, the Elkhorn River served as a reference point demarking its confluence with the Platte River as the upstream extent of pallid sturgeon in the Platte River; however, this river has been demonstrated to possess many characteristics of streams currently used by pallid sturgeon, and there are documented occurrences of pallid sturgeon in the Elkhorn River (Service 2014).

Reproduction in the Lower Platte River

The absence of natural recruitment limits species recovery in the CLMU (Service 2014). It is unknown to what degree the conditions on the Platte River may or may not limit natural recruitment. Long-term telemetry monitoring of pallid sturgeon have documented several instances where male and female individuals have migrated into the Platte River in a likely attempt to spawn (DeLonay et al. 2016). Different life stages of the pallid sturgeon have been documented in the Platte River. For example, Peters and Parham (2008) noted that both adult and juvenile pallid sturgeon have been captured in the lower Platte River. This observation is important because it demonstrates that the habitats of the lower Platte River are suitable for both adults and juveniles.

Factors Affecting Pallid Sturgeon in the Lower Platte River. While the Platte River provides some of the most intact hydrographic and morphologic pallid sturgeon habitat in the degraded CLMU, the river has also been substantially altered.

- *River flow reductions.* Spring flows in the central Platte have declined since the early 1900s (Service 2006). The depletion of flows in the upper Platte River basin alone accounts for an approximate 35 percent decrease in May and June flows in the lower Platte River (Service 2006). This reduction in flow results in substantially weaker spawning cues, and a considerably reduced capacity to form and maintain bottom substrates used by pallid sturgeon for feeding and spawning.
- *Habitat connectivity.* In 2005, the NRC suggested the loss of habitat connectivity during years of low discharge may be an important factor limiting the use of the lower Platte River by pallid sturgeon. A study conducted by Peters and Parham (2008) demonstrated that connectivity of pallid sturgeon habitats rapidly declined as flows were reduced from 5,600 cfs to 3,200 cfs, while available habitat was nearly fully connected at a flow of 8,000 cfs (as reported in Service 2016a).

  High river connectivity allows for the movement of individuals to avoid adverse conditions such as times when the lower Platte River water temperatures reach lethal levels (e.g., drought of 2012). Maintaining connectivity also allows for individuals to easily move between the Platte and Missouri Rivers. Habitat connectivity is also an important recruitment feature, as newly hatched free embryos must be able to exit the primary channel in sufficient numbers to avoid starving. Habitat connectivity depends on the right hydraulic conditions to transport the free embryos into supportive floodplain habitat that provides food and protection (Jacobson et al. 2016).

- *Hydropower operations.* The lower Platte River is the only affected area within the pallid sturgeon's range that is directly affected by hydropower peaking operations daily (Service 2006). Hydropower peaking operations of the Loup River Hydroelectric Project are concentrated within certain time frames, which in turn results in rapid, large magnitude, daily flow fluctuation in the reach below the generating facility (water is diverted from the Loup River and returned to the Platte River).

  Median 24-hour changes in flow at Louisville, Nebraska, range from 650 to 3,000 cfs per day, or 16 to 46 percent of the median monthly flow rate (Service 2006). The cumulative effects from hydropower peaking operations to the fisheries and aquatic community may adversely affect the pallid sturgeon's food base. Additionally, increased erosion of sandbars may have a direct adverse impact on sandbar complex habitats used by pallid sturgeon (Service 2006).

- *Water temperature.* Hamel et al. (2014a) found that pallid sturgeon were captured more frequently in cooler portions of the lower Platte River than other available habitat conditions but found water temperature is not a factor that limits species use of the lower Platte River (Hamel et al. 2014b); however, water temperatures are important to pallid sturgeon in three ways: temperature can affect food resources; high stream temperatures lead to a reduction in dissolved oxygen; and high temperatures can harm individuals and lead to direct mortality (Service 2016a).

  The relative condition of pallid sturgeon captured by Hamel et al. (2014a) in the Platte River was considered excellent; therefore, present stream temperatures have insignificantly affected food resources where it would be reflected by unfavorable conditions. Temperatures higher than 86°F have been shown to be stressful and detrimental to pallid sturgeon (Blevins 2011). During the summer drought of 2012, water temperatures exceeded the 86°F threshold for most of the month of July stressing and causing mortality of many fish in the lower Platte River, including pallid sturgeon. A major fish kill was observed during July, including two pallid sturgeon (Service 2016a).

- *Climate trends.* In the Platte River, water temperature is directly influenced by air temperature; therefore, under a scenario of increased temperatures, warmer river water temperatures could result. This could benefit primary and secondary productivity and in turn indirectly benefit some pallid sturgeon life stages. Pallid sturgeon growth rates could also be influenced by warmer water temperatures; this is because free embryos and larvae develop faster at higher water temperatures. In some areas where water temperatures are high, increased air temperature could increase river water temperatures, which would stress pallid sturgeon (Hupfeld et al. 2015).

  Across the U.S. range of the Northern Great Plains, spring precipitation is expected to increase between 0 and 40 percent under different carbon emission scenarios. This shift in temperature and moisture could have substantial impacts on pallid sturgeon. Additionally, changing precipitation patterns in the Rocky Mountains would likely have profound impacts on the amount of inflow into the Platte River system, affecting the amount of habitat available there.

In 2005, the NRC found that current conditions in the lower Platte River do not adversely affect the likelihood of survival or recovery of the pallid sturgeon; however, it did conclude that the loss of lower Platte River habitat would likely result in a catastrophic reduction of the pallid sturgeon population within the CLMU. In its BO for the Program (Service 2006), the Service concluded that "…while the lower Platte River is degraded in its ability to serve its apparent habitat function due to the effects of water resource development in the basin, the majority of which has occurred in the upper parts of the basin, and further degradation of this habitat would be catastrophic to the species."

Program Management Actions for Pallid Sturgeon

At the time of publication of the 2006 Platte River Recovery Implementation Program Final EIS, the primary issue regarding the pallid sturgeon was use of the lower Platte River by a small number of adult fish. While a great deal about the pallid sturgeon life cycle and its use of the lower Platte River is still unknown, as can be gleaned from the environmental baseline information provided above, substantial new knowledge has been learned since publication of the 2006 Final EIS. For example, evidence now indicates that pallid sturgeon use the Platte River year-round and as a spawning ground in the spring; however, discrete spawning locations are not known, and spawning habitat has not been mapped on the lower Platte River (DeLonay et al. 2016). Taken in totality, this new knowledge suggests the lower Platte River provides suitable habitat, supports multiple life stages of the species, and should be viewed as important for species recovery (Service 2014).

In response to this new knowledge, the Program's Governance Committee in September 2016 agreed to begin a step-wise incremental process to refine recovery goals, hypotheses and objectives related to the pallid sturgeon and, possibly, to conduct additional research in the form of an expanded increased flow discharge study and directed habitat selection observations. The first effort was an internal workshop convened by the Program in 2017 that resulted in publication of a report titled *Pallid Sturgeon State of the Knowledge Summary* (Program 2017c).

The issues and areas of disagreement reported in the *Pallid Sturgeon State of Knowledge Report* will be addressed by an independent expert workshop in 2018. Results of this workshop will guide activities implemented during the potential First Increment Extension. Both the internal workshop and the planned expert panel discussion are designed to help resolve the question about whether Program flow management actions in the central Platte River help to avoid adverse impacts on the pallid sturgeon in the lower Platte River. During this process, relevant Program goals, objectives, and hypotheses will be refined, decision criteria better defined, and potential pallid sturgeon research designed.

Incidental Take

No incidental take has been authorized under the 2006 BO (Service 2006) for Program water-related activities to investigate impacts from future diminishment of high flows and to negate or offset any such adverse impacts identified; however, incidental take of pallid sturgeon has been authorized within the 2006 BO for Program monitoring and research (Service 2006). If during the extension of the First Increment any further monitoring or research activities should be undertaken, any incidental take would be documented by the Program. Given the programmatic nature of the Program and the associated BO, should there be a take, Reclamation would again consult under the ESA on that aspect of the federal action resulting in that take only, rather than on the federal action as a whole.

3.10.3 Impacts from the Proposed Action

The environmental baseline population of the pallid sturgeon in the lower Platte River AHR is estimated to be 926 individuals; however, for the reasons articulated below, the ability to predict the effects of the Proposed Action on pallid sturgeon downstream is limited because of the high level of uncertainty associated with influence of Program activities on hydrologic conditions in the lower Platte River.

Program provisions (Service 2006) to address the pallid sturgeon and its lower Platte River habitat during the first increment are as follows:

- Impacts on the pallid sturgeon that are caused by Program activities or by new water-related activities covered by the state or federal depletions plans will be assessed. The assessment will be conducted through the pallid sturgeon research and monitoring described in the Program's AMP and complementary research conducted by others involved with the Missouri River and its tributaries.
- An assessment stage change study will be completed by the end of the 3rd year during the First Increment. If such impacts are deemed to adversely affect the pallid sturgeon, appropriate conservation measures that either negate or offset the occurrence of adverse impacts on the pallid sturgeon will be implemented during the First Increment (Service 2006).

Adverse impacts on pallid sturgeon may result from future significant alterations in the natural hydrograph during spawning periods. This is because altered seasonal flows and changes in water constituents, such as a reduction in turbidity caused by flow reduction, may preclude spawning. It also could cause mortalities to sturgeon in the early life stages or significantly disrupt normal behavioral patterns. These include breeding, feeding, or sheltering within an important portion of the species' range.

As it is difficult to estimate the level or amount of take that could occur from this impact, the Program includes a measure to investigate impacts from future diminishment of high flows and to negate or offset any such adverse impacts if identified (text modified from the 2006 BO; Service 2006).

Changes in flow in the lower Platte River can affect pallid sturgeon in a beneficial manner through three main mechanisms: 1) more water increases channel connectivity and, therefore, increases mobility for the pallid sturgeon, 2) more water may increase availability of important habitats and overall habitat capacity, and 3) more water may minimize low flows related to fish kill events (Program 2017c).

Fewer water scenarios or changes in the timing of flows would most likely affect the pallid sturgeon in a negative manner. These scenarios could occur from Program actions, but the impacts would likely be minor or undetectable. Nevertheless, the understanding of the connection between hydrology and pallid sturgeon use of the lower Platte River is incomplete and needs additional study. The combined effects of water management actions upstream of the central Platte River on hydrology in the lower Platte River, including both Program and non-Program uses, is uncertain. Some actions may provide benefits, while others may have adverse effects. For example, the combined effects of flow contribution from Tamarack 1 and depletions in excess of Service target flows, authorized under the new depletions plans, are not well understood.

One beneficial Program effect is the protection of Service target flows in the central Platte River through the state and federal new depletions plans, which limit degradation of lower Platte River flows and reduce the opportunity for lethal high-water temperatures.[4]

The Program has limitations in its ability to affect the hydrology of the lower Platte River through withdrawals or additions to the central Platte River because of the magnitude of the influence of flows from the Loup and Elkhorn Rivers. Daily hydro-cycling in the Loup River complicates the Program's ability to quantify the hydrologic contribution of the central Platte River; however, existing flow monitoring is sufficient to guide Program operations in the limited situations when hydrologic effects from the central Platte River may affect the lower Platte River.

The way that Program water management actions affect the hydrology of the lower Platte River, how changes in hydrology affect pallid sturgeon habitat, and, ultimately, how changes in habitat affect pallid sturgeon use of the lower Platte River are uncertain. Relationships between hydrology and the suitability of food resources, the suitability of spawning habitat, spawning cues, success of spawning, or larval survival are all unknown in the lower Platte River (Program 2017c).

Under the Proposed Action, knowledge gained during the Program's expert workshop scheduled for 2018 would allow the best available science to be put into action for the benefit of the pallid sturgeon. Additional research could be conducted to address remaining uncertainties regarding the pallid sturgeon life cycle and habitat use in the lower Platte River. This new learning could then be used to implement habitat improvements in the lower Platte River to benefit pallid sturgeon.

When all the Program elements are implemented, should extension of the First Increment be approved, these elements may affect, and are likely to adversely affect, the pallid sturgeon (see **Appendix A**). A summary of beneficial and adverse impacts from extending the First Increment is provided below.

[4]A primary First Increment objective of the Program is to reduce deficits to the Service's central Platte River annual species and pulse target flows by an average of 130,000 to 150,000 acre-feet per year at Grand Island, Nebraska. The Service formulated target flows, in their current form, in 1994 and submitted them to the FERC as Federal Power Act of 1920, Section 10(j), recommendations for relicensing Kingsley Dam and associated facilities in Nebraska. Reclamation subsequently incorporated the target flows into the Program as an initial reference point for determining periods of excess and shortage in the operation of Program reregulation. It did this so that Program water could be used to reduce those shortages. Target flows vary by season and month and include annual pulse flow targets.

- Summary of beneficial impacts from extending the First Increment (Service 2006):
  - Very small beneficial hydrological effects during food base production period
  - Small beneficial hydrologic effects during summer low flow period
  - Increased mean sediment transport rate[5] influencing habitat formation
  - Increased median sediment transport rate influencing habitat maintenance
- Summary of adverse impacts from extending the First Increment (Service 2006):
  - Very small adverse hydrologic effects during spawning
  - Very small adverse hydrologic effects during habitat formation period

Cumulative Effects

Cumulative effects are those from future state, local, or private (nonfederal) actions that are reasonably certain to occur in the area of analysis. A nonfederal action is "reasonably certain" to occur if the action requires the approval of a state or local resource or land-control agency, such agencies have approved the action, and the project is ready to proceed.

Continued operation of the Loup River Hydroelectric Project would result in daily fluctuations in flow release to the Platte River, but the Service has determined in a recent BO (Service 2016a) that this operation is not likely to jeopardize the continued existence of pallid sturgeon.

Cumulative effects on lower Platte River hydrology have been evaluated using a report titled 2014 Annual Evaluation of Availability of Hydrologically Connected Water Supplies (NDNR 2014, as reported in Service 2016a). The Nebraska Department of Natural Resources (NDNR) projects that future water development in the lower Platte River basin would result in an additional reduction in stream flows of 173 cfs at the Louisville stream gage by 2041 (NDNR 2014). Streamflow losses from future water development are in addition to expected declines from existing development reported as a 398-cfs reduction at the Louisville stream gage by the year 2041 (NDNR 2014).

Ongoing trends that are likely to occur include increased floodplain development (i.e., urban, industrial, and commercial); continued depletions and return flows from municipal, industrial, and agricultural uses on the Platte River; and ongoing construction and maintenance of bridges, highways, local roads, railways, and utility rights-of-way. Increased water temperatures from outfalls and introduction of contaminants from industrial, agricultural, and municipal sources may contribute to lack of pallid sturgeon recruitment by reduced egg quality and fitness of offspring, If the native fish community composition is altered, key prey species for pallid sturgeon may not be available for consumption, with implications for pallid sturgeon growth, condition, and reproductive success.

---

[5]Changes in sediment transport rate are expressed as change from previous contributions of the upper basins in the habitat area. Changes are determined near Chapman (approximately 125 river miles above uppermost extent of known habitat area), leading to some uncertainty on how the actual effects are realized in the habitat area.

The combined effects of Program water management actions upstream of the central Platte River on hydrology in the lower Platte River, including both Program and non-Program uses, is uncertain. Some actions may provide benefits, while others may have adverse effects. One beneficial Program effect is the protection of Service target flows in the central Platte River through the state and federal new depletions plans, which limit degradation of lower Platte River flows and reduce the opportunity for lethal high-water temperatures.

3.10.4 Impacts from the No Action Alternative

Because of the uncertainty associated with assessing the impacts of Program actions on the hydrology of the lower Platte River because of the magnitude of the influence of flows from the Loup and Elkhorn Rivers, distinguishing between the effects of the Proposed Action and the No Action Alternative is challenging with the current state of knowledge. Under the No Action Alternative, knowledge gained from the Program's expert workshop would not be put into action for the benefit of the pallid sturgeon; however, the lower Platte River habitats would deteriorate only if certain Program water projects and depletion plan protections were discontinued without the Program. The likelihood of this is uncertain under the No Action Alternative. The Service would continue to manage water for the benefit of the pallid sturgeon under the No Action Alternative. It has worked with non-Program entities to optimize species benefits and would continue to do so without the Program. The Program adds pallid sturgeon research, which is expected to improve how species' benefits are optimized; this would be lost under the No Action Alternative.

Cumulative Effects

As described above under the Proposed Action *Cumulative Effects* section, other actions can impact pallid sturgeon due to reduced stream flows, floodplain development and increased water temperatures. Not extending the Program's First Increment could result in the lower Platte River habitat deteriorating if certain Program water projects and depletion plan protections were discontinued without the Program; however, the likelihood of this is uncertain under the No Action Alternative.

3.11 Other Federally Listed Species and Designated Critical Habitat

3.11.1 Affected Environment

Table 3-14, below, shows other federally listed species and critical habitats that occur within the area of analysis and notes the state(s) in which each species occurs.

Table 3-14. Federally Listed Species and Critical Habitats in the Area of Analysis

Common Name	Scientific Name	Status	State
Federally Listed Species			
American burying beetle	*Nicrophorus americanus olivier*	Endangered	Nebraska
Black-footed ferret	*Mustela nigripes*	Endangered	Wyoming Colorado
Canada lynx	*Lynx canadensis*	Threatened	Wyoming Colorado

Table 3-14. Federally Listed Species and Critical Habitats in the Area of Analysis

Common Name	Scientific Name	Status	State
Colorado butterfly plant	*Gaura neomexicana* var. *coloradensis*	Threatened	Wyoming Colorado Nebraska
Eskimo curlew	*Numenius borealis*	Endangered	None[1]
Gray wolf	*Canis lupus*	Endangered; delisted	Wyoming[2] Colorado Nebraska
North Park phacelia	*Phacelia formosula*	Endangered	Colorado
Northern long-eared bat	*Myotis septentrionalis*	Threatened	Wyoming Nebraska
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Threatened	Wyoming Colorado
Rufa red knot	*Calidris canutus rufa*	Threatened	Nebraska
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	Wyoming Colorado Nebraska
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Nebraska
Wyoming toad	*Bufo baxteri*	Endangered	Wyoming
Designated Critical Habitats			
Colorado butterfly plant	*Gaura neomexicana* var. *coloradensis*	Threatened	Wyoming
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	Threatened	Colorado

Source: Service 2017c
[1]The Eskimo curlew is believed to be extirpated from the area of analysis (Service 2016b).
[2]Distinct Population Segment found in Wyoming delisted due to recovery.

The species and critical habitats listed above are generally the same as those described in the 2006 Final EIS with the following exceptions:

- The bald eagle (*Haliaeetus leucocephalus*) was delisted in 2007 due to recovery (72 FR 37346).
- Critical habitat for Preble's meadow jumping mouse was revised in 2010, and designated critical habitat is now limited to Colorado (75 FR 78430).
- The rufa red knot was listed as a threatened species under the ESA in 2014 (79 FR 73705).
- The northern long-eared bat was listed as a threatened species under the ESA in 2015 (80 FR 17973).
- Gray wolf was not analyzed in the 2006 Final EIS, but is now believed to be present within the area of analysis.
- The status of the western prairie fringed orchid is threatened, not endangered as reported in the 2006 Final EIS.
- In addition to known populations in Wyoming and Colorado, described in the 2006 Final EIS, the Ute ladies'-tresses orchid is also believed to occur in western Nebraska, north of the North Platte River (Service 2017d).

Detailed descriptions of each species and their occurrence in the area of analysis are provided below.

American Burying Beetle

Status and distribution. The American burying beetle was listed as an endangered species under the ESA in 1989 (54 FR 29652). The beetle was historically abundant throughout most of the eastern United States and Canada, ranging north to Québec, east to Nova Scotia, south to the Gulf of Mexico, and west to Nebraska. Beetle populations collapsed dramatically during the twentieth century primarily from habitat loss and alteration, and the species is considered to be extirpated throughout most of its historical range. It is estimated that the beetle currently occurs in less than 10 percent of its historical range and occupies less than 1 percent of its historical habitat (Service 1991 and 2008). At the time of its ESA listing in 1989, the beetle was believed to occur at only two locations: Block Island, Rhode Island, and Latimer County, Oklahoma (Service 1991); however, additional surveys have been conducted since that time, and the beetle is now believed to occur in Massachusetts (isolated populations), South Dakota, Kansas, Oklahoma, Arkansas, Texas, and Nebraska. Extensive surveys in many other eastern U.S. states have failed to discover remnant beetle populations (Service 2008).

In Nebraska, the American burying beetle occurs in two separate geographically isolated populations: the Loess Hills population and the Sandhills population (Service 2008). Individuals that occur within the area of analysis in Nebraska are members of the Loess Hills population, which includes Dawson, Frontier, Gosper, and Lincoln Counties.

Life history. The American burying beetle is a scavenging species that uses carrion (i.e., animal carcasses) for food and brood rearing. These beetles locate carrion, typically consisting of small mammals and birds, then one male and one female beetle work together to bury the carrion. The female lays her eggs in the buried carcass, and the adult pair stays with the developing larvae until the grubs pupate. Both the adults and young feed on the buried carcass. The beetle buries into the ground to hibernate during the winter, and the next generation typically reemerges in late May or early June (in Nebraska; Ratcliffe 1996).

Habitat. This species occurs in wet meadows, streams, and wetlands and in association with relatively undisturbed, semi-arid, sandhill and loam grasslands. The American burying beetle is generally recognized as a habitat generalist; however, this species is intolerant of human disturbances (Service 2008).

Threats. The major threat to the beetle is habitat fragmentation, to which the massive overall decline of this species has been attributed (Service 1991). In Nebraska, loss of native grassland from conversion to irrigated row crop agriculture is the main cause of beetle habitat loss and fragmentation. Other potential threats to this species include use of artificial lighting and competition with avian and mammalian scavengers for carrion. Because the beetle’s life cycle depends on temperature and precipitation cues, global climate variation may also affect this species (Service 2008).

Black-footed ferret

Status and distribution. The black-footed ferret was listed as an endangered species in 1967 (32 FR 4001) pursuant to early endangered species legislation in the United States and was “grandfathered” into the ESA. This species was once abundant throughout North American intermountain and prairie grasslands. This species underwent extreme decline from the late 1800s to the 1960s because of the loss of habitat from conversion of native prairie to cropland, poisoning, and disease. The ferret was considered extremely rare before a small population was located in Mellette County, South Dakota, in 1964. In 1974, the remnant wild population of ferrets in South Dakota abruptly disappeared.

Captive breeding efforts were unsuccessful, and the last captive animal from the Mellette population died at Patuxent Wildlife Research Center in 1979, at which time the species was presumed to be extinct; however, in 1981 a small population of ferrets was discovered near Meeteetse, Wyoming. The population increased from 1981 through 1984, reaching a peak of nearly 130 ferrets, but the population declined to only 18 animals due to a disease outbreak in the early 1980s. All surviving wild ferrets at Meeteetse were removed during 1985 to 1987, after which no wild populations of black-footed ferrets have been found (Service 2013).

The 20 specific black-footed ferret reintroduction projects have met with varying success, beginning in 1991. The estimated number of black-footed ferrets remaining in the wild due to reintroduction efforts is 418 individuals. Approximately 280 additional animals are managed in captive breeding facilities in Arizona, Colorado, Montana, and New Mexico. The only known population in Wyoming is a reintroduced population in the Shirley Basin located in the northwest corner of Carbon County. In Colorado, black-footed ferrets have been released in the remote White River region in the northwest portion of the state, and a Nonessential Experimental Population has been established at the U.S. Bureau of Land Management’s Wolf Creek Management Area (Service 2013); however, these areas are outside the area of analysis.

Life history. The black-footed ferret is generally a nocturnal predator, appearing above ground at irregular intervals and for varying durations. This species is an extreme specialist that depends on prairie dogs for food and shelter. Black-footed ferrets occupy prairie dog burrows and do not dig their own burrows. The black-footed ferret is solitary, except for the breeding period, which occurs from mid-March through early April in the wild (Service 2013).

Habitat. Habitat for the black-footed ferret is limited exclusively to prairie dog colonies, where they occupy existing burrows. Ferrets generally select for areas within prairie dog colonies that contain high burrow densities and thus high densities of prairie dogs (Service 2013).

Threats. Major threats to the black-footed ferret include habitat loss or fragmentation due to conversion of native prairie to cropland, urbanization, and disease (Service 2013).

Canada Lynx

Status and distribution. The Canada lynx was listed as a threatened species under the ESA in 2000 (65 FR 58). Within the contiguous United States, the lynx’s range extends into different regions that are separated from each other by ecological barriers consisting of unsuitable lynx habitat. These regions are the Northeast, Great Lakes, northern Rocky Mountain/Cascades, and the Southern Rocky Mountains. The Canada lynx is currently believed to occur in 14 U.S. states, including Wyoming and Colorado, where it is found in isolated, high-elevation populations well outside the North Platte River basin.

Critical habitat for the Canada lynx was designated in 2014 (79 FR 54781). Designated critical habitat for the Canada lynx covers portions of five U.S. states, including a portion of western Wyoming outside the area of analysis.

Life history. The Canada lynx is a top-tier predator with a relatively large home range, generally between 12 and 83 square miles. Snowshoe hares are the primary prey of lynx, comprising the bulk of the lynx diet throughout its range. Breeding typically occurs March through April (Service 2017e).

Habitat. Canada lynx are associated with moist boreal forest habitats that have cold, snowy winters and a high-density snowshoe hare prey base (Service 2017e).

Threats. In all regions within the range of the lynx in the contiguous United States, habitat fragmentation and land uses, including timber harvest, recreation, and their related activities, are the predominant threats to this species. Declining populations of their primary prey item, snowshoe hare, are also a threat to this species (Service 2017e).

Colorado Butterfly Plant

Status and distribution. The Colorado butterfly plant was listed as a threatened species under the ESA in 2000 (65 FR 62302). Distribution of this species is limited to Colorado, Wyoming, and Nebraska. This regional endemic species is restricted to Laramie and Platte Counties in Wyoming, and Larimer, Jefferson, and Weld Counties in Colorado. It historically occurred in western Kimball County, Nebraska, where it is likely extirpated now (Service 2017f).

Critical habitat. Critical habitat for the Colorado butterfly plant was designated in 2005 (70 FR 1940). The designation consists of seven units within Platte and Laramie Counties, Wyoming. The area of analysis includes Colorado butterfly plant critical habitat.

Life history. The Colorado butterfly plant is a perennial herb that lives for several years before bearing fruit once and then dying. The establishment and survival of seedlings appears to be enhanced at sites where tall and dense vegetation has been removed by some form of disturbance. In the absence of occasional disturbance, the plant’s habitat can become choked out by dense growth of willows, grasses, and exotic plants, which prevents new seedlings from becoming established and replacing plants that have died (Service 2017f).

Habitat. The Colorado butterfly plant occurs on sub-irrigated, alluvial (stream deposited) soils on level or slightly sloping flood plains and drainage bottoms at elevations of 1,524 to 1,951 meters (5,000 to 6,400 feet). Colonies are often found in low depressions or along bends in wide, active, meandering stream channels a short distance upslope of the actual channel. The plant requires early- to mid-succession riparian (riverbank) habitat. Colorado butterfly plant habitat is open, without dense or overgrown vegetation. The plant occurs on soils derived from conglomerates, sandstones, and tuffaceous mudstones and siltstones that are common in eastern Colorado and Wyoming (Service 2017f).

Threats. The primary threat to this species is habitat loss and fragmentation due to residential and urban development. Haying and mowing at certain times of the year, water development, land conversion for cultivation, competition with exotic plants, and nonselective use of herbicides are additional threats to the species (Service 2017f).

Eskimo Curlew

Status and distribution. The Eskimo curlew is listed as endangered under the ESA. The current population of Eskimo curlew is estimated at less than 50 individuals. It is highly possible that the species is extinct. The last documented sighting of the Eskimo curlew was in Texas in 1962. The Eskimo curlew was once very abundant with historical population estimates ranging from hundreds of thousands to millions. Unrestricted hunting for the market decimated Eskimo curlew populations leading to a dramatic decline between 1870 and 1890. There was no population recovery following the end of commercial harvest of the Eskimo curlew (Alaska Department of Fish and Game 2017).

Life history. The Eskimo curlew migrated incredible distances each year. In the spring, they migrated from South America through the central United States and the prairie provinces of Canada to their nesting areas in the Alaskan and Canadian arctic (Alaska Department of Fish and Game 2017). This northward migration likely began in late February or March with arrival on the breeding grounds in late May. In August they left the breeding grounds and travelled eastward to Labrador and Newfoundland to feed prior to beginning their non-stop southern migration. In the fall, they migrated down the east coast of North America to their wintering grounds in the grasslands of southern South America from southern Brazil and Uruguay to Argentina.

Eskimo curlew made nests by creating shallow depressions on bare ground in dry tundra areas of the Arctic and subarctic (Alaska Department of Fish and Game 2017). Females laid four eggs per clutch, one clutch per year. Eggs hatched in late June and early July. Eskimo curlews fed in open natural grassland and tundra, burned prairies, meadows, and pastures. They ate insect eggs found on the prairie grasslands of North America during their northward migration.

Habitat. The Eskimo curlew nested in arctic tundra areas in Alaska and northwestern Canada and fed in grassland, tundra, burned prairie, meadow, and pasture habitats. They spent the winter in grasslands in the South American countries of Brazil, Uruguay, and Argentina then migrated through North America to their summer breeding grounds in Alaska and northwestern Canada (Alaska Department of Fish and Game 2017).

Threats. If the Eskimo curlew still exists, the primary threat is habitat loss. The prairie habitat in central North America has been changed due to fire suppression and conversion to agricultural lands. In 1994, only 4 percent of the prairie habitat on their northern migration route remained (Alaska Department of Fish and Game 2017).

Gray Wolf

Status and distribution. Listed below are recent action taken by the federal government related to the status of the gray wolf and current populations trends (Service 2017g).

- On July 1, 2015, the Service determined that a petition to reclassify all gray wolves in the conterminous United States, except for the Mexican wolf (*Canis lupus baileyi*) in the Southwest, as a threatened species under the ESA does not present substantial information, indicating that reclassification may be warranted.
- On January 16, 2015, the Service finalized a rule listing Mexican wolves as a separate entity under the ESA and revised the regulations for the nonessential experimental population of the Mexican wolf under section 10(j) of the ESA to make it more effective in recovering this endangered subspecies, which became effective on February 17, 2015.
- On December 19, 2014, following two court orders, the Service reinstated regulatory protections under the ESA for the gray wolf in Wyoming and the western Great Lakes on February 20, 2015.
- On June 13, 2013, the Service concurrently proposed a rule in the *Federal Register* to remove the gray wolf from the Federal List of Threatened and Endangered Species and list the Mexican wolf subspecies as endangered and expand recovery efforts in the Southwest.
- The Service's 2013 comprehensive review determined that the current listing for gray wolf, which was developed 35 years ago, erroneously included large geographical areas outside the species' historical range. In addition, the review found that the then-current gray wolf listing did not reasonably represent only remaining range of the Mexican wolf population in the Southwest.
- On April 26, 2017, the Service delivered a final rule to comply with a court order that reinstated the removal of federal protections for the gray wolf in Wyoming under the ESA.

The gray wolf has rebounded from the brink of extinction to exceed population targets by as much as 300 percent. Today, an estimated 5,691 gray wolves are in the contiguous United States. Wolf numbers continue to be robust, stable, and self-sustaining (Service 2017g).

Life history. Gray wolves breed in late winter usually when they are 3 years of age. After a gestation period of 63 days, an average litter of 6 pups is born in a den in the ground, rock pile, hollow log, or other shelter. When the pups reach 8 weeks of age, the adults may move them to another den. By October the pups will weigh about 60 pounds and travel with the adults. Young gray wolves usually stay with the adults for 2 years, forming a pack. At 2 years of age, they may disperse hundreds of miles from their original home. Gray wolves usually hunt large animals such as moose and deer although beaver and other smaller animals supplement their diet. Gray wolves are often more successful taking old, weak, or injured prey. Gray wolves are territorial and will keep other gray wolves and coyotes out of their 50- to 100-square-mile home range. Howling is a way for pack members to communicate (Service 2017g).

Habitat. Wolves require large areas of contiguous habitat that can include forests and mountainous terrain. Suitable habitat must have sufficient access to prey, protection from excessive persecution, and areas for denning and taking shelter (Defenders of Wildlife 2017).

Threats. Perhaps the greatest threat to the gray wolf is from human adversaries who either shoot or poison them.

North Park Phacelia

Status and distribution. North Park phacelia was as an endangered species under the ESA in 1982 (47 FR 38540). This Colorado endemic species is only found in North Park in Jackson County. Within the North Park region, the species is found from Michigan Creek west to the headwaters of the North Platte River. Roughly 16,000 individuals are known from 6 separate populations and the entire species occurs within an area of approximately 10 square miles (Service 2017h).

Life history. North Park phacelia is a herbaceous plant species that grows 6 to 12 inches tall and bears bright purple flowers that are arranged in coils at the ends of stems. North Park phacelia blooms in July and August. This species is a biennial, surviving for 1 year as a rosette of leaves before flowering and dying the following year (Service 2017h).

Habitat. Habitat for this species consists of eroded soil outcrops composed of barren exposures of the Coalmont Formation, a coal-bearing substrate. The species is found at about 8,000 to 8,300 feet in elevation (Service 2017h).

Threats. The primary threats to North Park phacelia are concentrated livestock use (trampling); off-highway vehicle recreation; land use changes, including energy development, commercial, and residential development; and range improvements. Because of its extremely limited distribution, the species is vulnerable to habitat modification and changes in the environment. North Park phacelia also relies on insect pollinators to maintain genetic diversity. The loss of pollinators and pollinator habitat is considered a threat to the species (Service 2017h).

Northern Long-Eared Bat

Status and distribution. The northern long-eared bat was listed as a threatened species under the ESA in 2015 (80 FR 17973). In 2016, the Service also issued a 4(d) Rule (81 FR 1900), which allows incidental take under certain conditions in areas that have not been affected by white-nose syndrome (WNS), a fungal disease (outside the WNS zone). This small bat species occurs across much of the eastern and north-central United States. Its range encompasses 37 states and all 13 Canadian provinces.

Life history. During the summer, the northern long-eared bat roosts underneath bark or in cavities of a variety of tree species, both live and dead, and may roost individually or in colonies. Summer roosting sites may also include caves, mines, or human-made structures, such as barns, other buildings, utility poles, window shutters, and bat houses (80 FR 17974). During the winter, the northern long-eared bat inhabits large caves or mines (Caceres and Pybus 1997).

Habitat. The northern long-eared bat may roost in trees along the Platte River east of North Platte, Nebraska, in the area of analysis. The only known hibernacula in the area of analysis are limestone quarries located in Cass County, Nebraska (80 FR 17974). The northern long-eared bat's range includes portions of northeastern Wyoming outside the area of analysis. Potential occurrences of this species in the area of analysis would be limited to the central and lower Platte

River Sub-basins. Most of this area is within the WNS zone, as defined in the Service's Final 4(d) Rule (81 FR 1900).

Threats. The predominant threat to this species is WNS, a fungal disease that has caused massive population declines in some portions of this species' range, prompting the Service to list this species under the ESA.

Preble's Meadow Jumping Mouse

Status and distribution. The Preble's meadow jumping mouse was listed as threatened by the Service on May 3, 1998, and occurs only in Colorado and Wyoming. Critical habitat for the mouse was designated in Colorado and has been amended several times. The mouse is known to occupy the counties along the Front Range from the Wyoming border through El Paso County. No range-wide population estimates are available for the species.

Life history. The Preble's meadow jumping mouse usually has two litters per year, with an average of five young born per litter. They are long lived for a small mammal (up to 3 years). The diet of the mouse shifts seasonally, consisting of insects and fungi after emerging from hibernation in May and shifting to fungi and moss during mid-summer with insects in the fall. Seeds are also an important part of the diet. They construct day nests composed of grasses, forbs, sedges, rushes, and other available plant material. An individual mouse can have multiple day nests that it uses for about a week. The Preble's meadow jumping mouse typically enters its hibernation nests between September and October, and emerge the following May. They do not store food, but rather survive off body fat accumulated prior to hibernation (Service 2017i).

Habitat. During summer, the most important wetland types occupied by Preble's meadow jumping mice include riparian areas and adjacent wet meadows. During the summer, they prefer dense shrub, grass, and forb ground cover along creeks, rivers, and associated waterbodies. From early fall through the spring, they hibernate underground in burrows that are typically at the base of vegetation (Colorado Parks and Wildlife 2017a).

Threats. Primary threats to the Preble's meadow jumping mouse population include habitat loss, alternation, degradation, and fragmentation resulting from urban development, flood control, other water development, and other human land uses, especially in riparian habitat.

Rufa Red Knot

Status and distribution. The rufa red knot was listed as a threatened species under the ESA in December 2014, following a rapid population decline from about 82,000 individuals in the 1980s to fewer than 30,000 individuals by 2010 (79 FR 73706). The rufa red knot is a subspecies of the red knot (*Calidris canudus*), the largest North American sandpiper species. Individuals of the Texas wintering subset have occasionally been documented in the states along the Central Flyway, including Nebraska (Baker et al. 2013; Jorgensen 2014); however, only 15 occurrences of the rufa red knot have been noted in the state of Nebraska in more than 100 years (Jorgensen 2014; Central Flyway Council 2013). Sites where the rufa red knot has been documented in Nebraska include Rainwater basin in south-central Nebraska and Lake McConaughy on the North Platte River. This species would potentially occur in the area of analysis only during spring and fall migrations, and the likelihood of occurrence is very low.

Life history. The red knot is noted for its extraordinarily long migrations, sometimes traveling up to 9,000 miles between breeding and wintering grounds. The rufa subspecies breeds in the Canadian Arctic and winters in Chile and Argentina, except for the small subset that winters along the Texas coast.

Habitat. Nesting habitat for the rufa red knot consists of barren tundra, while wintering habitat consists of sandy beaches, tidal flats, and mangroves.

Threats. Threats to the rufa red knot include loss of nesting and wintering habitat from climate variation (Baker et al. 2013), which affects weather conditions, seasons, and availability of food resources, most notably the availability of horseshoe crab eggs.

Ute Ladies'-tresses Orchid

Status and distribution. Ute Ladies'-tresses orchid was listed as a threatened species under the ESA in 1992 (57 FR 2053). Distribution of this species occurs within seven U.S. states, including Wyoming, Colorado, and Nebraska. It is believed to be extirpated throughout much of its historical range (Service 2017d).

Life history. Ute Ladies'-tresses orchid is a long-lived perennial forb that likely reproduces exclusively by seed. Its life cycle consists of four main stages: seedling, dormant, vegetative, and reproductive (flowering or fruiting). Fruits are produced in late August or September across most of the plant's range, with seeds shed shortly thereafter (Service 2017d).

Habitat. This orchid is found in moist soils near wetland meadows, springs, lakes, and perennial streams. It occurs generally in alluvial substrates along riparian edges, gravel bars, old oxbows, and moist to wet meadows at elevations from 4,200 to 7,000 feet. The orchid colonizes early successional riparian habitats such as point bars, sandbars, and low-lying gravelly, sandy, or cobbly edges, persisting in those areas where the hydrology provides continual dampness in the root zone through the growing season. The species occurs primarily in areas where the vegetation is relatively open and not overly dense, overgrown, or overgrazed. Plants usually occur as small scattered groups and occupy relatively small areas within the riparian system (Service 2017d).

Threats. Threats that initially led to the listing of this species included habitat loss and modification (through urbanization, water development, and conversion of wetlands to agriculture), over-collection, competition from exotic weeds, and the use of herbicides. Other threats that have been identified since that time include impacts from recreation, mowing for hay production, grazing by cattle or horses, changes in hydrology (modification of wetland habitats through development, flood control, de-watering, and other changes to hydrology), herbivory by native wildlife (particularly voles), reduction in the number and diversity of insect pollinators, drought, absence or rarity of mycorrhizal symbionts, and conflicting management with other rare species (Service 2017d).

Western Prairie Fringed Orchid

Status and distribution. The western prairie fringed orchid was listed as a threatened species under the ESA in 1989 (54 FR 39857). This species is extirpated throughout much it its historical range and is currently known to occur in six U.S. states (including Nebraska) and one Canadian province. In Nebraska, the orchid is known to occur at 64 sites in 15 counties, and has been documented in the central Platte Valley (NRCS 2009). Within the area of analysis, the orchid has been documented in Hall County and Sarpy County, as noted in the 2006 Final EIS.

Life history. The western prairie fringed orchid is a smooth, erect, perennial herb that is 4 feet tall with 2 to 5 fairly thick, elongate, hairless leaves. The flowering stalk is a raceme bearing up to 24 showy, creamy white to white, or rarely greenish white flowers. The western prairie fringed orchid flowers from mid-June through mid-July (Service 1996; NRCS 2009).

Habitat. The western prairie fringed orchid is found in wet to moist soils with full sunlight in swales in tallgrass prairie and on wet meadows usually in calcareous silt loam or sub-irrigated sandy loam prairies. It may occur along ditches or roadsides (Service 1996).

Threats. As noted in the 2006 Final EIS, habitat dewatering and conversion to cropland are primary factors adversely affecting the western prairie fringed orchid throughout its range. Hydrologic alterations that draw down the water table near the root zone are associated with decreased flowering and increased plant mortality.

Because Platte River discharge and stage are dominant factors influencing groundwater levels in the Platte River valley, depletions during the spring contribute to reduced frequency and duration of saturated soil conditions. Depletions contribute cumulatively to flow reductions during the pulse flow season (May and June). This, in turn, influences the frequency and duration of soil saturation. Because of reduced flows, low-lying prairies and wet meadows near the Platte River have become drier. Conversion, fragmentation, and dewatering of low grassland and wet meadow habitats may adversely affect the western prairie fringed orchid by: 1) eliminating habitat; 2) reducing its potential range and distribution; 3) preventing or retarding expansion, colonization, or recolonization; and 4) decreasing the resilience of isolated populations to environmental stochasticity.

Other threats to the long-term survival of western prairie fringed orchid include the spread of invasive plants into prairie swales, the effects of herbicide and pesticide on the species and its pollinators, overgrazing, intensive haying, river channelization, and river siltation. Invasive plants that may displace the western prairie fringed orchid through competition include leafy spurge (*Euphorbia esula*), Kentucky bluegrass, and musk thistle (*Carduus nutans*; Service 2009b).

Wyoming Toad

Status and distribution. The Wyoming toad was listed as an endangered species under the ESA in 1984 (49 FR 1992). It is considered one of the four most endangered amphibian species in North America. The Wyoming toad is endemic to Wyoming and is only found in the Laramie River basin. It was common throughout this region until the 1970s, but the last ten toads believed to exist in the wild were taken into captivity in 1989 for breeding (Service 2015b).

Currently, all Wyoming toads are the product of captive bred releases and can be found in the Laramie River basin at Mortenson Lake located on the Service's Mortenson Lake Wildlife Refuge and on two properties covered under the Wyoming Toad Safe Harbor Agreement. No other populations are known to exist in the wild (Service 2015b).

Life history. The Wyoming toad breeding season is from mid-May to mid-June. Eggs are deposited in gelatinous strings resembling black pearl necklaces and are often intertwined with vegetation. Hatching occurs within several days, and metamorphosis occurs 4 to 6 weeks later. Adult Wyoming toads have an extremely small dispersal range, rarely venturing more than a quarter of a mile from their hatching location (Service 2015b).

Habitat. Remaining occupied habitat for Wyoming toad consists of Mortenson Lake, a 61-acre lake situated in the shortgrass prairie ecosystem of the Laramie River basin. The vegetation immediately around the lake consists of a mixture of rush, sedge, and grass communities. Uplands are arid and consist of grass with scattered shrubs (Service 2015b).

Threats. While the precise causes of the Wyoming toad's population decline are unknown, a variety of factors have likely contributed to the decline. Infectious disease, habitat alterations, and contaminants have been suggested as top contributors to the decline (Service 2015b).

3.11.2 Impacts from the Proposed Action

Under the Proposed Action, extension of the Program's First Increment would result in the continuation of the effects on other federally listed species that were described in the 2006 Final EIS. In general, potential effects on other federally listed species would occur because of changes in river flow, agricultural activities, and water use.

Because of the wide distribution of some listed species and the uncertainty regarding the specific location of some activities, such as land acquisition and management and water leasing, the potential for site-specific impacts on some listed species, habitats, and designated critical habitats within the area of analysis cannot be fully predicted; however, following consultation with the Service, actions that are likely to jeopardize listed species or adversely modify designated critical habitat would be avoided or offset. **Table 3-15**, below, and **Appendix A**, summarize effects of implementing the Proposed Action on other federally listed species and designated critical habitats. These effects are described in more detail below and are grouped by effect determination.

Table 3-15. Determination of Effect for Other Federally Listed Species and Designated Critical Habitats under the Proposed Action

Species	Effect Determination
Federally Listed Species	
American burying beetle	May affect, not likely to adversely affect
Black-footed ferret	No effect
Canada lynx	No effect
Colorado butterfly plant	May affect, not likely to adversely affect
Eskimo curlew	No effect
Gray wolf	No effect
North Park phacelia	No effect
Northern long-eared bat	May affect, not likely to adversely affect
Preble's meadow jumping mouse	May affect, not likely to adversely affect
Rufa red knot	No effect
Ute ladies'-tresses orchid	May affect, not likely to adversely affect
Western prairie fringed orchid	May affect, likely to adversely affect
Wyoming toad	May affect, not likely to adversely affect

Table 3-15. Determination of Effect for Other Federally Listed Species and Designated Critical Habitats under the Proposed Action

Species	Effect Determination
Designated Critical Habitats	
Colorado butterfly plant	May affect, not likely to adversely affect
Preble's meadow jumping mouse	May affect, not likely to adversely affect

No Effect

Implementing the Proposed Action would not affect the black-footed ferret or the Canada lynx because these species are not known to occur in the area of analysis. Both species are found in isolated populations that are far removed from areas potentially considered for water leasing.

Implementing the Proposed Action would not affect the rufa red knot because this species is extremely unlikely to be present in the area of analysis based on historical records and would potentially occur in the area of analysis only during spring and fall migrations.

Implementing the Proposed Action would not affect the North Park phacelia because no actions are anticipated to occur in the North Platte River headwaters where this species is found.

Implementing the Proposed Action would not affect the gray wolf because no actions are anticipated to result in loss of habitat for this species or its prey. Additionally, this species is extremely rare and transient in nature. Potential occurrences in the study area would be infrequent.

Implementing the Proposed Action would not affect the Eskimo curlew because this species is believed to be extirpated from the area of analysis (Service 2016b).

May Affect, not Likely to Adversely Affect

Implementing the Proposed Action could affect the American burying beetle through water leasing actions, as described in the 2006 Final EIS; however, site-specific NEPA compliance and ESA Section 7 consultation with the Service would be undertaken to ensure that the Proposed Action would not jeopardize the continued existence of this species; therefore, the Proposed Action may affect, but is not likely to adversely affect, the American burying beetle.

Under the Proposed Action, land management activities and other actions, including tree clearing, removing in-channel vegetation, disking, channel widening, and prescribed burning on grasslands, have the potential to adversely affect the northern long-eared bat along the central Platte River AHR. Tree removal may pose the greatest risk to this species because the northern long-eared bat uses trees along the central Platte River for summer roosting habitat. Under the final 4(d) rule, incidental take from tree removal activities is not prohibited unless it results from removing a known occupied maternity roost tree(s) or from tree removal activities within 150 feet of a known occupied maternity roost tree from June 1 through July 31 or within 0.25 miles of a hibernaculum.

Reclamation conducted informal consultation with the Service in August 2016 regarding potential impacts of the Program on the northern long-eared bat. The Service confirmed that the portion of the central Platte River AHR where Program actions would occur meets the criteria for allowance of incidental take under the final 4(d) rule and determined that Reclamation could eliminate the risk of take by avoiding all tree removal activities from June 1 through July 31; therefore, the Proposed Action may affect, but is not likely to adversely affect, the northern long-eared bat.

Potential impacts on the Colorado butterfly plant, Preble's meadow jumping mouse, Ute ladies'-tresses orchid, and Wyoming toad cannot be fully predicted because of these species' distribution in the study area and the uncertainty regarding the specific location of land acquisition and management and water leasing activities under the Proposed Action; however, site-specific NEPA compliance and ESA Section 7 consultation with the Service would be undertaken to ensure that implementation of the Proposed Action would not result in a jeopardy determination for any of these species or result in damage or adverse modification of critical habitat; therefore, the Proposed Action may affect, but is not likely to adversely affect, these species or their designated critical habitats.

May Affect, Likely to Adversely Affect

Extension of the Program's first increment under the Proposed Action would result in ongoing effects on the western prairie fringed orchid if flow management activities resulted in decreased early and late spring peaks, as described in the 2006 Final EIS. Potential adverse effects could include:

- Decreased surface water interaction with wet meadows in the central Platte River
- Reduced groundwater sub-irrigation along the central and lower Platte Rivers

Therefore, the Proposed Action may affect, and is likely to adversely affect, the western prairie fringed orchid.

3.11.3 Impacts from the No Action Alternative

Under the No Action Alternative, the Program would not be continued. Discontinuation of the Program would have no effect on other federally listed species because none of the actions associated with the Proposed Action would occur, and the effects of those actions on other federally listed species, described above, would not occur.

3.12 State-Listed and Species of Concern

3.12.1 Affected Environment

Table 3-16, below, shows Wyoming, Colorado, and Nebraska state-listed endangered and threatened species and species of special concern that may occur in the area of analysis. Species that may occur in the area of analysis were determined based on lists provided by the three states. The State of Wyoming does not have listed threatened and endangered species, but it did supply a list of species of greatest conservation need that may occur in the area of analysis (Wyoming Game and Fish Department 2017a).

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Amphibians				
Great Basin spadefoot	*Spea intermontana*	Species of greatest conservation need		
Great Plains toad	*Anaxyrus cognatus*	Species of greatest conservation need		
Northern cricket frog	*Acris crepitans*		Species of special concern	
Northern leopard frog	*Rana pipiens*	Species of greatest conservation need	Species of special concern	
Plains leopard frog	*R. blairi*		Species of special concern	
Plains spadefoot	*Spea bombifrons*	Species of greatest conservation need		
Western boreal toad	*Bufo boreas*		Endangered	
Western tiger salamander	*Ambystoma mavortium*	Species of greatest conservation need		
Western toad	*Anaxyrus boreas*	Species of greatest conservation need		
Wood frog	*Rana sylvatica*	Species of greatest conservation need	Species of special concern	
Birds				
American bittern	*Botaurus lentiginosus*	Species of greatest conservation need		
American kestrel	*Falco sparverius*	Species of greatest conservation need		
American peregrine falcon	*F. peregrinus anatum*	Species of greatest conservation need	Species of special concern	
American pipit	*Anthus rubescens*	Species of greatest conservation need		
American white pelican	*Pelecanus erythrorhynchos*	Species of greatest conservation need		
Ash-throated flycatcher	*Myiarchus cinerascens*	Species of greatest conservation need		
Baird's sparrow	*Ammodramus bairdii*	Species of greatest conservation need		
Bald eagle	*Haliaeetus leucocephalus*	Species of greatest conservation need	Species of special concern	
Bewick's wren	*Thryomanes bewickii*	Species of greatest conservation need		
Black-backed woodpecker	*Picoides arcticus*	Species of greatest conservation need		
Black-billed cuckoo	*Coccyzus erythropthalmus*	Species of greatest conservation need		
Black-chinned hummingbird	*Archilochus alexandri*	Species of greatest conservation need		
Black-crowned night heron	*Nycticorax nycticorax*	Species of greatest conservation need		
Black-throated gray warbler	*Setophaga nigrescens*	Species of greatest conservation need		
Black rosy-finch	*Leucosticte atrata*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Black tern	*Chlidonias niger*	Species of greatest conservation need		
Blue-gray gnatcatcher	*Polioptila caerulea*	Species of greatest conservation need		
Blue grosbeak	*Passerina caerulea*	Species of greatest conservation need		
Bobolink	*Dolichonyx oryzivorus*	Species of greatest conservation need		
Boreal owl	*Aegolius funereus*	Species of greatest conservation need		
Brewer's sparrow	*Spizella breweri*	Species of greatest conservation need		
Brown-capped rosy-finch	*Leucosticte australis*	Species of greatest conservation need		
Burrowing owl	*Athene cunicularia*	Species of greatest conservation need	Threatened	
Bushtit	*Psaltriparus minimus*	Species of greatest conservation need		
Calliope hummingbird	*Selasphorus calliope*	Species of greatest conservation need		
Canyon wren	*Catherpes mexicanus*	Species of greatest conservation need		
Caspian tern	*Sterna caspia*	Species of greatest conservation need		
Cattle egret	*Bubulcus ibis*	Species of greatest conservation need		
Chestnut-collared longspur	*Calcarius ornatus*	Species of greatest conservation need		
Clark's grebe	*Aechmophorus clarkii*	Species of greatest conservation need		
Clark's nutcracker	*Nucifraga columbiana*	Species of greatest conservation need		
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	Species of greatest conservation need		
Common loon	*Gavia immer*	Species of greatest conservation need		
Common nighthawk	*Chordeiles minor*	Species of greatest conservation need		
Common yellowthroat	*Geothlypis trichas*	Species of greatest conservation need		
Dickcissel	*Spiza americana*	Species of greatest conservation need		
Ferruginous hawk	*Buteo regalis*	Species of greatest conservation need	Species of special concern	
Flammulated owl	*Psiloscops flammeolus*	Species of greatest conservation need		
Forster's tern	*Sterna forsteri*	Species of greatest conservation need		
Franklin's gull	*Leucophaeus pipixcan*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Golden eagle	*Aquila chrysaetos*	Species of greatest conservation need		
Grasshopper sparrow	*Ammodramus savannarum*	Species of greatest conservation need		
Great blue heron	*Ardea herodias*	Species of greatest conservation need		
Great gray owl	*Strix nebulosa*	Species of greatest conservation need		
Greater sage-grouse	*Centrocercus urophasianus*	Species of greatest conservation need	Species of special concern	
Greater sandhill crane	*Grus canadensis tabida*		Species of special concern	
Harlequin duck	*Histrionicus histrionicus*	Species of greatest conservation need		
Juniper titmouse	*Baeolophus ridgwayi*	Species of greatest conservation need		
Lewis's woodpecker	*Melanerpes lewis*	Species of greatest conservation need		
Loggerhead shrike	*Lanius ludovicianus*	Species of greatest conservation need		
Long-billed curlew	*Numenius americanus*	Species of greatest conservation need	Species of special concern	
MacGillivray's warbler	*Geothlypis tolmiei*	Species of greatest conservation need		
McCown's longspur	*Rhynchophanes mccownii*	Species of greatest conservation need		
Merlin	*Falco columbarius*	Species of greatest conservation need		
Mountain plover	*Charadrius montanus*	Species of greatest conservation need	Species of special concern	Threatened
Northern goshawk	*Accipiter gentilis*	Species of greatest conservation need		
Northern pygmy-owl	*Glaucidium gnoma*	Species of greatest conservation need		
Plains sharp-tailed grouse	*Tympanuchus phasianellus jamesii*		Endangered	
Purple martin	*Progne subis*	Species of greatest conservation need		
Pygmy nuthatch	*Sitta pygmaea*	Species of greatest conservation need		
Pygmy rabbit	*Brachylagus idahoensis*	Species of greatest conservation need		
Red-eyed vireo	*Vireo olivaceus*	Species of greatest conservation need		
Red-headed woodpecker	*Melanerpes erythrocephalus*	Species of greatest conservation need		
Red crossbill	*Loxia curvirostra*	Species of greatest conservation need		
Rufous hummingbird	*Selasphorus rufus*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Sage thrasher	*Oreoscoptes montanus*	Species of greatest conservation need		
Sagebrush sparrow	*Artemisiospiza nevadensis*	Species of greatest conservation need		
Short-eared owl	*Asio flammeus*	Species of greatest conservation need		
Snowy egret	*Egretta thula*	Species of greatest conservation need		
Snowy plover	*Charadrius nivosus*	Species of greatest conservation need		
Swainson's hawk	*Buteo swainsoni*	Species of greatest conservation need		
Upland sandpiper	*Bartramia longicauda*	Species of greatest conservation need		
Virginia rail	*Rallus limicola*	Species of greatest conservation need		
Virginia's warbler	*Leiothlypis virginiae*	Species of greatest conservation need		
Western grebe	*Aechmophorus occidentalis*	Species of greatest conservation need		
Western snowy plover	*Charadrius alexandrinus nivosus*		Species of special concern	
White-faced ibis	*Plegadis chihi*	Species of greatest conservation need		
Williamson's sapsucker	*Sphyrapicus thyroideus*	Species of greatest conservation need		
Willow flycatcher	*Empidonax traillii*	Species of greatest conservation need		
Woodhouse's scrub-jay	*Aphelocoma woodhouseii*	Species of greatest conservation need		
Fish				
Bigmouth shiner	*Notropis dorsalis*	Species of greatest conservation need		
Bluehead sucker	*Catostomus discobolus*	Species of greatest conservation need		
Brassy minnow	*Hybognathus hankinsoni*	Species of greatest conservation need	Threatened	
Burbot	*Lota*	Species of greatest conservation need		
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*	Species of greatest conservation need		
Common shiner	*Luxilus cornutus*	Species of greatest conservation need	Threatened	
Finescale dace	*Phoxinum neogaeus*	Species of greatest conservation need		Threatened
Flannelmouth sucker	*Catostomus latipinnis*	Species of greatest conservation need		
Flathead chub	*Platygobio gracilis*	Species of greatest conservation need		
Hornyhead chub	*Nocomis biguttatus*	Species of greatest conservation		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Iowa darter	*Etheostoma exile*	Species of greatest conservation need	Species of special concern	
Lake chub	*Couesius plumbeus*		Endangered	
Lake sturgeon	*Acipenser fulvescens*			Threatened
Northern plains killifish	*Fundulus kansae*	Species of greatest conservation need		
Northern redbelly dace	*Phoxinus eos*		Endangered	Threatened
Plains minnow	*Hybognathus hankinsoni*	Species of greatest conservation need	Endangered	
Plains orangethroat darter	*Etheostoma spectabile*		Species of special concern	
Plains topminnow	*Fundulus sciadicus*	Species of greatest conservation need		
Roundtail chub	*Gila robusta*	Species of greatest conservation need		
Sauger	*Sander canadensis*	Species of greatest conservation need		
Stonecat	*Noturus flavus*		Species of special concern	
Sturgeon chub	*Macrhybopsis gelida*			Endangered
Suckermouth minnow	*Phenacobius mirabilis*	Species of greatest conservation need	Endangered	
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*	Species of greatest conservation need		
Invertebrates				
Ash gyro	*Gyraulus parvus*	Species of greatest conservation need		
Beavertail fairy shrimp	*Thamnocephalus platyurus*	Species of greatest conservation need		
Calico/papershell crayfish	*Orconectes immunis*	Species of greatest conservation need		
Creeping ancylid	*Ferrissia rivularis*	Species of greatest conservation need		
Cylindrical papershell	*Anodontoides ferussacianus*	Species of greatest conservation need	Species of special concern	
Devil crayfish	*Cambarus diogenes*	Species of greatest conservation need		
Dusky fossaria	*Galba dalli*	Species of greatest conservation need		
Fairy, tadpole, and clam shrimp	Class Branchiopoda	Species of greatest conservation need		
Forest disc	*Discus whitneyi*	Species of greatest conservation need		
Marsh rams-horn	*Planorbella trivolvis*	Species of greatest conservation need		
Pewter physa	*Physella heterostropha*	Species of greatest conservation need		
Plain pocketbook	*Lampsilis cardium*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Prairie fossaria	*Galba bulimoides*	Species of greatest conservation need		
Quick gloss	*Zonitoides arboreus*	Species of greatest conservation need		
Ringed crayfish	*Orconectes neglectus*	Species of greatest conservation need		
Rocky Mountain capshell	*Acroloxus coloradensis*		Species of special concern	
Subalpine mountainsnail	*Oreohelix subrudis*	Species of greatest conservation need		
Tadpole physa	*Physella acuta*	Species of greatest conservation need		
Umbilicate sprite	*Promenetus umbilicatellus*	Species of greatest conservation need		
Mammals				
Abert's squirrel	*Sciurus aberti*	Species of greatest conservation need		
American pika	*Ochotona princeps*	Species of greatest conservation need		
American pygmy shrew	*Sorex hoyi*	Species of greatest conservation need		
Bighorn sheep	*Ovis canadensis*	Species of greatest conservation need		
Black-tailed prairie dog	*Cynomys ludovicianus*	Species of greatest conservation need	Species of special concern	
Dwarf shrew	*Sorex nanus*	Species of greatest conservation need		
Eastern red bat	*Lasiurus borealis*	Species of greatest conservation need		
Eastern Spotted Skunk	*Spilogale putorius*	Species of greatest conservation need		
Fringed myotis	*Myotis thysanodes*	Species of greatest conservation need		
Hayden's shrew	*Sorex haydeni*	Species of greatest conservation need		
Hispid pocket mouse	*Chaetodipus hispidus*	Species of greatest conservation need		
Little brown myotis	*Myotis lucifugus*	Species of greatest conservation need		
Long-eared myotis	*M. septentrionalis*	Species of greatest conservation need		
Long-legged myotis	*M. volans*	Species of greatest conservation need		
Moose	*Alces alces*	Species of greatest conservation need		
North American wolverine	*Gulo luscus*	Species of greatest conservation need	Endangered	
Northern river otter	*Lontra canadensis*	Species of greatest conservation need	Threatened	Threatened
Northern flying squirrel	*Glaucomys sabrinus*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Olive-backed pocket mouse	*Perognathus fasciatus*	Species of greatest conservation need		
Pallid bat	*Antrozous pallidus*	Species of greatest conservation need		
Plains harvest mouse	*Reithrodontomys montanus*	Species of greatest conservation need		
Plains pocket mouse	*Perognathus flavescens*	Species of greatest conservation need		
Sagebrush vole	*Lemmiscus curtatus*	Species of greatest conservation need		
Sand Hills pocket gopher	*Geomys lutescens*	Species of greatest conservation need		
Silky pocket mouse	*Perognathus flavus*	Species of greatest conservation need		
Spotted ground squirrel	*Xerospermophilus spilosoma*	Species of greatest conservation need		
Swift fox	*Vulpes velox*	Species of greatest conservation need	Species of special concern	Endangered
Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	Species of greatest conservation need	Species of special concern	
Uinta chipmunk	*Tamias umbrinus*	Species of greatest conservation need		
Water vole	*Arvicola amphibius*	Species of greatest conservation need		
Western small-footed myotis	*Myotis ciliolabrum*	Species of greatest conservation need		
Western spotted skunk	*Spilogale gracilis*	Species of greatest conservation need		
White-tailed prairie dog	*Cynomys leucurus*	Species of greatest conservation need		
Wyoming pocket gopher	*Thomomys clusius*	Species of greatest conservation need		
Plants				
Saltwort	*Salicornia rubra*			Endangered
Reptiles				
Common garter snake	*Thamnophis sirtalis*		Species of special concern	
Eastern spiny softshell	*Apalone spinifera*	Species of greatest conservation need		
Great Plains earless lizard	*Holbrookia maculata*	Species of greatest conservation need		
Greater short-horned lizard	*Phrynosoma hernandesi*	Species of greatest conservation need		
Massasauga rattlesnake	*Sistrurus catenatus*		Species of special concern	Threatened
Northern many-lined skink	*Plestiodon multivirgatus*	Species of greatest conservation need		
Northern rubber boa	*Charina bottae*	Species of greatest conservation need		
Pale milk snake	*Lampropeltis triangulum*	Species of greatest conservation need		

Table 3-16. Wyoming, Colorado, and Nebraska State-Listed Species and Species of Concern in the Area of Analysis

Common Name	Scientific Name	Wyoming Status	Colorado Status	Nebraska Status
Plains black-headed snake	*Tantilla nigriceps*	Species of greatest conservation need		
Plains box turtle	*Terrapene ornata*	Species of greatest conservation need		
Plains garter snake	*Thamnophis radix*	Species of greatest conservation need		
Plains hog-nosed snake	*Heterodon nasicus*	Species of greatest conservation need		
Plateau fence lizard	*Sceloporus tristichus*	Species of greatest conservation need		
Prairie lizard	*Sceloporus consobrinus*	Species of greatest conservation need		
Prairie racerunner	*Cnemidophorus sexlineatus viridis*	Species of greatest conservation need		
Prairie rattlesnake	*Crotalus viridis*	Species of greatest conservation need		
Red-sided garter snake	*Thamnophis sirtalis*	Species of greatest conservation need		
Smooth green snake	*Opheodrys vernalis*	Species of greatest conservation need		
Western painted turtle	*Chrysemys picta*	Species of greatest conservation need		
Yellow mud turtle	*Kinosternon flavescens*		Species of special concern	

Sources: Wyoming Game and Fish Department 2017a, Nebraska Game and Parks Commission 2017, Colorado Parks and Wildlife 2017b

The federally listed species described in **Sections 3.8** through **3.10** are given a separate protected status at the state-level in Colorado and Nebraska. Federally listed species also listed at the state level are not included in **Table 3-16**, but their status at the state level in Colorado and Nebraska is the same as their federal status except for the Colorado butterfly plant, which is listed as endangered at the state level in Nebraska. Many of the federally listed species described in **Sections 3.8** through **3.10** are also considered to be species of greatest conservation need in Wyoming.

3.12.2 Impacts from the Proposed Action

Under the Proposed Action, potential impacts on state-listed species and species of concern within the area of analysis in Wyoming, Colorado, and Nebraska would generally be the same as those described in the 2006 Final EIS. Potential impacts of the Proposed Action on these species and their habitats are summarized by state. The Proposed Action is not anticipated to result in substantial adverse impacts for any state-listed species or other species of concern at the state level.

Wyoming

Under the Proposed Action, management of main stem reservoirs and the affiliated fluctuation in reservoir levels and North Platte River flows would result in only localized impacts on riparian and wetland habitats that provide habitat for species of concern in Wyoming.

Potential impacts may include increased predator access to bird islands at Pathfinder Reservoir resulting from low water levels during the nesting period (April through July) for ground-nesting birds such as American white pelican and Caspian terns; however, any potential increase in predator access would be extremely minimal (estimated at 2 percent) and is not likely to result in population-level effects on any species. Changes in pool elevation at Pathfinder Reservoir are not expected to be substantial enough to change the wetland vegetation and habitat values at the Pathfinder National Wildlife Refuge. Management of main stem reservoirs and the concomitant fluctuation in reservoir levels and North Platte River flows are not anticipated to affect cottonwood-riparian species, including Lewis' woodpecker.

Water leasing activities may result in localized impacts on riparian and wetland conditions associated with smaller canals and creeks, but any potential impacts would occur on a temporary basis, only during a few months of particular years.

The Proposed Action would not result in adverse impacts on species of greatest conservation need in Wyoming.

Colorado

The Tamarack Project, completed during the First Increment of the Program, resulted in improved habitat conditions for a variety of Colorado state-listed species that occupy riverine and wetlands habitat. The project resulted in elevated water tables in riparian meadows, increased groundwater return flows to the sloughs and river channels at the State Wildlife Areas, and creation of wetland habitat. Under the Proposed Action, continued operation of the project would result in ongoing benefits to a variety of Colorado state-listed species, including the boreal toad, northern leopard frog, northern cricket frog, wood frog, plains leopard frog, yellow mud turtle, brassy minnow, common shiner, Iowa darter, lake chub, plains minnow, stonecat, and suckermouth minnow. On the contrary, water leasing actions under the Proposed Action could adversely affect riparian habitats and species occupying habitats that depend on irrigation return flows to maintain water levels; however, potential adverse impacts would be localized and would not result in population-level effects on any listed species.

No other Colorado state-listed species or habitats are anticipated to be affected under the Proposed Action, and the Proposed Action would not result in adverse impacts on any state-listed species or species of special concern in Colorado.

Nebraska

Continuation of the Program under the Proposed Action could benefit the Massasauga rattlesnake because alteration of hydrology associated with flow management activities could improve wet meadow quality in drier years, as described in the 2006 Final EIS.

Similarly, flow management activities under the Proposed Action would result in ongoing benefits to the northern river otter associated with improved habitat conditions and increased prey abundance in major streams within the North Platte River Sub-basin.

No other Nebraska state-listed species or habitats are anticipated to be affected under the Proposed Action, and the Proposed Action would not result in adverse impacts on any state-listed species in Nebraska.

3.12.3 Impacts from the No Action Alternative

Under the No Action Alternative, the Program would not be continued. Discontinuation of the Program would have no effect on state-listed species and species of concern because none of the actions associated with the Proposed Action would occur, and the effects of those actions on state-listed species and species of concern, described above, would not occur. Any potential future benefits to state-listed species and species of concern associated with ongoing Program activities, such as improved conditions in riparian, wetland, and wet meadow habitats, would not be realized.

3.13 Sandhill Cranes

3.13.1 Affected Environment

Source: Service
*Sandhill crane (*Grus canadensis*)*

In the 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006), the sandhill crane (*Grus canadensis*) is listed by the Program as a species of concern. It is as a State of Colorado species of special concern, with additional protection under the Migratory Bird Treaty Act of 1918 (MBTA). The species was further evaluated in the 2006 Final EIS because of the potential of impact by the proposed alternatives, given that the North Platte and Platte Rivers (Platte Rivers) and surrounding lands serve as important stopover grounds within their migratory path. The Sandhill Cranes Appendix was developed within the 2004 Draft EIS as a technical appendix to further discuss the existing conditions and habitat and population trends of the species. It was subsequently modified in the 2006 Final EIS (Reclamation and Service 2006).

It was estimated in the 2006 Final EIS that more than 500,000 cranes, which make up approximately 80 percent of the entire U.S. population of cranes, use the Platte Rivers between February and April. In 2017, the Service published the administrative report Status and Harvests of Sandhill Cranes, Mid-continent, Rocky Mountain, Lower Colorado River Valley and Eastern Populations, which states the 2017 population estimate for sandhill cranes in the central Platte River valley (CPRV), Nebraska, shows a 40 percent population increase from the previous year (Dubovsky 2017). Overall, there has been a population increase of sandhill cranes in the CPRV of 5 percent between 2006 and 2017 (Dubovsky 2017).

The 2016 Service administrative report, Status and Harvests of Sandhill Cranes, Mid-continent, Rocky Mountain, Lower Colorado River Valley and Eastern Populations, suggests that agricultural practices in the CPRV are shifting to production of soy bean crops instead of the historic corn crops that the sandhill cranes are accustomed to (Dubovsky 2016 pg. 12). This shift in agricultural crops may affect the sandhill crane population due to the nutritional differences in the crops, as soybeans contain less fat than corn and would not meet the bird’s high caloric migration requirements; however, damage to croplands, caused by sandhill cranes, is leading to agricultural developments seeking alternative methods to protect the cropland.

Use of chemical deterrents is being developed and proposed to keep sandhill cranes from consuming the corn and causing damage to the cropland (Blackwell et. al 2001). Although it may be beneficial to the crops and cropland, taking away the food source that sandhill cranes have become dependent on could have impacts on the population or health of the cranes if the food source is not replaced in an alternate nearby location.

Wide-channel habitat, used by sandhill cranes, is managed for protection of whooping cranes, a Service endangered species in the CPRV. The 53-mile stretch along the CPRV in Nebraska, referred to as Big Bend Ranch, is designated critical habitat for whooping cranes. Within the past 11 years, progress has been made in the management of wide-channel habitat under the Program. Between 2006 and 2016 approximately 24,807 acres of in-channel vegetation management (disking and herbicide application) was accomplished (Program GIS 2017). These activities, combined with natural peak flows, decrease the amount of vegetation within the river channels and in turn increase the surface area of the water, thereby improving the wide-channel suitable roosting habitat for sandhill cranes.

As of March 2016, the Program had acquired 12,650 acres of land along the Platte River (Program 2016c). The ability to directly manage the land may allow for more flexibility in the protection of the species.

3.13.2 Impacts from the Proposed Action

Under the Proposed Action, the Program would continue to support water and land use practices that would protect, restore, and maintain habitat for the target species. Although sandhill cranes are not one of the target species, they would indirectly be protected by these practices, as they depend on habitat like whooping crane habitat.

3.13.3 Impacts from the No Action Alternative

Direct impacts could be caused by habitat shifts that may cause changes in population numbers of sandhill cranes. If Program Assets are purchased by signatories that would continue to manage Program Assets to provide habitat for the target species, trends would also continue as described under the 2006 Final EIS. Program Assets could be sold without the condition that they be managed to provide habitat for the target species; in this case, habitat for sandhill cranes could be depleted depending on how the purchaser decides to manage the Program Assets.

3.14 Fisheries

3.14.1 Affected Environment

Although both rivers and reservoirs serve as habitat for fish species, the creation of 15 dams and reservoirs in the Platte River basin has altered the natural flow of the rivers and in turn has eliminated or altered habitat for native fish species. The reservoirs serve an important role in flood control and water supply management. The reservoirs that have been developed are subsequently used for recreation, including sport fishing. The species of fish that can tolerate life in a reservoir are different from those that are adapted to turbid, free-flowing rivers.

Three separate sections to evaluate impacts on fisheries along the Platte River system were developed in the 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006): the Central Platte Fishery, North Platte Fishery, and Nebraska Sport Fisheries. Individual technical appendices were developed for each and included in the 2006 Final EIS.

The overall 2006 Program First Increment objective includes increasing target flows by 130,000 to 150,000 acre-feet and providing 10,000 acres of managed and restored habitat (Program 2006a). Benefits of this goal include restoring natural habitat for native fish species in the river by the reintroduction of sufficient water levels at critical times of the year. The adverse effects on reservoir fisheries identified in the 2006 Final EIS include quality of fisheries and average fishing visitation caused by the decreased water levels at four of the major reservoirs on the north Platte River: Seminoe, Pathfinder, and Glendo in Wyoming and Lake McConaughy in Nebraska (Reclamation and Service 2006).

Although the Program goal of 130,000 to 150,000 acre-feet increased target flow has not been reached, three water projects have been developed since 2006 and have collectively gained 80,000 acre-feet per year for the system. Factors outside the control of the Program, such as local weather conditions and regional climate patterns, also had a notable influence on water flows. For example, water years 2009 and 2013 were relatively dry, and water year 2011 was one of the wettest years on record (Tetra Tech 2015). Increased flow in the river system during relevant periods improves habitat for fish by lowering water temperature, reducing the fluctuation of temperature, and increasing the amounts of available macronutrients (Reclamation and Service 2006).

Water levels in the four major reservoirs have not decreased, due to releases to meet the Program objectives, below levels suitable for maintaining successful fish populations or recreation between 2006 and 2017 (Reclamation 2017a).

Between 2006 and 2016, approximately 24,807 acres of in-channel vegetation management (disking and herbicide application) was accomplished (Program GIS 2017). These activities decrease the amount of vegetation within the river channels and in turn alter the fish habitat within the stretches of river.

3.14.2 Impacts from the Proposed Action

Impacts from the Proposed Action would likely remain similar to what has been observed since the implementation of the Program. The Program extension would allow for more progress toward meeting the goal of increasing the water during relevant times in the system by 130,000 to 150,000 acre-feet. This would help restore natural habitat for native fish species in the river by the reintroduction of sufficient water levels at critical times of the year. Water releases to meet Program objectives would not likely decrease reservoirs below levels suitable for maintaining successful fish populations.

The Program’s influence on mean monthly discharge is expected to continue under the Proposed Action. It is expected that knowledge gained during the First Increment can be used to continue improving the mean monthly discharge during the extension of the First Increment under the Proposed Action.

3.14.3 Impacts from the No Action Alternative

Under the No Action Alternative, a less unified approach to management would occur, which would affect the central Platte River basin. This has the potential for introducing conflicting or inconsistent approaches to managing water quality and quantity in a highly dynamic, interconnected hydrologic system, thereby reducing the likelihood for meeting goals, such as target flows, in the central Platte River basin. This would likely degrade natural habitat for native fish species in the river.

3.15 Wildlife

3.15.1 Affected Environment

In the 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006) wildlife species in the area of analysis are described under Central Platte River Terrestrial Vegetation Communities and Land Use Types chapters. Common species include eastern cotton-tail (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), striped skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), muskrat (*Ondatra zibethicus*), beaver (*Castor canadensis*), and various mice (*Mus* spp.) and voles (*Microtus* spp.). These species are described in greater detail in the 2006 Final EIS (Reclamation and Service 2006).

The types of species and habitat associations are the same as those described in the 2006 Final EIS. Abundance and distribution have changed for some species, and population numbers for some species have fluctuated due to diseases and other stressors (Schneider et al. 2011; Colorado Parks and Wildlife 2015; Wyoming Game and Fish Department 2017b).

3.15.2 Impacts from the Proposed Action

Under the Proposed Action, the nature and type of impacts on wildlife would be the same as described in the Central Platte River Terrestrial Vegetation Communities and Land Use Types chapter of the 2006 Final EIS (Reclamation and Service 2006). Minor reductions in wildlife habitat types, such as agricultural lands, woodlands, and shrublands, would likely continue as described in the 2006 Final EIS; however, any impacts on wildlife that use these habitats would be localized.

Actions that focus on restoring, maintaining, and acquiring habitat for the benefit of the target species would likely indirectly benefit wildlife, particularly those species associated with wetland habitats.

3.15.3 Impacts from the No Action Alternative

If Program Assets are purchased by signatories who would continue to manage them to provide habitat for the target species, then trends for wildlife habitat would also continue as described under the 2006 Final EIS. Program Assets could be sold without the condition that they be managed to provide habitat for the target species; in this case, the number acres of wildlife habitat may change, but for other reasons, depending on how the purchaser decides to manage Program Assets.

3.16 Recreation

3.16.1 Affected Environment

Many state parks, state recreation areas, and state wildlife management areas have been developed around or along the lakes, reservoirs, and rivers of the Platte River basin. The 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) provides details of the recreation resources in the area of analysis (e.g., reservoirs, lakes, fisheries, wildlife areas, and state parks). Recreation access to Program lands is by written permission only, granted through the Platte River Recreation Access Program (internet website: www.platteaccess.org).

Allowed activities are deer hunting, turkey hunting, waterfowl hunting, small game hunting, fishing, mushroom collecting, birdwatching, and hiking. Some sites may have additional restrictions. Specific information on Platte River recreation areas, including location and restrictions, can be found at http://apps.outdoornebraska.gov/PlatteRiver/uploadedimages/Platte_River_Recreation_Access_Maps.pdf.

3.16.2 Impacts from the Proposed Action

Under the Proposed Action, access to current Platte River recreation areas and any newly acquired lands would be managed as described above. By maintaining habitat for the benefit of the target species, recreation opportunities would also be available. Acquired lands could offer more opportunities for recreation than currently exist for the general public. Increased recreational opportunities could lead to monetary benefits for the local economy as well.

3.16.3 Impacts from the No Action Alternative

When the Program ends in 2019, until Program Assets are sold, trends for recreation would continue as described under the 2006 Final EIS. If Program Assets are purchased by signatories that would continue to manage Program Assets to provide habitat for the target species, trends would also continue as described under the 2006 Final EIS. Program Assets could be sold without the condition that they be managed to provide habitat for the target species; in this case, opportunities for recreation could be depleted depending on how the purchaser decides to manage the Program Assets.

3.17 Land Use/Realty

3.17.1 Affected Environment

Lands along the main stems of the North Platte River, South Platte River, and Platte River consist largely of agricultural and urban uses. Some of these uses, particularly those within a few miles of the river, rely on water from the Platte River system for irrigation and municipal and industrial purposes. The South Platte River basin is the most densely populated and has the highest concentration of urban development, particularly in the western portion of the basin along the front range of Colorado. Public spaces, such as parks and open space, are also common throughout the area of analysis. These spaces provide an opportunity for the public to view river water and associated riparian habitats and wildlife.

There are approximately 12,000 acres of conservation lands in the area of analysis. These lands are either held in title by the Platte River Recovery Implementation Foundation, or managed by the Program via a contractual agreement, such as an easement or lease, with the landowner. Conservation lands are not available for future urban or agricultural development, unless the Program and landowner, where applicable, mutually agree to relinquish the conservation easement or related land encumbrance.

3.17.2 Impacts from the Proposed Action

Under the Proposed Action, the Program would acquire from a willing seller, or multiple sellers, up to 1,500 acres of lands. Acquired lands would be either purchased and held under title by the Platte River Recovery Implementation Foundation, or placed within a conservation easement, lease, or similar encumbrance that runs with the land in exchange for compensating the underlying landowner. The Proposed Action would change the predominate land use of the acquired lands from agriculture or general open space to protected open space. Uses on the acquired lands would be restricted to those that do not adversely affect the target species or may benefit them. The Program would continue operating under the good neighbor policy and, as such, would continue paying the applicable taxes at equivalent levels, which would ensure the tax base remains largely unchanged.

3.17.3 Impacts from the No Action Alternative

Upon the Program's termination, Program Assets would be made available for acquisition by another partnership or environmental entity, or sold to a willing buyer on the open realty market. If Program Assets are purchased by signatories or similar groups that would continue to manage Program Assets to provide habitat for the target species, land uses would also continue as described under the 2006 Final EIS. If Program Assets are sold without the condition that they be managed to provide habitat for the target species, lands may revert to agricultural, urban, or other non-conservation open space uses. This could increase the amount of non-conservation-related uses along the Platte River by up to 12,000 acres beyond 2019.

3.18 Agricultural Economics

3.18.1 Affected Environment

The 2006 Platte River Recovery Implementation Program Final EIS (Reclamation and Service 2006) described cropping patterns, yields, and estimated revenue for irrigated crops in the area of analysis from 1998 to 1997. Updated data is provided below as relevant. Data is limited to the economic regions for which an impact on agricultural economics was anticipated in the 2006 Final EIS, the central Platte River habitat area, Eastern Wyoming area, and North Platte Headwaters area.

Based on the data from the past two agricultural censuses, completed by the National Agricultural Statistical Service in 2007 and 2012, total irrigated acres in the economic regions of interest have remained stable over the past 10 years (see **Table 3-17**). As compared with data reported in the 2006 Final EIS, an increase was seen in irrigated harvested acres in the central Platte River habitat area, slight decrease in the Eastern Wyoming area, and decrease in the North

Table 3-17. Irrigated Harvested Cropland (Acres)

Year	Central Platte River Habitat Area	Eastern Wyoming Area	North Platte River Headwaters Area
2012	1,830,900	162,300	291,444
2007	1,897,700	157,000	296,511
1988-1997[1]	1,693,200	176,600	326,920

Source: USDA 2012; Reclamation and Service 2006
[1]As reported in the 2006 Final Platte River Recovery Implementation Program EIS.
Note: Acres are rounded to the nearest 100 acres

Platte Headwaters area; however, it should be noted that the 2006 Final EIS data represented a 10-year average and was based on specific field crop data, and may not be directly comparable to 2007 and 2012 data.

Estimated agricultural revenue based on primary crops, price of products, and average yield was estimated in the 2006 Final EIS. Price per acre from harvested crops can, however, vary dramatically based on market conditions, impacting associated revenues. Corn for grain is the primary product harvested on irrigated land in the economic area of interest. From 1996 to 2000, the price for corn for grain ranged from a low of $271 per plated acre in 1996 to a high of $761 in 2012 (USDA 2017).

3.18.2 Impacts from the Proposed Action

Acquiring up to a total of 130,000 acre-feet of water beyond current 90,000-acre-foot levels for Program conservation use would result in potential reductions to the acres of irrigated lands, and related production levels and revenues as detailed in the 2006 Final EIS. Because the total annual acre-feet for the First Increment may be reduced from the original maximum projections, related impacts on irrigated acres may also be decreased from projected levels. Reduction in farmed acres is most likely to occur in the central Platte River habitat area, Eastern Wyoming, and North Platte Headwater economic regions. Substitution of dryland farming, as discussed in the 2006 Final EIS, is likely to offset some economic losses only in the central Platte River habitat area, where the average precipitation levels necessitate this method.

As discussed in the 2006 Final EIS, reductions in irrigation consumptive use was estimated at 1 percent average annual use, minimizing Program impacts on regional agricultural economics. Acres irrigated, cropping patterns, and revenue would continue to vary based on factors independent of the Proposed Action, including precipitation levels and market conditions.

Acquiring and managing an additional 1,500 acres of land to provide improved habitat for the target species could have impacts on the agricultural economy when these lands are currently farmed. Impacts would be limited to the central Platte River habitat area, where acquisitions would primarily occur, and would be minor in nature due to the limited acreage involved and variable production levels of current lands that may be acquired.

3.18.3 Impacts from the No Action Alternative

Upon termination, Program Assets would be made available for acquisition by another partnership or environmental entity, or sold to a willing buyer on the open realty market. If Program Assets are purchased by signatories or similar groups that would continue to manage

Program Assets to provide habitat for the target species, the level of irrigated lands, cropping patterns, production, and associated revenues would remain similar to the 2006 Final EIS. If Program Assets are sold without the condition that they be managed to provide habitat for the target species, Program lands and water may be available for other uses, including more intensive irrigated agriculture, with higher crop yields and associated revenues; however, land may also be developed for other nonagricultural purposes, such as residential and commercial development, which would decrease the contribution from agricultural economics to the local economies.

3.19 Regional Economics

3.19.1 Affected Environment

The 2006 Final Platte River Recovery Implementation Program EIS (Reclamation and Service 2006) described regional sales, income, taxes, and employment in the area of analysis. Updated summary data is provided below for key indicators as based on Headwater Economics, Economic Profile System (Headwater Economics 2017). Headwater Economics compiles published government data from sources such as the U.S. Census Bureau, Bureau of Economic Analysis, and Bureau of Labor Statistics. Data is provided for the Platte River basin, excluding counties in the South Platte Headwater economic area and the Denver Metro area economic regions, for which no economic impacts were found in the 2006 Final EIS.

Following trends since 1970 in the Platte River basin, service industry employment has continued to rise since 2000, with over 61 percent of people employed in the service industry sectors. Non-service industries saw a decline over the same time period, with 20.7 percent employment in 2016. As seen in the 2006 Final EIS, farm industry employment has gradually declined, to 3.7 percent in 2016 (see **Table 3-18**).

Table 3-18. Platte Basin Employment by Sector

Total Employment	2001	2016
Non-services related	23.3%	20.7%
Farm	4.9%	3.7%
Forestry, fishing, and agricultural services	0.6%	0.7%
Mining (including fossil fuels)	1.2%	2.3%
Construction	7.2%	6.7%
Manufacturing	9.4%	7.3%
Services related	58.2%	61.6%
Utilities	0.2%	0.3%
Wholesale trade	3.1%	3.2%
Retail trade	12.1%	10.6%
Transportation and warehousing	3.1%	3.5%
Information	1.4%	1.2%
Finance and insurance	3.7%	4.2%
Real estate and rental and leasing	3.3%	4.9%
Professional and technical services	4.5%	5.1%
Management of companies and enterprises	0.4%	0.6%
Administrative and waste services	4.4%	4.3%
Educational services	0.7%	1.0%
Health care and social assistance	7.8%	8.2%

Table 3-18. Platte Basin Employment by Sector

Total Employment	2001	2016
Arts, entertainment, and recreation	1.6%	1.8%
Accommodation and food services	6.9%	7.2%
Other services, except public administration	5.3%	5.3%
Government	16.4%	16.1%

Source: Headwater Economics 2017

Contributions from farming represent 4.4 percent of labor income in 2016. Per-capita income in the Platte River basin counties increased at approximately 25 percent as compared to 15 percent for the United States overall from 2001 to 2016 (Headwater Economics 2017).

3.19.2 Impacts from the Proposed Action

The Proposed Action would continue to bring money into the economic region through payments for land and water acquired or leased by the Program from willing participants. Acquiring up to 130,000 acre-feet of water beyond current 90,000 acre-foot levels and an additional 1,500 acres conservation lands would continue to affect income through direct payment from the Program as discussed in the 2006 Final EIS. Location of impacts would depend on specific areas where water is acquired and the method used (i.e., purchasing or leasing).

Construction of Program features and facilities affects both local income and business receipts and taxes. The construction of large-scale projects detailed in the reconnaissance-level water action plan has not occurred to the extent anticipated in the 2006 Final EIS. As a result, contributions to local area economies from these elements may have been lower than projected in the 2006 Final EIS analysis. Assuming an emphasis on water action plan projects, such as slurry wall pits and recharge areas, this trend is likely to continue.

Impacts would continue to occur to agricultural sector employment and income where use of water for conservation purposes leads to a decrease in irrigated acres as discussed in **Section 3.18**. A decrease in irrigated acres would have variable impacts depending on the type of crop production lost and the associated employment, income, and taxes.

As detailed in the 2006 Final EIS, projected economic impacts are less than or equal to one-tenth of 1 percent of the economic activity in the region. While minor changes have occurred to existing conditions, this analysis is likely to remain true under the extension of the First Increment. The specific distribution of effects depends upon location of site-specific implementation of activities, including water leasing and water management activities.

3.19.3 Impacts from the No Action Alternative

Upon termination, Program Assets would be made available for acquisition by another partnership or environmental entity, or sold to a willing buyer on the open realty market. If Program Assets are purchased by signatories or similar groups that would continue to manage Program Assets to provide habitat for the target species, impacts on employment, income, taxes, and sales would remain like those described in the 2006 Final EIS. In addition, while assets remained the responsibility of the signatories, property taxes would therefore continue to be paid, and no impacts on local county tax revenues would occur. If Program Assets are sold without the condition that they be managed to provide habitat for the target species, land and water use may revert to agricultural, urban, or other uses. As a result, employment, income, taxes, and sales would be dependent on the land uses and would vary throughout the area of analysis.

4.0 Environmental Commitments

4.1 Introduction

The following is a list of environmental commitments that would be undertaken by the Program, as appropriate, when carrying out Program activities. All Program activities undertaken with federal funds or require that federal permits or involve federal facilities, will be considered federal actions and subject to federal environmental laws, such as NEPA, ESA, and the Clean Water Act of 1972 (CWA).

These environmental commitments generally are intended to avoid, minimize, or compensate for adverse environmental impacts that would otherwise occur because of Program implementation activities. In some cases, these commitments help ensure that such activities are conducted in accordance with applicable laws and guidelines. Some actions may require compliance with other federal laws and regulations not listed here.

4.2 Federal Laws

4.2.1 National Environmental Policy Act

As described in **Section 1.4**, this EA covers the regional- and system-wide impacts of the Proposed Action, as far as they can be foreseen. Under the Proposed Action, feasibility studies would be undertaken for several Program facilities and individual projects selected. Also, procedures would be established to solicit offers for habitat land and Program water supplies that may be purchased or leased for the Program in whole, or in part, with federal funds. These actions may require evaluation and appropriate documentation under NEPA, tiered off this EA.

The following is a list of future Program activities that likely will require further NEPA analysis:

- Water action plan projects undertaken with federal funds, including water conservation and supply projects (site-specific impact analysis), such as leasing, acquiring and retiring farmland, creating broad-scale recharge areas, and small-scale slurry wall water storage pits
- Program land restoration with federal funds that is likely to affect the environment (site-specific impact analysis)

4.2.2 Fish and Wildlife Coordination Act

The Fish and Wildlife Coordination Act of 1934 (FWCA) reads as follows:

> [W]henever the waters or channel of a body of water are modified by a department or agency of the U.S., the department or agency first shall consult with the Service and with the head of the agency exercising administration over

> the wildlife resources of the state where construction will occur, with a view to the conservation of wildlife resources. The Act provides that land, water, and interests may be acquired by federal construction agencies for wildlife conservation and development. In addition, real property under jurisdiction or control of a federal agency and no longer required by that agency, can be utilized for wildlife conservation by the state agency exercising administration over wildlife resources upon that property.

The specific reports and recommendations of the Secretary and the state agency on the wildlife aspects of such projects must be made part of the responsible federal agency's report. It is intended that the reports and recommendations be based on surveys and investigations to determine possible damage to wildlife resources and measures that should be adopted to prevent their loss or damage. Federal agencies must consider the reports.

It is likely that some of the specific Program implementation activities will trigger consultation under the FWCA. An example of this is water action plan projects undertaken with federal funds, including water conservation and supply projects (site-specific impact analysis), such as leasing, acquiring and retiring farmland, creating broad-scale recharge areas, and small-scale slurry wall water storage pits.

4.2.3 Clean Water Act

The habitat restoration activities under the Proposed Action are likely to involve significant efforts to restore river channel and wet meadow habitat in the Central Platte Habitat Area. Specific plans will be developed once the Program begins acquiring interests in habitat lands. The "Wetlands" section in Chapter 5 of the 2006 Final EIS (page 5-89) projects that the Proposed Action would lead to a significant increase in wetlands that fall under the CWA, Section 404, jurisdiction (Reclamation and Service 2006).

When Program lands are acquired and plans are developed for river channel and wet meadow restoration, Section 404 permits will be needed before restoration activities begin that may require discharging dredge or fill material to Waters of the U.S., such as moving river sand perched on islands back into the active river channel.

Where such actions are undertaken, specific proposals would be developed and subject to analysis under the CWA, Section 404, provisions to support a request for a permit. The development and analysis of these proposals would be coordinated with appropriate offices of the Corps and the EPA.

The following process is anticipated for obtaining site-specific Section 404 permits for the channel and wet meadow restoration in the Central Platte Habitat Area:

- Land and channel restoration may be subject to local, state, and federal permitting processes. Under the Program, on acquisition of lands, the Program would develop management plans to describe the appropriate restoration, maintenance, and other management activities. Generally, parcel-specific management plans are expected to be approved and implementation is to begin within 1 year of acquisition.

- Management activities would be subject to CWA, Section 404; permitting and development of these plans would require close coordination with the Corps in Omaha, Nebraska. Concurrently, site plans would be submitted to federal, state, and local regulatory agencies for a final determination of permit requirements and necessary approvals. Information to be included in the pre-construction review phase would include the following:
  - Statement of site restoration goals and objectives
  - Pre-construction site characterization
  - Description of restoration treatments and management plans
  - Description of site's anticipated response
  - Specification of performance standards, monitoring protocols, and identification of remedial management prescriptions, should performance standards and project targets be deficient
  - Documentation of site protection measures and maintenance methods
  - Documentation of final assurances (financial obligations, responsible parties, and schedules)

The Proposed Action's water action plan includes construction of off-stream reservoirs, slurry wall pits, and broad-scale recharge areas in the central Platte valley as part of the water action plan. As with all the water action plan elements, feasibility investigations of each element must occur before the element being adopted by the Program. If the Program chooses to proceed with any of these elements, site-specific NEPA analysis would be undertaken. If wetland impacts are likely, a site-specific analysis of wetland would be undertaken as part of the NEPA analysis of alternatives, to support application for a site-specific Section 404 permit.

4.2.4 Endangered Species Act

All site-specific Program actions that could affect listed species or their habitat would be assessed under the ESA beforehand. The Program will evaluate the potential impact of Program site-specific activities on other listed species when Program activities are proposed and before they are implemented. The Program will take appropriate actions if adverse impacts on other listed species or designated critical habitats are identified. Any adverse impacts would be avoided, or offset based on consultation with the Service.

4.2.5 Migratory Bird Treaty Act

The MBTA prohibits the take of migratory birds. EO 13186 requires federal agencies to avoid impacts on migratory birds. Under the Program, clearing woods and shrubs from riparian areas to restore river channel habitat and wet meadows would reduce migratory bird habitat and could result in unintentional take of these species. In compliance with EO 13186, such activities would be restricted to those periods of the year when nesting activities do not occur, to minimize the chances of unintentional take. Each site-specific NEPA analysis tiered to this EA will examine potential methods to reduce impacts on migratory birds and implement those methods found to be reasonable.

4.2.6 National Historic Preservation Act

According to the National Historic Preservation Act of 1966 (NHPA), where site-specific Program actions may affect cultural resources or sites and structures listed on or eligible for listing on the National Register of Historic Places (NRHP), consultation would be undertaken by the Program with the State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation (ACHP). Appropriate surveys would be undertaken and incorporated into site-specific planning and evaluation. Programmatic agreements would be implemented with each state and interested tribes, providing a process for consultation and mitigation. This would take place when these Program actions and others are found likely to affect cultural or historic resources.

4.2.7 Farmland Protection Policy Act

According to the Farmland Protection Policy Act of 1981, for each site-specific NEPA compliance analysis for Program actions, the Program would coordinate with the Natural Resources Conservation Service. It would do this to identify prime farmlands that might, through Program actions, be permanently converted to nonagricultural uses and to consider conversion of these lands when deciding where to pursue construction and habitat restoration actions. The Program would strive to minimize unnecessary and irreversible conversion of prime farmlands.

4.3 Monitoring

The Proposed Action incorporates an extensive strategy of resource monitoring and research. The IMRP would continue to monitor key resource features. It would also provide ongoing feedback to Program decisionmakers about trends in environmental and species conditions and the impact of Program actions on those resources. The IMRP can be found in the Implementation Program Document: Attachment 3: Adaptive Management Plan (Program 2006a).

Two additional items were identified in the 2006 Final EIS analysis that will be incorporated into the IMRP:

- **Selenium—**As described in the “Water Quality” section in Chapter 5 (page 5-67) of the 2006 Final EIS, two elements of the Proposed Action (Groundwater Management in the Central Platte Groundwater Mound Area and Dry Creek/Fort Kearney Cutoffs) could increase inputs of selenium to the central Platte River (Reclamation and Service 2006). If these elements, or similar elements, were pursued by the Program, the associated feasibility studies should carefully assess, and avoid where possible, the risk of increasing selenium inputs to the river. Where Program actions ultimately may affect selenium concentrations in the river, monitoring of this element would be added to the Program IMRP.
- **Copper, Lead, and Nickel—**The “Water Quality” analysis in Chapter 5 (page 5-67) of the 2006 Final EIS indicates that there are levels of copper, lead, and nickel exceeding EPA advisory levels in the central Platte River sediments (Reclamation and Service 2006). Monitoring of these constituents in sediment, water, and biota will be added to the Program IMRP to track the impacts of channel management activities in the Proposed Action, specifically vegetation clearing, island leveling, sediment augmentation.

5.0 Consultation and Coordination

This chapter details the consultation and coordination among Reclamation and other federal, state, and local agencies, American Indian tribes, and the public in preparing this Draft EA.

5.1 Public Involvement

Public involvement is a vital part of the EA process. It provides an opportunity for those affected by project actions to take part in the decision-making process and facilitates full environmental disclosure. Guidance for implementing public involvement under NEPA is codified in 40 CFR 1506.6 and 43 CFR 46, ensuring that federal agencies make a diligent effort to involve the public in the NEPA process.

Public involvement is being conducted throughout the course of the EA process; the public has specific opportunities to comment during the following phases:

- Public scoping before NEPA analysis begins, to determine the scope of issues and alternatives to be addressed in the EA; this phase occurred during the 45-day, September 18 to November 2, 2017, scoping period and is summarized in a scoping report published in December 2017 (Reclamation 2017b)
- Public review of and comment on this Draft EA (February 28 through April 14, 2018)

Public outreach during the public scoping period included the following:

- Distributing a press release on September 18, 2017, announcing the public scoping period and public open houses
- Placing newspaper advertisements in the *Scottsbluff Star-Herald* on September 19, 2017, the *Grand Island Independent* and *Loveland Reporter Herald* on September 21, 2017, and the *Torrington Telegram* on September 22, 2017
- Announcing the public scoping meetings via Reclamation's project website, https://www.usbr.gov/gp/nepa/platte_river/index.html

Reclamation held a public scoping open house at each of the following locations, from 6:00 to 8:00 p.m. on the dates shown:

- Wednesday, October 4, 2017—Goshen County Fair Grounds, 7078 Fairgrounds Road, Torrington, Wyoming
- Thursday, October 5, 2017—The Ranch Events Complex, 5280 Arena Circle, Loveland, Colorado

- Wednesday, October 11, 2017—Hotel Grand, 2503 S. Locust Street, Grand Island, Nebraska
- Thursday, October 12, 2017—Program Executive Director's Office, 4111 4th Avenue, Suite 6, Kearney, Nebraska

Reclamation staff prepared the handouts, conducted the open houses, and answered questions during the open houses.

Six comment letters, emails, and forms were received during the scoping period, from individuals, public works departments, and state agencies. More information on the scoping process, including comments received, may be found in the Scoping Summary Report (Reclamation 2017b), which is available on the project website, https://www.usbr.gov/gp/nepa/platte_river/index.html. Reclamation took these comments into consideration in developing the Draft EA and incorporated this feedback, as appropriate, during alternatives development and impact analysis.

5.2 Cooperating Agency Involvement

In August 2017, Reclamation sent letters to 10 federal cooperating agencies on the 2006 Platte River Recovery Implementation Program Final EIS, inviting them to be cooperating agencies on the EA. To date, the following agencies have accepted:

- U.S. Department of Agriculture, Natural Resources Conservation District—West
- EPA, Region 7
- U.S. Forest Service, Rocky Mountain Region
- Corps, Omaha District

5.3 Native American Consultation

Reclamation sent letters to 39 tribes (see **Table 5-1**) in October 2017. In these letters, Reclamation informed them of the upcoming preparation of the Draft EA, notified them of the scoping meetings, solicited their comments, and offered to meet with the tribe at their request. Of the 39 letters sent, Reclamation received one response from the Lower Sioux Indian Community of Minnesota. They indicated their support of the project goal, declined to comment further, and deferred to the local tribes of Wyoming, Colorado, and Nebraska. Copies of the scoping postcard were emailed to tribes that provided email addresses.

Table 5-1. Native American Consultation

Spirit Lake Tribe, North Dakota	Shakopee Mdewakanton Sioux Community of Minnesota
Cherokee Nation	Pawnee Nation of Oklahoma
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation, South Dakota	Lower Brule Sioux Tribe of the Lower Brule Reservation, South Dakota
Cheyenne and Arapaho Tribes, Oklahoma	Jicarilla Apache Nation, New Mexico
Winnebago Tribe of Nebraska	Fort Sill Apache Tribe of Oklahoma
Otoe-Missouria Tribe of Indians, Oklahoma	Kiowa Indian Tribe of Oklahoma
Upper Sioux Community, Minnesota	Three Affiliated Tribes of the Fort Berthold Reservation, North Dakota
Flandreau Santee Sioux Tribe of South Dakota	Lower Sioux Indian Community in the State of Minnesota
Santee Sioux Nation, Nebraska	Northwestern Band of Shoshone Nation
Prairie Island Indian Community in the State of Minnesota	Eastern Shoshone Tribe of the Wind River Reservation, Wyoming
Wichita and Affiliated Tribes	Ponca Tribe of Indians of Oklahoma
Assiniboine & Sioux Tribes of the Fort Peck Indian Reservation, Montana	Cheyenne River Sioux Tribe of the Cheyenne River Reservation, South Dakota
Crow Creek Sioux Tribe of the Crow Creek Reservation, South Dakota	Crow Tribe of Montana
Mescalero Apache Tribe	Northern Arapaho Tribe of the Wind River Reservation, Wyoming
Northern Cheyenne Tribe	Oglala Sioux Tribe
Omaha Tribe of Nebraska	Ponca Tribe of Nebraska
Rosebud Sioux Tribe of the Rosebud Indian Reservation, South Dakota	Shoshone-Bannock Tribes of the Fort Hall Reservation
Shoshone-Paiute Tribes of the Duck Valley Reservation, Nevada	Southern Ute Indian Tribe
Standing Rock Sioux Tribe of North & South Dakota	Ute Mountain Ute Tribe
Yankton Sioux Tribe of South Dakota	

5.4 U.S. Fish and Wildlife Service Consultation

To comply with ESA Section 7(a)(2), Reclamation is using this EA as a BA to address the potential impacts of the proposed First Increment Extension. The EA and BA analyze impacts on the target species (whooping cranes, interior least terns, piping plovers, and pallid sturgeons) and other federally-listed species. Any impacts on designated or proposed critical habitat will also be evaluated in the EA and BA.

Once Reclamation submits the BA to the Service, and once the Service considers it sufficient, formal consultation under ESA Section 7(a)(2) and 50 CFR, 402. will have begun. The Final EA will include the BO.

5.5 Cultural Resources

Section 106 of the NHPA requires federal agencies to take into account the impacts of their undertakings on historic properties. It gives the ACHP a reasonable opportunity to comment. Site-specific Program actions may affect cultural resources or sites and structures listed on or eligible for listing on the NRHP. To comply with Section 106, the Program would consult with the SHPO and the ACHP.

6.0 List of Preparers

A list of individuals with primary responsibility for conducting this study, preparing the documentation, and providing technical reviews is below:

Name	Title	Project Role
Bureau of Reclamation		
Brock Merrill	Special Projects Coordinator	Project Manager
Jennifer Beardsley	Natural Resource Specialist	NEPA Advisor/Program and environmental review
David Trimpe	Natural Resource Specialist/Biologist	ESA content review
Dr. George Shannon	Great Plains Regional Archaeologist	Cultural resource content review
U.S. Fish and Wildlife Service		
Matt Rabbe	Senior Wildlife Biologist	ESA consultation/Program and environmental review
Thomas Econopouly	Hydrologist	Hydrology review
Jeff Runge	Wildlife Biologist, Pallid Sturgeon Lead	Document review
Program Executive Director's Office		
Jerry Kenny, PhD	Executive Director	Program review
Jason Farnsworth	Director of Habitat Management and Rehabilitation	Program and environmental review
EMPSi – Environmental Management and Planning Solutions, Inc.		
David Batts	Principal	Project Manager/Quality control and assurance
Chad Ricklefs, AICP	Senior Environmental Planner	Environmental Coordinator/Document preparer
Katie Patterson, JD	Environmental Planner	Public Involvement Lead
Theresa Ancell	Biologist	Contributing author: wildlife, fisheries, threatened and endangered species, state species of concern
Kevin Doyle	Senior Cultural Resource Specialist	Contributing author: cultural resources, tribal interests
Zoe Ghali	Economist	Public involvement/Contributing author: agricultural economics, socioeconomics
Peter Gower, AICP	Senior Environmental Planner	Contributing author: land use and realty
Haley Holladay	Environmental Planner	Decision file
Derek Holmgren	Hydrologist	Contributing author: water resources, geomorphology
Jenna Jonker	GIS Specialist	GIS data and map production
Molly McCarter	Environmental Planner	Public involvement/Contributing author: recreation
Kevin Rice	Biologist	Contributing author: wildlife
Cindy Schad	Word Processor	Document production
Morgan Trieger	Biologist	Contributing author: vegetation, wetlands, riparian
Randy Varney	Writer-Editor	Technical editing

Name	Title	Project Role
Meredith Zaccherio	Senior Biologist	Contributing author: vegetation, wetlands, riparian
Louis Berger		
Thomas St. Clair	Project Manager	Scientific review and NEPA adequacy
Laura Totten	Principle Ecologist	ESA and Biological Assessment Lead/ Contributing author: wildlife, fisheries, threatened and endangered species, state species of concern
Joe Dalrymple	Biologist	Contributing author: wildlife, fisheries, threatened and endangered species, state species of concern

7.0 References

Alaska Department of Fish and Game. 2017. Eskimo Curlew Species Profile Sheet. Internet website: http://www.adfg.alaska.gov/index.cfm?adfg=eskimocurlew.main.

Baasch, D. M., P. D. Farrell, J. M. Farnsworth, and C. B. Smith. 2017. "Interior least tern productivity in relation to flow in the Central Platte River Valley." *Great Plains Research* 27(1) Spring 2017.

Baker, A., P. Gonzalez, R. I. G. Morrison, and B. A. Harrington. 2013. "Red knot (*Calidris canutus*)" The Birds of North America Online (A. Poole, editor). Cornell Lab of Ornithology, Ithaca, New York. Internet website: http://bna.birds.cornell.edu/bna/species/563doi:10.2173/bna.563.

Blackwell, Bradley F., David A. Helon, and Richard A. Dolbeer. 2001. Repelling Sandhill Cranes from Corn: Whole-Kernel Experiments with Captive Birds. USDA National Wildlife Research Center—Staff Publications. 526. Internet website: http://digitalcommons.unl.edu/icwdm_usdanwrc/526.

Blevins, D. W. 2011. Water-Quality Requirements, Tolerances, and Preferences of Pallid Sturgeon (*Scaphirhynchus albu*s) in the Lower Missouri River. U.S. Geological Survey Scientific Investigations Report #2011–5186. Reston, Virginia.

Bowman, D. 1994. Instream Flow Recommendations for the Central Platte River, Nebraska. U.S. Fish and Wildlife Service, Grand Island, Nebraska. May 23,1994.

Bowman, D., and D. Carlson. 1994. Pulse Flow Requirements for the Central Platte River. Report from a May 16–20, 1994, workshop at the Midcontinent Ecological Science Center, Fort Collins, Colorado. U.S. Fish and Wildlife Service, Grand Island, Nebraska. August 3, 1994.

Brei, J., and A. A. Bishop. 2008. Platte River Vegetation Mapping Project 2005 Land Cover Methods Summary. Headwaters Corporation, Kearney, Nebraska, and U.S. Fish and Wildlife Service, Grand Island, Nebraska.

Butler, M., and W. Harrell. 2017. Whooping Crane Survey Results: Winter 2016–2017. Draft Report, U.S. Fish and Wildlife Service, Albuquerque, New Mexico.

Caceres, M. C., and M. J. Pybus. 1997. Status of the Northern Long-Eared Bat (*Myotis septentrionalis*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 3. Edmonton, Alberta, Canada.

Central Flyway Council. 2013. Response letter to proposed rule to list rufa red knot as a threatened species. Dave Morrison, Chair. Austin, Texas. November 26, 2013.

Colorado Parks and Wildlife. 2015. State Wildlife Action Plan. Internet website: http://cpw.state.co.us/Documents/WildlifeSpecies/SWAP/CO_SWAP_FULLVERSION.pdf.

_____. 2017a. Preble's meadow jumping mouse profile sheet. Internet website: https://cpw.state.co.us/Documents/LandWater/WetlandsProgram/Priority Species/Factsheet-and-Habitat-Scorecard_PreblesMeadowJumpingMouse.pdf.

_____. 2017b. Federal and State Listed Species and Their Status in Colorado's Northeast Region. Provided by Brandon Marette. Denver, Colorado. November 27, 2017.

Corps (U.S. Army Corps of Engineers). 2016. Draft Missouri River Recovery Plan—Climate Change Assessment. Hydrologic Engineering Branch, Engineering Division, Omaha District, Nebraska.

Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetlands and Deepwater Habitats of the United States. U.S. Fish and Wildlife Service, Washington, DC.

Defenders of Wildlife. 2017. Basic facts about gray wolfs. Internet website: https://defenders.org/gray-wolf/basic-facts.

Department (U.S. Department of the Interior). 2006. Record of Decision, Platte River Recovery Implementation Program. Washington, DC. September 27, 2006.

DeLonay, A. J., K. A. Chojnacki, R. B. Jacobson, J. L. Albers, P. J. Braaten, E. A. Bulliner, C. M. Elliott, et al. 2016. Ecological Requirements for Pallid Sturgeon Reproduction and Recruitment in the Missouri River—A Synthesis of Science, 2005 to 2012. U.S. Geological Survey Scientific Investigations Report #2015–5145. Internet website: https://pubs.er.usgs.gov/publication/sir20155145.

Dubovsky J. A. 2016. Status and Harvests of Sandhill Cranes: Mid-Continent, Rocky Mountain, Lower Colorado River Valley and Eastern Populations. Administrative Report, U.S. Fish and Wildlife Service, Lakewood, Colorado.

_____. 2017. Status and Harvests of Sandhill Cranes: Mid-Continent, Rocky Mountain, Lower Colorado River Valley and Eastern Populations. Administrative Report, U.S. Fish and Wildlife Service, Lakewood, Colorado.

Dugger, K.M. 1997. "Foraging ecology and reproductive success of least terns nesting on the Lower Mississippi River." Doctoral dissertation, University of Missouri, Columbia.

EA Engineering, Science, and Technology, Inc. 2011. Platte River Recovery Implementation Program Water Quality Monitoring Protocol. Submitted to Platte River Recovery. Kearney, Nebraska. April 28, 2011.

_____. 2013. Platte River Recovery Implementation Program Annual Data Summary Report. Platte River Water Quality Monitoring 2012 Monitoring Season. Submitted to Platte River Recovery Implementation Program. Kearney, Nebraska. September 16, 2013.

Friesen, B., J. Von Loh, J. Schrott, J. Butler, D. Crawford, and M. Pucherelli. 2000. (Central) Platte River 1998 Land Cover/Use Mapping Project, Nebraska. Remote Sensing and Geographic Information System Group, U.S. Bureau of Reclamation, Technical Service Center, Denver, Colorado.

Hamel M. J. 2013. "Determining *Scaphirhynchus* sturgeon population demographics and dynamics: implications for range-wide management, recovery, and conservation." Doctoral dissertation, University of Nebraska, Lincoln.

Hamel, M. J., M. A. Pegg, J. J. Hammen, and M. L. Rugg. 2014a. "Population characteristics of pallid sturgeon, *Scaphirhynchus albus* (Forbes & Richardson, 1905), in the Lower Platte River, Nebraska." *Journal of Applied Ichthyology* 30: 362–1370.

Hamel M. J., J. J. Spurgeon, M. A. Pegg, J. J. Hammen, and M. L. Rugg. 2014b. Hydrologic Variability Influences Local Probability of Pallid Sturgeon Occurrence in a Missouri River Tributary, River Research Applications, DOI: 10.1002/rra.2850.

Headwater Economics. 2017. Economic Profile System. Internet website: https://headwaters economics.org/.

Howlin, S., and K. Nasman. 2017. Correlates of Whooping Crane Habitat Selection and Trends in Use in Central Platte, Nebraska: Platte River Recovery Implementation Program Report. Kearney, Nebraska.

Hupfeld, R. D., Q. E. Phelps, M. K. Flammang, and G. E. Whitledge. 2015. "Assessment of the effects of high summer temperature on shovelnose sturgeon and potential implications of climate change." *River Research Applications* 31: 1195–1201.

Jacobson, R. B., M. L. Annis, M. E Colvin, D. A. James, T. L. Welker, and M. J. Parsley. 2016. Missouri River *Scaphirhynchus albus* (Pallid Sturgeon) Effects Analysis, Integrative Report 2016. U.S. Geological Survey Scientific Investigations Report 2016–5064. Reston, Virginia.

Jorgensen, J. 2014. Red Knot (*Calidris canutus*): Its Distribution and Temporal Occurrence in Nebraska. Information based on Species Account from Sharpe et al. 2001, Revised by W. Ross Silcock. Lincoln, Nebraska. September 14, 2014.

Jorgensen, J. G., and M. Bomberger Brown. 2017. "Temporal migration shifts in the Aransas-Wood Buffalo population of whooping cranes (*Grus americana*) across North America." *Waterbirds* 40: 195–206.

Keenlyne, K. D., and L. G. Jenkins. 1993. "Age of sexual maturity of the pallid sturgeon." *Transactions of the American Fisheries Society* 122: 393–396.

Keldsen, K. J., and D. M. Baasch. 2016. Platte River Recovery Implementation Program: 2016 Interior Least Tern and Piping Plover Monitoring and Research Report for the Central Platte River, Nebraska. Kearney, Nebraska.

Lott, C. A. 2006. Distribution and abundance of the interior population of the Least Tern (*Sternula antillarum*), 2005; A Review of the First Complete Range-Wide Survey in the Context of Historic and Ongoing Monitoring Efforts. U.S. Army Corps of Engineers, Engineer Research and Development Center, Vicksburg, Mississippi.

Nebraska Department of Environmental Quality. 2016. 2016 Surface Water Quality Integrated Report. Water Quality Division. Lincoln, Nebraska. April 1, 2016.

NDA (Nebraska Department of Agriculture). 2017. Noxious Weed Program. Internet website: http://www.nda.nebraska.gov/plant/noxious_weeds/index.html.

NDNR (Nebraska Department of Natural Resources). 2014. 2014 Annual Evaluation of Availability of Hydrologically Connected Water Supplies, Nebraska Department of Natural Resources, Lincoln.

Nebraska Game and Parks Commission. 2017. Nebraska State Listed Species list. Provided by Michelle Koch. Lincoln, Nebraska. November 28, 2017.

NRC (National Research Council). 2005. Endangered and Threatened Species of the Platte River. Committee on Threatened and Endangered Species in the Platte River Basin (William Graft, Chair). National Academies Press. Washington, DC.

NRCS (Natural Resources Conservation Service). 2009. Western prairie fringed orchid (*Platanthera praeclara*). Internet website: https://efotg.sc.egov.usda.gov/references/public/NE/Western_Prairie_Fringed_Orchid_description.pdf.

Pearse, A. T., D. A. Brandt, W. C. Harrell, K. L. Metzger, D. M. Baasch, and T. J. Hefley. 2015. Whooping Crane Stopover Site Use Intensity within the Great Plains, U.S. Geological Survey Open-File Report 2015–1166. Internet website: http://dx.doi.org/10.3133/ofr20151166.

Pearse, A. T., M. J. Harner, D. M. Baasch, G. D. Wright, A. J. Caven, and K. L. Metzger. 2017. Evaluation of Nocturnal Roost and Diurnal Sites Used by Whooping Cranes in the Great Plains, United States, U.S. Geological Survey Open-File Report 2016–1209. Internet website: https://doi.org/10.3133/ofr20161209.

Peters, E. J., and J. E. Parham. 2008. Ecology and Management of Sturgeon in the Lower Platte River, Nebraska, Nebraska Technical Series 18. Nebraska Game and Parks Commission, Lincoln.

Program (Platte River Recovery Implementation Program). 2006a. Final Platte River Recovery Implementation Program. Program Executive Director’s Office. Kearney, Nebraska. October 24, 2006.

_____. 2006b. Platte River Recovery Implementation Program, Cooperative Agreement. October 24, 2006. Internet website: https://www.platteriverprogram.org/PubsAndData/Pages/ProgramLibrary.aspx.

_____. 2015. 2014 Water Action Plan Update. Prepared by Executive Director's Office staff. Kearney, Nebraska. May 2015.

_____. 2016a. Program Memorandum: Pallid Sturgeon Background and Future Activities. Program Executive Director's Office. Kearney, Nebraska. August 31, 2016.

_____. 2016b. Analysis of Sandbar Height Distributions following First Increment Peak Flow Events. Prepared for the Platte River Recovery Implementation Program. Kearney, Nebraska.

_____. 2016c. Platte River Recovery Implementation Program. 2015–2016 Biennial Report. Program Executive Director's Office. Kearney, Nebraska.

_____. 2017a. Addendum to the Final Plate River Recovery Implementation Program, First Increment Extension. Kearney, Nebraska. June 7, 2017.

_____. 2017b. Annual Platte River Surface Water Flow Summary. Prepared by Platte River Recovery Implementation Program staff. Kearney, Nebraska. April 24, 2017.

_____. 2017c. Pallid Sturgeon State of Knowledge Report. Prepared for the Platte River Recovery Program by the Pallid Sturgeon Technical Team. Kearney, Nebraska.

_____. 2017d. Unpublished channel width assessment. Provided by the Executive Director's Office. Kearney, Nebraska.

_____. 2017e. Whooping Crane (*Grus Americana*) Habitat Synthesis Chapters (Draft). Prepared by Staff of the Executive Director's Office for the Governance Committee of the Platte River Recovery Implementation Program. Kearney, Nebraska.

_____. 2017f. 2015 State of the Platte: Adaptive Management Plan 2015 "Big Question" Assessment: Platte River Recovery Implementation Program Report. Kearney, Nebraska.

_____. 2017g. 2016 Incidental Take and Reasonable and Measures Report. Prepared by the Platte River Implementation Program. Kearney, Nebraska.

_____. 2018. Unpublished whooping crane surveys and decoy survey results. Provided by the Executive Director's Office. Kearney, Nebraska.

Program GIS. 2017. Spatial data of land use/land cover and in-channel management activities. Data provided by the Executive Director's Office. Kearney, Nebraska.

Ratcliffe, B. C., 1996, "The carrion beetles of Nebraska." *Bulletin of the University of Nebraska State Museum* 13: 60–65.

Reclamation (U.S. Department of the Interior, Bureau of Reclamation). 2017a. Current Reservoir Data; Seminoe, Pathfinder, and Glendo in Wyoming and Lake McConaughy in Nebraska. Internet website: https://www.usbr.gov/gp/.

_____. 2017b. Scoping Summary Report. Great Plains Region. Billings, Montana. December 2017. Internet website: https://www.usbr.gov/gp/nepa/platte_river/final_scoping_report.pdf.

Reclamation and Service (U.S. Department of the Interior, Bureau of Reclamation and U.S. Department of the Interior, Fish and Wildlife Service). 2006. Platte River Recovery Implementation Program Final Environmental Impact Statement, Assessing Alternatives for Implementation of a Basinwide, Cooperative, Endangered Species Recovery Program. Denver, Colorado. April 2006.

Schneider, R., K. Stoner, G. Steinauer, M. Panella, and M. Humpert (editors). 2011. The Nebraska Natural Legacy Project: State Wildlife Action Plan. Second edition. The Nebraska Game and Parks Commission. Lincoln, Nebraska.

Service (U.S. Department of the Interior, Fish and Wildlife Service). 1991. American Burying Beetle (*Nicrophorus americanus*) Recovery Plan. U.S. Fish and Wildlife Service, New England Field Office, Concord, New Hampshire.

_____. 1996. Western Prairie Fringed Orchid Recovery Plan (*Platanthera praeclara*). U.S. Fish and Wildlife Service, Fort Snelling, Minnesota.

_____. 1997. Biological Opinion on the Federal Regulatory Commission’s Preferred Alternative for the Kingsley Dam Project (Project No. 1417) and North Platte/Keystone Dam Project (Project No. 1835). Volumes I, II, and III and Appendix A and B. Grand Island, Nebraska. July 1997.

_____. 2006. Biological Opinion on the Platte River Recovery Implementation Program. Ecological Services, Nebraska Field Office, Grand Island, Nebraska. June 16, 2006.

_____. 2007. International Whooping Crane Recovery Plan, third edition. Internet website: https://ecos.fws.gov/docs/recovery_plan/070604_v4.pdf.

_____. 2008. American Burying Beetle (*Nicrophorus americanus*) 5-Year Review: Summary and Evaluation. New England Field Office, Concord, New Hampshire. March 2008.

_____. 2009a. Piping Plover (*Charadrius melodus*), 5-Year Review: Summary and Evaluation. Internet website: https://www.fws.gov/northeast/endangered/PDF/Piping_Plover_five_year_review_and_summary.pdf.

_____. 2009b. Western Prairie Fringed Orchid (*Platanthera praclara*) 5-Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service. Twin Cities Field Office, Bloomington, Minnesota.

_____. 2011. Whooping Crane (*Grus Americana*) Five–Year Review and Evaluation. Internet website: https://ecos.fws.gov/docs/five_year_review/doc3977.pdf.

_____. 2013. Recovery Plan for the Black-footed Ferret (*Mustela nigripes*). U.S. Fish and Wildlife Service. Region 6, Denver, Colorado.

_____. 2014. Revised Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service, Denver, Colorado. Internet website: http://www.pallidsturgeon.org/wp-content/uploads/2012/11/Pallid-Sturgeon-Recovery-Plan-First-Revision-signed-version-012914_3.pdf.

_____. 2015a. Recovery Plan for the Northern Great Plains Piping Plover (*Charadrius melodus*). Volume I: Draft Breeding Recovery Plan for the Northern Great Plains Piping Plover (*Charadrius melodus*), and Volume II: Draft Revised Recovery Plan for the Wintering Range of the Northern Great Plains Piping Plover (*Charadrius melodus*) in the Continental United States. Denver, Colorado.

_____. 2015b. Wyoming Toad (*Bufo hemiophrys baxteri*, now known as *Anaxyrus baxteri*) Revised Recovery Plan, Denver, Colorado.

_____. 2016a. Biological Opinion Section 7 Consultation, Loup River Hydroelectric Project, Nebraska Field Office, Wood River, Nebraska.

_____. 2016b. Eskimo Curlew (*Numenius borealis*) 5-Year Review: Summary and Evaluation. Fairbanks Fish and Wildlife Field Office, Fairbanks, Alaska.

_____. 2017a. Whooping crane monitoring database. Grand Island, Nebraska.

_____. 2017b. Least Tern (Interior Population) (*Sternula antillarum*) Fact Sheet. Internet website: https://www.fws.gov/midwest/endangered/birds/leasttern/IntLeastTernFactSheet.html.

_____. 2017c. Updated species list for the Platte River Recovery Implementation Program Action Area Extension. Provided by Matt Rabbe, Wildlife Biologist. Wood River, Nebraska. September 1, 2017.

_____. 2017d. Environmental Conservation Online System (ECOS): Species Profile for Ute ladies'-tresses (*Spiranthes diluvialis*). Internet website: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=2159.

_____. 2017e. Species Profile for Canada Lynx (*Lynx canadensis*). U.S. Fish and Wildlife Service Environmental Conservation Online System (ECOS). Internet website: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=3652#crithab.

_____. 2017f. Species Profile for Colorado Butterfly Plant (Gaura neomexicana var. coloradensis). U.S. Fish and Wildlife Service Environmental Conservation Online System (ECOS). Internet website: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=6110#rangeInfo.

_____. 2017g. Gray Wolf Recovery Website. Internet website: https://www.fws.gov/home/wolfrecovery/.

_____. 2017h. Species Profile for North Park phacelia (*Phacelia formosula*). U.S. Fish and Wildlife Environmental Conservation Online System (ECOS). Internet website: https://ecos.fws.gov/ecp0/profile/speciesProfile?sId=123#rangeInfo.

_____. 2107i. Preble's meadow mouse species profile. Internet website: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=A0C2.

Smith, C. B. 2011. "Adaptive management on the Central Platte River—Science, engineering, and decision analysis to assist recovery of four species." *Journal of Environmental Management* 92(2011): 1414–1419.

Steffensen, K. D., M. A. Pegg, and G. Mestl. 2013. "Population prediction and viability model for pallid sturgeon (*Scaphirhynchus albus*) in the Lower Missouri River." *Journal of Applied Ichthyology* 29: 984–989.

Stehn, T. V., and C. Strobel. 2011. "An update on mortality of fledged whooping cranes in the Aransas-Wood Buffalo population." *Proceedings of the North American Crane Workshop* 12: 43–50.

_____. 2014. "An update on mortality of fledged whooping cranes in the Aransas-Wood Buffalo Population." *Proceedings of the North American Crane Workshop* 11: 43–50.

Stehn, T. V., and T. Wassenich. 2008. "Whooping crane collisions with power lines: An issue paper." *Proceedings of the North American Crane Workshop* 10: 25–36.

Tetra Tech. 2015. Channel Geomorphology and In-channel Vegetation. 2014 Platte River Final Data Analysis Report. Platte River Recovery Implementation Program. Kearney, Nebraska. December 22, 2015.

_____. 2017. Draft 2016 Platte River Final Data Analysis Report. Tetra Tech, Fort Collins, Colorado.

Urbanek, R. P., and J. C. Lewis. 2015. "Whooping crane (*Grus Americana*)." The Birds of North America Online (A. Poole, editor). Internet website: http://bna.birds.cornell.edu/bna/species/153doi:10,2173/bna.153.

USDA (U.S. Department of Agriculture). 2012. 2012 Agricultural Census. National Agricultural Statistical Service. Internet website: https://agcensus.usda.gov/Publications/2012/Full_Report/Volume_1,_Chapter_2_County_Level/.

_____. 2017. Commodity Costs and Returns—Corn in Prairie Gateway Region. Economic Research Service. Internet website: https://www.ers.usda.gov/data-products/commodity-costs-and-returns/commodity-costs-and-returns/.

USGS (U.S. Geological Survey). 2017a. USGS 06768000 Platte River near Overton, Nebraska. Internet website: https://maps.waterdata.usgs.gov/mapper/index.html. Search results for monthly statistics.

_____. 2017b. USGS 06770200 Platte River near Kearney, Nebraska. Internet website: https://maps.waterdata.usgs.gov/mapper/index.html. Search results for monthly statistics.

_____. 2017c. USGS 06770500 Platte River near Grand Island, Nebraska. Internet website: https://maps.waterdata.usgs.gov/mapper/index.html. Search results for monthly statistics.

_____. 2017d. USGS Stream Gage 06770500 Discharge. Internet website: https://nwis.waterdata .usgs.gov/ne/nwis/uv?site_no=06770500.

Wyoming Game and Fish Department. 2017a. Wyoming Species of Greatest Concern list. Provided by Denise Jensen. Cheyenne, Wyoming. November 30, 2017.

_____. 2017b. State Wildlife Action Plan. Internet website: https://wgfd.wyo.gov/Habitat/ Habitat-Plans/Wyoming-State-Wildlife-Action-Plan.

This page intentionally left blank.

Appendix A. Endangered Species Act Section 7 Effects Determination

Appendix A. Endangered Species Act Section 7 Effects Determination

Below is the effects determination for federally listed target and nontarget species and designated critical habitats under the Proposed Action.

Species	Status	Determination
Federally Listed Species		
Whooping crane	Endangered	May affect, likely to adversely affect
Least tern	Endangered	May affect, likely to adversely affect
Piping plover	Threatened	May affect, likely to adversely affect
Pallid sturgeon	Endangered	May affect, likely to adversely affect
American burying beetle	Endangered	May affect, not likely to adversely affect
Black-footed ferret	Endangered	No effect
Canada lynx	Threatened	No effect
Colorado butterfly plant	Threatened	May affect, not likely to adversely affect
Eskimo curlew	Endangered	No effect
Gray wolf	Endangered; delisted	No effect
North Park phacelia	Endangered	No effect
Northern long-eared bat	Threatened	May affect, not likely to adversely affect
Preble's meadow jumping mouse	Threatened	May affect, not likely to adversely affect
Rufa red knot	Threatened	No effect
Ute ladies'-tresses orchid	Threatened	May affect, not likely to adversely affect
Western prairie fringed orchid	Threatened	May affect, likely to adversely affect
Wyoming toad	Endangered	May affect, not likely to adversely affect
Designated Critical Habitats		
Whooping crane	Endangered	May affect, likely to adversely affect
Colorado butterfly plant	Threatened	May affect, not likely to adversely affect
Preble's meadow jumping mouse	Threatened	May affect, not likely to adversely affect

This page intentionally left blank.

APPENDIX B – Final PRRIP Program Document Addendum

ADDENDUM TO THE FINAL PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM – FIRST INCREMENT EXTENSION

ADDENDUM TO THE FINAL PLATTE RIVER RECOVERY IMPLEMENTATION PROGRAM FIRST INCREMENT EXTENSION

June 07, 2017

I. PREAMBLE

The Platte River Recovery Implementation Program (Program; PRRIP) became effective January 1, 2007 following signatures by the Governors of Colorado, Wyoming, and Nebraska and the U.S. Secretary of the Interior. PRRIP provides Endangered Species Act (ESA) compliance for water related activities within the three states and Federal Government while working to provide recovery benefits for four endangered and threatened species.

The First Increment of the Program began in 2007 and extends through 2019. The Program's long-term goal is to improve and maintain the associated habitats of the target species. This includes: (1) improving and maintaining migrational habitat for whooping cranes and reproductive habitat for least terns and piping plovers; (2) reducing the likelihood of future listing of other species found in this area; and (3) testing the assumption that managing flow in the central Platte River also improves the pallid sturgeon's lower Platte River habitat.

The Program signatories committed to achieving the following objectives by the end of the First Increment of the Program:

(1) providing water capable of improving the occurrence of Platte River flows in the central Platte River associated habitats relative to the present occurrence of species and annual pulse target flows by an average of 130,000 to 150,000 acre-feet per year at Grand Island, through reregulation and water conservation/supply projects. Department of the Interior (DOI) and the states agree that United States Fish and Wildlife Service (FWS) target flows will be examined through the Adaptive Management Plan (AMP) and peer review and may be modified by FWS accordingly. DOI 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 reregulation and water conservation/supply projects.

(2) protecting, restoring where appropriate, and maintaining at least 10,000 acres of habitat in the central Platte River area between Lexington and Chapman, Nebraska.

During the First Increment ESA compliance is measured through progress in achieving ten Program Milestones that are related to the First Increment Objectives. Milestones and current Program status are presented in **Table 1**. Given the status of the Water Action Plan identified in **Table 1**, the primary purpose of this Extension is to fulfill the Program's obligations under the Water Action Plan as described in this document.

The First Increment land objective and associated milestone have been achieved. The Program currently protects in excess of 12,000 acres in the Associated Habitat Reach (AHR). The First Increment water objective (Milestone #4) is not achievable by the end of 2019, and due to reliance on water projects being developed by the Governance Committee (GC), the Nebraska Depletions Plan (Milestone #9) is also not achievable by 2019. All State water projects and the Colorado, Wyoming, and Federal depletions plans are operational. The Program currently provides approximately 90,000 acre-feet towards the First Increment objective of 130,000 to 150,000 acre-feet. Additional water projects in the planning and/or design phase are expected to provide an additional 40,000 acre-feet of water. However, they will not be operational prior to the end of the First Increment in 2019 and may require more funding than what is currently available during the First Increment. As such, Milestone 4 will not be achieved.

Table 1. Platte River Recovery Implementation Program ESA Compliance Milestones (Final Program Document, Attachment 2, Pages 1-2).

Milestone	Program Status (as of November 2016)
1. The Pathfinder Modification Project will be operational and physically and legally capable of providing water to the Program by no later than the end of Year 4 of the First Increment.	Achieved
2. Colorado will complete construction of the Tamarack I and commence full operations by the end of Year 4 of the First Increment.	Achieved
3. CNPPID and NPPD will implement an Environmental Account for Storage Reservoirs on the Platte System in Nebraska as provided in FERC licenses 1417 and 1835.	Achieved
4. The Reconnaissance-Level Water Action Plan, as may be amended by the Governance Committee, will be implemented and capable of providing at least an average of 50,000 acre-feet per year of shortage reduction to target flows, or for other Program purposes, by no later than the end of the First Increment.	Not Achievable by end of 2019
5. The Land Plan, as may be amended by the Governance Committee, will be implemented to protect and, where appropriate, restore 10,000 acres of habitat by no later than the end of the First Increment.	Achieved
6. The Integrated Monitoring and Research Plan, as may be amended by the Governance Committee, will be implemented beginning Year 1 of the Program.	Achieved
7. The Wyoming Depletions Plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved
8. The Colorado Depletions Plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved
9. The Nebraska Depletions Plan, as may be amended with the approval of the December 7, 2005 Milestones Document 2 Governance Committee, will be operated during the First Increment of the Program.	Not Achievable by end of 2019
10. The Federal Depletions Plan, as may be amended with the approval of the Governance Committee, will be operated during the First Increment of the Program.	Achieved

Implementation of the AMP, including Integrated Monitoring and Research Plan (IMRP) activities, is ongoing and has focused on testing of the flow-sediment-mechanical (FSM) and mechanical creation and maintenance (MCM) management strategies. Accordingly, the Program's IMRP milestone has been achieved. However, the objective of examining FWS target flows through the AMP has not yet been achieved. Design, implementation, and assessment of target flow-related management actions will not be possible prior to the end of 2019.

Section II.D of the 2006 Final Program Agreement makes provision for the Agreement to be extended or amended by the written agreement of all signatories. This proposal presents a 13-year Extension (2020-2032) of the First Increment. The Extension would not change First Increment objectives, milestones, or the implementation framework. It would provide additional time to complete and operate Program water projects and to conduct the monitoring and research necessary to determine the best use of Program water to benefit the target species. This knowledge is necessary to provide a sound base upon which to structure a Second Increment.

II. PROPOSED FIRST INCREMENT EXTENSION ACTIVITIES

Proposed Extension activities are organized according to the existing Program land, water, and adaptive management plan structure. These activities will be implemented in 2020-2032 and will reflect GC decisions through the end of the First Increment. Accomplishment of Extension activities is dependent upon what is practicably achievable given available funding and resources, as described in this document.

A. Land Plan

The First Increment milestone of protecting 10,000 acres has been achieved. Restoration and management of habitat lands is ongoing. Extension Land Plan activities will proceed under the same principles that have guided land acquisition and management since Program initiation. Land acquisition will proceed under a willing buyer/willing seller approach and all management activities will be conducted in accordance with the Program's Good Neighbor Policy.

Land Acquisition

- Review and renew (as appropriate) existing leases and management agreements.[1]
- At the request of owners, evaluate existing conservation lands for inclusion in the Program under management or sponsorship agreements.
- Acquire an interest in at least an additional 1,500 acres of complex habitat with the intent of establishing a new habitat complex.

Land Management

- Manage lands acquired by PRRIP for the benefit of the target species and species of concern when not in conflict with the target species.
- Conduct land management actions within the framework of the Land Plan and the AMP.

B. Water Plan

- The Program is committed to achieving the minimum water milestone of 130,000 acre-feet in annual reductions to target flow shortages. However:
    - The Program recognizes there are fiscal constraints to achieving this milestone, and
    - Scientific investigations need to be completed to confirm the need for 130,000 acre-feet in annual reductions to target flow shortages.
- The Program will invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the Extension and will also invest in the science necessary to determine if the additional 10,000 acre-feet is justified.
- The Program is committed to finding the additional resources necessary to achieve that additional 10,000 acre-feet if justified by the science.
- Extension Water Plan activities will proceed under the same principles that have guided water supply and management since Program initiation. Water acquisition will proceed under a willing buyer/willing seller approach and all water management activities will be conducted in accordance with the Program's Good Neighbor Policy.

Water Conservation and Supply

- Design, construct, and implement Water Action Plan (WAP) projects in time to enable scientific evaluation prior to the end of the Extension term.
- Revise state and federal depletions plans to remain consistent with operational or statutory requirements.[2]
- Renew water project agreements as deemed necessary to achieve water milestone.

[1] Renew Cottonwood Ranch sponsorship agreement (2,650 acres), Broadfoot South lease (15 acres), and complex management and land use agreements (1,140 acres).
[2] The Program will cooperate with Nebraska as it finalizes its Depletion Plan.

Program Water Management

- Aggressively continue to implement channel conveyance improvements at North Platte choke point through efforts directed toward achieving and maintaining at least 3,000 cfs conveyance capacity while remaining below flood stage, with additional capacity developed as practicably achievable with available resources.
- Implement water releases including short-duration high flows (SDHF) and target flows once Program water projects are operational and choke point conveyance issues are resolved.
- The Program will continue to evaluate the efficacy of available Program water and choke point capacity through time to ensure Program water meets its intended purposes.

C. Adaptive Management Plan

The First Increment milestone of implementation of the PRRIP Integrated Monitoring and Research Plan (IMRP) has been achieved. During the Extension, AMP implementation will include evaluation of FWS target flows in addition to current Program management actions.

Management Actions

- Continued implementation of the management actions specified in the AMP related to SDHF, sediment augmentation, and least tern, piping plover, and whooping crane habitats.
- Contribute to reach-scale phragmites and invasive species control efforts.
- Utilization of Program water assets to implement and evaluate flow-related management actions including SDHF and species-related target flows.

Integrated Monitoring and Research

- The IMRP will continue to provide the framework for monitoring the implementation and effectiveness of Program management actions during the Extension.
- Pallid sturgeon activities in the Extension will be guided by the results of the incremental four-step process adopted by the GC at the September 2016 meeting.
- The Program will continue to consider the emerging science related to climate change in management and decision making.

Independent Science Review

- Retain a six-member Independent Scientific Advisory Committee.
- Continue peer review and publication of key Program science products relevant to decision making.

III. FIRST INCREMENT EXTENSION FUNDING

Federal and State contributions will continue throughout the Extension using the existing 50/50 cost share with credits for in-kind contributions from the States. Key budget items and projected new money expenditures for the Extension are contained in **Attachment A**. All Government funding commitments made in this proposed Program Extension are subject to approval and appropriation by the appropriate state and federal legislative bodies.

IV. FIRST INCREMENT EXTENSION ORGANIZATIONAL STRUCTURE

First Increment governance and organizational structure will be retained throughout the Extension.

Attachment A
PRRIP First Increment Extension Budget and Cash Flow Requirements

Activity	Estimated Cash Requirements in 2020 Dollars (Millions)	Cash Equivalent Credit (Millions)
Water (120 – 130 KAF of total water/Yr)		
• Three States Water Projects (80 KAF/Yr)		$50.000
• Channel Capacity Improvements	$ 4.550	
• Water Conservation/Supply (40-50 KAF/Yr)	$84.561	_______
Subtotal – Water	$89.111	$50.000
Land (Additional Acres)		
• Acquisition (1,500 Acres)	$12.548	
• Land Management	$ 4.135	
Subtotal – Land	$16.683	
Monitoring, Research and Administration		
• Adaptive Management Program	$10.782	
• Monitoring and Research	$14.774	
• Independent Science Review	$ 3.588	
• Administration and Governance	$33.886	
Subtotal - Monitoring, Research and Admin.	$63.030	
Totals	$168.824	$50.000
Less: First Increment Funding Carried Forward	$62.824	_______
Total 2020 -2032 First Increment Extension	$106.000	$50.000

Total 2020 – 2032 First Extension Cash and Cash Equivalent Costs = $156.00

2020 – 2032 First Increment Extension Contributions (Values in Millions)					
Contributions	Total	DOI	Colorado	Nebraska	Wyoming
Cash	$106.000	$78.000	$24.900	$ 0.000	$ 3.100
Cash Equivalent	$ 50.000	$ 0.000	$ 6.250	$31.250	$12.500
Totals	$156.000	$78.000	$31.150	$31.250	$15.600

APPENDIX C – PRRIP Supplemental Biological Opinion Full Consultation History

Full Consultation History for the Program Extension

Program History

Discussions regarding the need for a comprehensive, basin-wide recovery and research program had taken place among the numerous disparate parties involved with water use and management of species in the Platte River basin. In order to address this growing conflict, reverse habitat loss, and restore a severely degraded Platte River ecosystem, the Service determined action was necessary to ensure the survival and recovery of the federally listed species. There was general agreement that the objectives of the various parties could best be met through implementation of a basin-wide, cooperative recovery and research program. After years of negotiations, the development, authorization, funding and implementation of the Program was approved. On June 16, 2006, a final Opinion was issued that evaluated effects of the Program (PBO); the final Program Agreement, formally signed by the Secretary of Interior and governors of the three states, commenced on January 1, 2007. A Governance Committee consisting of signatory members from the three states, Reclamation, and Service, combined with upstream water users, downstream water users, and environmental representatives would collectively guide Program implementation and decision making with assistance of a third party neutral Executive Director's Office. Concurrent with initiation of the Program, the Service also concluded formal consultation on a related action with the Federal Energy Regulatory Commission on behalf of Central Nebraska Public Power and Irrigation District in 2007; this consultation was for water related operations that affected the amount and timing of flow releases due in part to hydrocycling. The Service issued an Opinion (USFWS, 2007) on January 23, 2007, in which a hydrocycling agreement was put into place to provide the necessary protections for whooping cranes roosting on the river during the migration season.

Program implementation is currently ongoing and legislation authorizing and funding it will expire September 30, 2020. As previously described, the Program will not complete all of the required First Increment milestones before the end of the First Increment and additional monitoring and research is required to determine how to best use the limited resources to provide benefits to the target species and the Platte River ecosystem they depend upon. The Program, through Reclamation, is requesting funding and authorization of the Program Extension, commencing on January 1, 2020, ending December 31, 2032 (or until such time that legislative funding and authorization expire).

ESA compliance for past water-related activities and projects included within the PBO will continue throughout the remainder of the first increment extension (for projects/activities previously authorized, see PBO). ESA compliance will also continue for those existing projects that have undergone formal consultation tiering from the PBO since Program inception[14]).

[14] see Appendix A, PRRIP tiered consultations 2007-2017

New water-related projects (federal, state, and private) or expansion of existing water-related projects that occur on or after January 1, 2020, and which are covered by the respective states' or federal new depletion plans will continue to be covered within Program throughout the extension. New water-related activities beyond the scope of the states' new depletion plans will be addressed via separate ESA consultation.

Negotiation and Development of the Program Extension

At the beginning of the First Increment, many Water Action Plan (WAP) projects were evaluated and ranked based on their feasibility, cost and score (amount of reduction to target flows (in acre-feet [af]). Some projects were removed from consideration while others were flagged as priorities. One such project, the J-2 Regulating Reservoir (J-2 Project), was initially deemed the highest priority based on its cost and ability to provide the majority of the remaining water needed to fulfill Program water obligations in the First Increment. The J-2 Project was selected in and approved by the Governance Committee in 2013; and planning of the J-2 Project began immediately. In 2015, doubts surrounding the timing, feasibility and cost of the J-2 Project emerged; this led Program signatories to contemplate whether the Program would meet the water-related milestones by the end of the First Increment. Negotiations became complicated and estimated costs skyrocketed. Ultimately, in 2016, it was determined that the J-2 Project could not be fully implemented as planned and would be incapable of providing the water needed to meet the milestones before 2020. On July 27, 2016, a formal motion to put the J-2 Project on hold and pursue other water projects was approved by the Governance Committee and the Program has not pursued the project any further at this time. Given the significant amount of water the J-2 Project was expected to contribute toward meeting Program water milestones, it became clear the Program would fall short of obtaining the water it needed to meet the first increment milestones. Given that a substantial amount of time would be needed to meet Program water milestones and there was also a need to investigate a number of uncertainties surrounding Program water, land, species, and system-wide hypotheses (Program Document, 2006 [Adaptive Management Plan]), the Governance Committee elected to pursue the Program Extension. The Program Extension for 13 years was formally agreed to, and approved by, the Governance Committee (Attachment 1, July 7, 2017 Program Addendum).

Detailed Consultation Timelines

Included below is a timeline of events related to the development of the Program Extension and consultation history to date:

March 9-10, 2016 – Governance Committee Quarterly Meeting (Kearney, Nebraska)

- Governance Committee discussed inability to meet water goals for the First Increment.
- Governance Committee discussed development of a draft Extension Document.
- Governance Committee asked for comments on the draft Extension Document from all PRRIP parties and directed the Executive Director's Office to compile comments and develop a revised draft for discussion.

June 7-8, 2016 – Governance Committee Quarterly Meeting (Cheyenne, Wyoming)

- Governance Committee discussed the revised draft Extension Document and offered additional edits.
- Governance Committee developed a schedule for providing comments on the revised draft; scheduled an additional meeting in July 2016 to discuss the Extension Document.

July 26-27, 2016 – Governance Committee Meeting (Denver, Colorado)

- Governance Committee discussed the latest draft of the Extension Document and several suggestions from the Executive Director's Office based on comments received to date.
- Governance Committee provided edits to the Extension Document and scheduled an additional meeting in August 2016 to discuss the Extension Document

August 17, 2016 – Governance Committee Meeting (Denver, Colorado)

- Governance Committee discussed the latest draft of the Extension Document and offered additional edits

September 13-14, 2016 – Governance Committee Quarterly Meeting (Kearney, Nebraska)

- Governance Committee discussed the latest draft of the Extension Document and offered additional edits
- Governance Committee set a schedule of meetings for the remainder of 2016 to finalize and approve the Extension Document

October 14, 2016 – Governance Committee Conference Call

- Governance Committee discussed the latest draft of the Extension Document and offered additional edits

November 2, 2016 – Governance Committee Special Session (Denver, Colorado)

- Governance Committee discussed the latest draft of the Extension Document and offered additional edits
- **Governance Committee Decision –** *Governance Committee approved the October 24, 2016 First Increment Extension Proposal, as amended on November 2, 2016 by the Governance Committee, contingent upon approval of Attachment A, PRRIP 1st increment extension budget and cash flow requirements*

December 7, 2016 – Finance Committee (FC) Meeting (Denver, Colorado)

- FC discussed the proposed detailed budget for the Program Extension and several comments from the State of Colorado on the budget and associated line-item costs
- Signatories agreed to start discussing the revised budget and Attachment A for the Extension Document in January 2017
- FC directed the Executive Director's Office to develop an Extension Roadmap for discussion in 2017

March 7-8, 2017 – Governance Committee Quarterly Meeting (Kearney, Nebraska)

- Governance Committee discussed the Extension Document, a draft version of Attachment A, and the draft Extension Roadmap from the Executive Director's Office
- Governance Committee agreed to include the Roadmap on the agenda for future Governance Committee meetings until the Extension begins

June 6-7, 2017 – Governance Committee Quarterly Meeting (Cheyenne, Wyoming)

- Governance Committee approved a final version of Attachment A for the Program Addendum Extension Document

August 10 and 11, 2017- Environmental Assessment and Biological Assessment kickoff

- Governance Committee discussed the updated Extension Roadmap
- Kick-off Meeting and Site Visit- Reclamation, Service and staff from Environmental Planning Solutions Inc. (Reclamation contractor) attended.

August 31, 2017- Reclamation formally requested a species list (federally threatened or endangered) for development of the Draft Environmental Assessment, which would serve as the Biological Assessment as well for the purposes of ESA consultation (Draft EA).

September 1, 2017- The Service provided an updated species list for use in development of the Draft EA and for use in formal consultation.

September 6, 2017- National Environmental Policy Act Internal Scoping Meeting

- Reclamation, Service, EMPSi staff attended

October, 2017- National Environmental Policy Act Public Scoping Meetings

- Reclamation, Service, EMPSi, Executive Director's Office staff attended
- Torrington, WY – October 4, 2017
- Loveland, CO – October 5, 2017
- Grand Island, NE – October 11, 2017
- Kearney, NE – October 12, 2017

December, 2017-February, 2018 - Develop Draft EA

- Internal Preliminary Draft EA- December 14, 2017
- Final Scoping Comment Report – December 28, 2017
- Preliminary Draft EA and FONSI – January 18, 2018
- Pre-Draft EA teleconference with Reclamation, the Service, and Cooperating Agencies (USFWS participated) – January 30, 2018

February 28, 2018 - Draft EA and FONSI issued for public review

March 7, 2018 - Reclamation requested initiation of formal consultation pursuant to section 7(a)(2) of the ESA on the effects of the proposed Program extension as well as the continued operation of certain Service and Reclamation water-related activities on federally listed species and designated critical habitat in the central and lower reaches of the Platte River. Attached to that letter was the Draft EA, which serves as the Biological Assessment. This included a determination and description of the effects of the proposed action for the draft biological opinion as described in the draft Final Program Extension documents June 7, 2017.

July 6, 2018 - Service issues Draft Supplement

- Draft Supplement is issued based on the information and instructions included in the February 28, 2018, Draft EA and March 7, 2018, letter initiating formal consultation. Attachments to letter included the final Addendum to the Program document, as approved by the Program participants on June 7, 2017 and by reference

August 27, 2018 – Service issues Final Supplement

APPENDIX D – Updates to Attachments to the Program Document

Updates to Attachments of the Program Document

Supplemental information pertinent to the Finance Document, the Milestones Document, the Adaptive Management and Integrated Monitoring and Research Plan, the Land Plan, and Water Action Plan are further described in detail in *Appendix D*.

D1. Finance Document

Attachment A of *Appendix B* provides an update to the Program Extension budget and cash flow requirements. Total estimated cash requirements (in 2017 dollars) are provided as well as a detailed breakdown of individual contributions by each state and Interior.

D2. Milestones Document

The Milestones Document remains unchanged from the Opinion. The milestones can be changed by the Governance Committee during the remainder of the First Increment and the Program Extension as described in the Program documents. A change in milestones may necessitate a determination on whether or not the change is within the scope of the Supplement and if reinitiated section 7 consultation would be required. If reinitiation is requested, the Service intends to expeditiously pursue consultation. If new or additional measures are identified, the Service will pursue all means to amend or modify the agency authorizations. If a state agrees to continue to carry out the responsibilities it had under the Program, that state assumes that ESA compliance will continue during the consultation period. In any reinitiated section 7 consultation, the Service will consider such undertakings by a state.

D3. Adaptive Management Integrated Monitoring and Research Plan

The draft AMP, reviewed for the Opinion was finalized and adopted as part of the Program Document prior to Program implementation. Significant progress has been made investigating many uncertainties but confounding circumstances have prevented conclusively addressing all of the uncertainties. Below is a list of progress that has been made related to monitoring, research and using adaptive management to inform decision making.

The Integrated Monitoring and Research Plan has been implemented since Program inception. Monitoring and Research has taken place on an annual or near-annual basis for least terns, piping plovers and whooping cranes to track the amount and location of use during the First Increment. System-scale geomorphology and vegetation monitoring, forage fish monitoring, water quality, LIDAR and aerial photography have also been collected and provide critical information related to key hypotheses. The Program assembled an Independent Scientific Advisory Committee who continues to help provide expert opinions on the science that facilitates Program decision making. Specific research studies implemented in the first increment include the Lower Platte River Stage Change Study, Tern and Plover Foraging Habits Study, Directed Vegetation Research, Whooping Crane Telemetry Project, Wet Meadows Information Review and hydrology studies, tern and plover banding, tern and plover synthesis chapters, whooping crane habitat selection synthesis chapters, among others. Program products were peer-reviewed and in many instances published to ensure high scientific standards are met.

The following provides a summary of relevant conclusions, learning, or decisions that have been made through adaptive management during the First Increment (Program, 2017):

1) Flow Sediment Mechanical (FSM) Strategy and Implementation of Short-Duration High Flows (SDHFs) - The Program has spent considerable time investigating the effectiveness of the FSM Strategy, which seeks to create and/or maintain desired channel conditions through release of an SDHF of 5,000-8,000 cfs for three to five days. The Program has yet to gain the ability to release a flow of this magnitude due to the choke point at North Platte, where the existing flood stage prevents releasing enough water to achieve the desired magnitudes without flooding. Instead, the Program has relied, in part, upon flows within or above this range to investigate mechanisms driving channel maintenance. The Program found that during wet years, higher magnitude and duration natural peak flow events may eclipse any positive benefit of short-duration, high-flow managed releases. Mature common reed plants or plant patches that obstruct channel widening have a low probability of being eroded even at high flow magnitudes and velocities. Mechanical spraying, clearing and leveling may be necessary to create suitable channel configurations and facilitate channel adjustments to changes in flow and sediment.

   While data gathered by the Program suggests that implementation of the FSM strategy may not create or maintain suitable habitat conditions, free of vegetation or obstructions, the increased frequency and duration of high flow events combined with continuing mechanical actions did result in significantly improved channel conditions. A field implemented SDHF test has yet to be implemented and the Program has not acquired the capacity or ability to implement the FSM management strategy as was prescribed for the First Increment. The existing science suggests our expectations surrounding SDHF may need to be adjusted and the likelihood of success is lower than previously thought. However, additional study is needed to detect whether the FSM strategy, once implemented, is capable of maintaining channel conditions between years where natural peak flows create suitable habitat conditions or whether the smaller but incremental benefit of an SDHF results in this management action being carried forward. The Program is committed to implementing and testing at least one full SDHF release in the Program Extension. Ongoing mechanical maintenance may be necessary to maintain suitable in-channel habitat at Program complexes. Mechanical creation and maintenance is limited to those lands that are controlled by Program or its partners and does not provide system-scale benefits associated with the FSM strategy or natural high flows.

2) Channel Consolidation - This is not suitable as a management action. Channel consolidation was part of the FSM strategy, however, after investigating the management action further, it was deemed impracticable, infeasible, difficult to permit, and unable to be implemented at a large-scale across the central Platte River. The Governance Committee made the decision to abandon flow consolidation as a management action and instead investigate FSM and SDHF without consolidating channels.

3) In-channel Tern and Plover Nesting Islands - Sandbars and islands in the central Platte River are a function of peak flow stage, duration, and sediment size and load. While an SDHF release has not been implemented, the amount, size and frequency of islands created at a suitable elevation from natural high flow events was monitored and investigated. In general, information collected to date indicates that the majority of islands may be forming at significantly lower (1-2 ft. below) than peak stage during a high flow event, which contradicts the belief that islands form at the same elevation as the peak stage. The 2015 peak flow event of 15,000 cfs did produce suitably high islands but was 2-3 times higher magnitude than SDHF. While sediment size and amount may influence sandbar/island height as well, existing sediment augmentation efforts are likely insufficient to significantly change the sediment grain size or amount available for island/bar building across the AHR. Generally, production on in-channel nesting islands or bars has not occurred at high levels to date. This led the Governance Committee to use a structured decision making process to facilitate decision making. The Governance Committee approved a plan that focused the majority of tern and plover habitat development on off-channel sand and water (OCSW) constructed sites. While in-channel nesting islands were not entirely abandoned, the focus moving forward is directed toward these OCSW sites. These OCSW site have resulted in increases in tern and plover productivity during the First Increment. It is believed that sufficient tern and plover productivity can be maintained over the long-term at these sites with small contributions from the river (in-channel habitat). Reliance on OCSW will require indefinite anthropogenic management (vegetation, predator management) to maintain viable productive habitat year after year.

4) Sediment Augmentation - While it may be difficult, costly, and time-consuming to measure its effectiveness, sediment augmentation is necessary and is planned to continue as part of the Program Extension. The amount, timing, and location as well as the most effective mechanism are not well known and augmentation to date has not occurred consistently throughout the First Increment. Recently, sediment augmentation was implemented at the farthest upstream location below the J-2 return (south channel, Jeffery Island) and will be occurring annually with approximately 80,000 tons being delivered. This is anticipated to slow and ultimately stop future degradation of the south channel and prevent further impacts related to sediment deficits throughout the AHR.

5) Whooping Crane habitat - Whooping crane habitat selection occurs disproportionately to the amount and availability of habitat in the central Platte River. The Program conducted research investigating whooping crane use of habitats relative to available habitats and found that in general, whooping cranes select for wider unobstructed channel widths and un-forested widths than those occurring most frequently throughout the central Platte River. Channels with unobstructed channel widths between 600-800 feet were used most disproportionately (highest disproportion of use occurred at density twice that of habitat availability) suggesting the Program could increase habitat suitability by managing for unobstructed channel widths of at least 650 feet. Similarly, un-forested channel widths of at least 1100 feet were found to provide highly suitable habitat.

6) Tern and Plover habitat - Suitable habitat availability was limiting tern and plover habitat production in the AHR. The Program has increased habitat availability and tern and plover reproductive use and productivity has increased as a result.

7) Tern and Plover Foraging - Forage fish do not appear to be limiting tern and plover productivity under all but the lowest flows. Existing productivity is high and forage fish abundance appears to be sufficient in all but the driest years. The Program also found terns and plovers were selecting the river for foraging, suggesting on-channel habitats are preferred and needed for providing sufficient forage opportunities.

8) Program Habitat Management - Overall Program management actions have contributed to detectable changes in habitat on the associated habitat and use by terns, plovers and whooping cranes has increased. In addition to Program off-channel habitat for terns and plovers, on-channel management has contributed to the overall amount of managed river miles and habitat with suitable habitat conditions. River miles where active habitat management has resulted in wider unobstructed channel widths and un-forested channel widths on properties owned or managed by conservation entities contain the overwhelming majority of whooping crane use. Measuring the Program's exact contribution toward this (and detecting increases in use) will take time as many properties the Program acquired were owned and managed by conservation owners prior to the Program and already had suitable habitat conditions; it is unlikely that changes in use would be expected simply due to a change in ownership. Additionally, the most noticeable increases in habitat suitability occurred only recently as Program acquisition and restoration takes time and species response and detection of a small population of migrating whooping cranes whose migration patterns fluctuate year to year requires even more time. Considering the cumulative changes in channel conditions in the AHR and the statistically significant increases in use of the AHR by the target species during the same period, Program actions have resulted in benefits to the habitat conditions and the target species, in addition to a variety of other species using the AHR. Whooping crane use has increased recently at many Program properties where improvements to habitat

conditions have occurred. These include the Program Plum Creek Complex, Elm Creek Complex, Cottonwood Ranch and Pawnee Complexes. Other efforts such as those on the Shoemaker Island Complex and management agreements on Audubon Rowe Sanctuary have contributed to continuing the historical high use observed before and during Program implementation. Contributions toward reach-wide phragmites spraying in the AHR have produced system scale improvements to habitat conditions that have also facilitated the increases in whooping crane use of the AHR during the first increment.

Adaptive management has provided a foundation by which to increase scientific and biological understanding throughout the First Increment. After 11 years, many hypotheses have been investigated and learning has allowed for decision making. The Adaptive Management Plan has remained unchanged throughout the First Increment but will be updated during the Program Extension to prioritize the additional learning needed to facilitate decision making. Future scientific studies are needed to determine how best to manage water. Development of a flow management strategy that incorporates the best available science is needed. The existing scientific data collected in the First Increment suggests an important component of any flow management strategy would include consideration of peak flows which contribute to system-scale processes needed to help sustain suitable river conditions for the target species and the Platte River ecosystem they depend upon. As such, target flows, which are nearly 25 years old, are anticipated to be reviewed and potentially updated in the extension.

D4. Land Plan Implementation

The Land Plan contained within the Program Document was developed to provide guidance in implementing the land component of the PRRIP. Implementation of the Land Plan has been successful in protecting, restoring or managing at least 10,000 acres of habitat in the First Increment. Through 2017, the Program has acquired or managed (through lease, fee title or sponsorship agreement/management agreement) approximately 12,000 acres that collectively function together with other conservation organizations to make habitat complexes (or the beginning of) in 10 bridge segments. Non-complex lands have also been successfully acquired in the form of off channel sand and water and palustrine wetlands. Early indications suggest that palustrine wetlands are not sufficient in availability in the central Platte River and are unlikely to serve as a functional surrogate for riverine habitat. However, the Program did successfully acquire some of this habitat type. In 2016, the Governance Committee approved a motion to allow for the remaining non-complex palustrine wetland acres to be used on OCSW habitat, suggesting that palustrine wetlands are not a priority land type for the PRRIP into the future. As of March 2018, approximately 8,208 acres are owned in fee title or easement, 2,665 acres are under sponsorship or lease, and an additional 1,752 acres are credited from non-binding management agreements. The PRRIP has been successful in acquisition and management of land as intended within the First Increment to date. The complex and non-complex lands acquired and/or managed to date provide a solid foundation for land management and restoration activities which future efforts can maintain and improve upon. Some complexes have recently undergone restoration or management while others are due for an evaluation of past, ongoing, and future management through an update to the complex restoration and management plans. The efforts and progress made by the PRRIP within the First Increment provide necessary benefits to the target species and provide ESA compliance.

While the Program has now met and exceeded the 10,000 acre milestone objective, the Service recognizes that many of these acquisitions were lands owned or managed by conservation organizations prior to 1997. Because of the building conflict over continuing conservation land purchases, the Governance Committee agreed to use 10,000 acres (land milestone goal) as a “floor” for acquisition and management, not a “ceiling.” As development of the Program Extension proceeded, the Governance Committee also agreed to “acquire an interest in at least an additional 1,500 acres of complex habitat, with the intent of establishing a new habitat complex” (Addendum, June 2017). Acquisition should proceed with the understanding that the current amount of land holdings designated as counting toward the First Increment should remain at, or approximately near, these levels. As new acquisitions occur, the Governance Committee should approve and designate a specific tract of land (or specific acres) as counting toward the 1500 acres for the Program Extension, if it is determined to meet those purposes. This crediting is important for fulfilling the intent of the First Increment land milestone while separately accounting for progress toward, and ultimately achieving, the Program Extension objective. An example of this accounting occurred in 2018 when a tract of land was acquired that was considered for crediting toward the Program Extension land goal (credit toward the 1500 acres). However, due to concerns with purchasing another “pre-97” (see Opinion for background on pre-97 lands) conservation land, the Governance Committee agreed to acquire the land and credit only a portion of it toward the Program Extension; the majority was credited toward the First Increment as part of a larger land negotiation involving disposition of low priority Program tracts. Table 3-1 (below) provides a list of current Program land holdings and their respective accounting relative to the First Increment milestone or the Program Extension at the time of this Supplement. The list of current land holdings contains lands with varying degrees of protection or long-term control (leases, management agreements subject to short-term termination) and is provided as a snapshot in time to demonstrate the amount and type of land holdings acquired throughout the First Increment to date.

Table 3-1 Program Land Interest Acquired In the First Increment

First Increment Habitat Complex Lands	
Dyer (owned)	360.3 acres
Cook (owned)	356 acres
Robb (management agreement)	150 acres
Stall (owned)	337 acres
Morse (owned)	565 acres
Cottonwood Ranch (Sponsorship/lease-NPPD)	2650 acres
Bartels (owned)	139 acres

McCormick (owned)	218.21 acres
Sullwold (owned)	184 acres
Johns (owned & easement)	580.36 acres
NGPC Blue Hole (owned)	51.08 acres
Aten (management agreement)	20 acres
Johnson (management agreement)	48 acres
Hubbard (management agreement)	84 acres
Volentine (owned)	233 acres
BELF Pawnee (owned)	240.94 acres
P Broadfoot (management agreement)	61 acres
DOR (management agreement)	207 acres
Fox (owned)	177.76 acres
Hostetler (owned)	331.66 acres
Sherrerd (conservation easement)	304.37 acres
Wyoming (owned)	455.29 acres
Blessing (no build easement)	195.9 acres
Speidell (owned)	750.1 acres
Audubon Rowe (management agreement)	783 acres
Younkin (management agreement)	51 acres
Dippel (owned)	663.84 acres
Binfield (owned)	1064.04 acres
Leaman West (owned)	54.35 acres
Crane Trust (management agreement)	90 acres
Foot and Osborne (management agreement)	50 acres
TNC (management agreement)	84 acres
Martin Meadows (no build easement)	286 acres
Penrose (management agreement)	10 acres
First Increment Non-Complex Lands	
Broadfoot N (owned)	211.15 acres
Hoskins (owned)	5 acres
Leaman East (owned)	85 acres
Fulmer Alda Pit	75 acres
Broadfoot K (leased)	15 acres
Debore (owned)	100.72 acres
Liehs (owned)	153.3 acres
First Increment Extension Lands	
Dipple plus up (owned)	120 acres

While acquisition within remaining priority areas remains challenging and elusive, it is still vitally important and should continue to be considered during the remainder of the First Increment. Past, current, and future efforts related to land acquisition and management will further fulfill the intent of both the First Increment milestones and progress toward achieving Program long-term land objectives. As was previously described in the Opinion, the Service remains concerned and generally does not support continued future land acquisition of prior-conserved (1997) conservation lands; additionally we do not support counting them against the additional 1500 acres for the Program Extension. Land plan implementation will continue to assist in providing the non-water related benefits to the target species as the PRRIP continues to make progress on other water-related milestones. The Program will continue implementation using the existing "good neighbor" policy described in the Program Document.

Land management has proceeded as envisioned. Complex lands were acquired and when applicable, blended into complex management plans, which were used to guide habitat restoration and management. Significant land restoration and management activities included:

- Removal of buildings, burial of power lines on various parcels
- Large-scale tree removal aimed at increasing un-forested and unobstructed widths at riverine or off-channel habitat areas
- Native grass planting, restoration and management including application of prescribed fire
- Noxious weed control (spraying)
- Creation and implementation of the Platte River Recreation Access Program (PRRA), which opens over 6,000 acres of land for public access
- Wet meadow and palustrine wetland restoration projects
- Establishment and habitat enhancement of new complexes in bridge segments with little or no prior conservation
- Channel widening, in-channel disking, in-channel spraying (target and reduce phragmites occurrence)
- Sediment augmentation
- Enhancement or creation of permanent off-channel sand and water sites and temporary in-channel nesting islands for tern and plover nesting

Efforts by the Program combined with Platte Valley Weed Management resulted in a cumulative total of 25,000 acres of vegetation treatment in or adjacent to the river channel (See Figure 1 and 2 below).

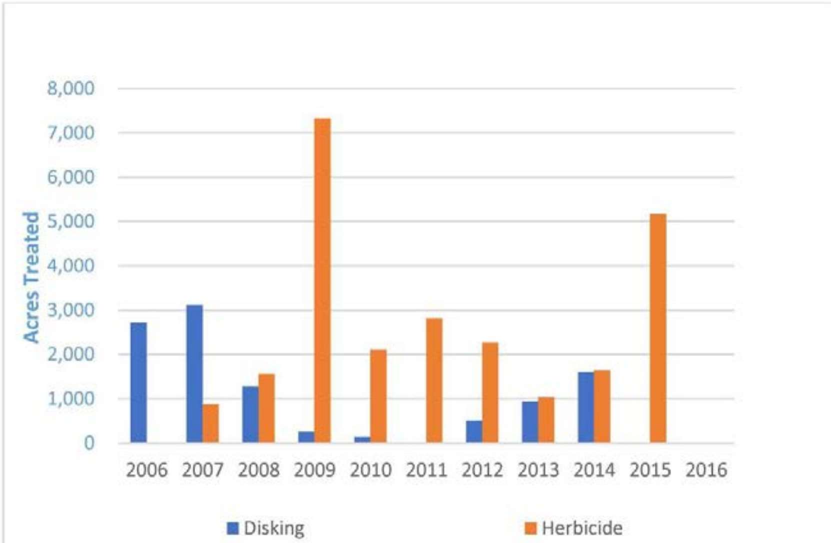


Figure 1- Acres of Vegetation Treatment by year (Source: Draft EA)

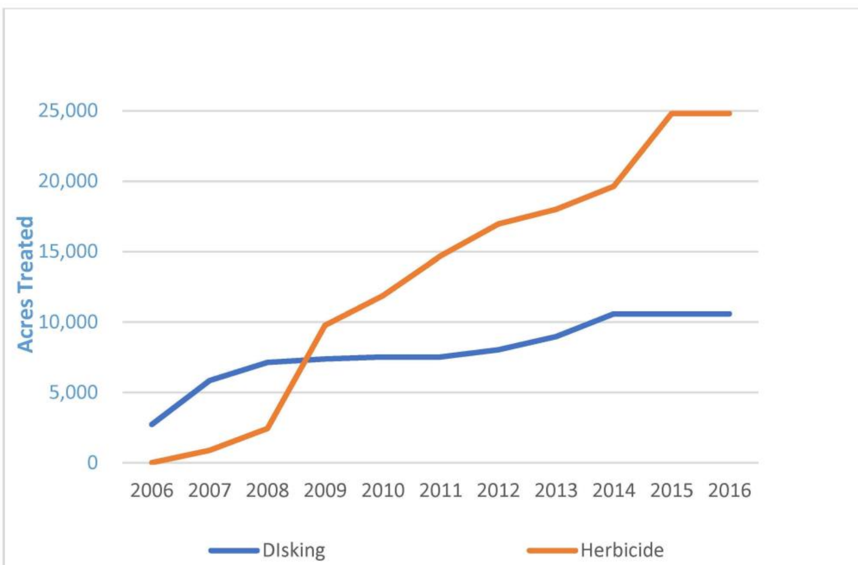


Figure 2- Cumulative Acres of Vegetation by year (Source: Draft EA)

D5. Water Action Plan

Water Plan

The Water Plan contained within the Program Document (Attachment 5) was developed to provide guidance in implementing the water component of the PRRIP. During the First Increment, there has been limited improvement in the channel capacity of the North Platte River upstream of Highway 83, with the capacity remaining below 3,000 cfs. Implementation of the Water Action Plan has resulted in progress toward reducing shortages to target flows. Water projects implemented to date have reduced shortages to target flows by approximately 90,000 acre feet (af) (of the proposed 130,000 to 150,000 af) needed to meet the First Increment water milestones. The Program is committed to achieving the minimum water milestone of 130,000 acre-feet in annual reductions to target flow shortages. However, the Program recognizes there are fiscal constraints to achieving this milestone, and scientific investigations need to be completed to confirm the need for 130,000 acre-feet in annual reductions to target flow shortages. The Program will invest the resources available to achieve at least 120,000 acre-feet in annual reductions to target flow shortages as quickly as possible during the Extension and will also invest in the science necessary to determine if the additional 10,000 acre-feet is justified. The Program is committed to finding the additional resources necessary to achieve that additional 10,000 acre-feet if justified by the science. Until such time changes are warranted, the existing water milestones remains unchanged until change is warranted.

Channel Capacity of the North Platte River Upstream of Highway 83:
Increasing the channel capacity of the North Platte River continues to be a challenge. Presently, the Program is reactivating the State Channel to reduce flooding of properties near the river. The project should be completed by the end of the First Increment and should increase the channel capacity of the North Platte River upstream of Highway 83 to 2,400 cfs. The Program also continues to clear and prevent vegetation from encroaching into the stream channel. During the Program Extension, the Program will aggressively continue to implement channel conveyance improvements at North Platte choke point through efforts directed toward achieving and maintaining at least 3,000 cfs conveyance capacity while remaining below flood stage, with additional capacity developed as practicably achievable with available resources.

Water Reregulation Projects:
The three state projects (Lake McConaughy Environmental Account, Pathfinder Modification Project, and the Tamarack Project, Phase 1) have been completed and contribute 80,000 af to reducing the shortage to target flows. Other smaller projects (Phelps County Recharge 2,700 af, Cook Recapture Well 260 af, Pathfinder Municipal Lease 4,000 af, and No-Cost Net Controllable Conserved Water 260 af) contributed 7,120 af. The total score (or reductions of shortage to targets flow) of completed and officially scored projects is then 87,120 af (PRRIP, 2018).

The Program was not able to meet the shortages to target flows milestone, predominately because the J-2 Project was determined to be infeasible due to land and construction costs. The project may have supplied approximately 30,600 af shortage reductions. The Water Action Plan was revised as a result of the loss of J-2 Project; the plan now includes broad-scale recharge and slurry wall gravel pits to make up for the loss. Table 3-2 contains a summary of WAP project scores for completed scored projects; completed projects not yet scored; and new projects and/or enhancements to existing operating projects (scores reflect project planning as of March 2018 [PRRIP, 2018]). It is assumed the Pathfinder Modification Project (with a score of 4,000 af) will continue through the Program Extension.

Table 3-2. Estimated WAP project scores

Program Water Features and Elements	Improvements Toward Target Flows (Average Acre-Feet Per Year)
Completed Scored Projects	87,120
Projects to be Completed and/or Scored Cottonwood Ranch broad-scale recharge Groundwater recharge w/ recapture wells Slurry wall storage Surface water leasing and transfers	35,000 to 40,000
TOTAL	122,120 to 127,120

The Water Action Plan is routinely revised. The recently updated version, as described by the Executive Director's Office (2017), includes but may not be limited to:

- Cottonwood Ranch Broad-scale Recharge Project would involve recharge using large areas, employing short berms to allow flooding to shallow depths in the fall and spring. The shallow depth ponds provide habitat value for the spring and fall whooping crane migration. The project should yield approximately 4,000 af of score.

- Leasing surface water within the central and North Platte River basin. The leasing of surface water has the potential to provide up to approximately 10,000 af.

- Leasing recharged groundwater from Nebraska irrigation canal companies and power districts. Existing canals of irrigation systems are used to recharge excess flow. Some over winter recharge is possible, but most systems are limited to spring and fall operations. Most of the lease agreements are in place; however, some are temporary until all permits are put in place. The anticipated scores for planned, and active projects not scored are: Elwood Reservoir, 4,500 af; CPNRD, 3400 af; NPPD, 1800 af; and associated recapture wells, 3640.

- Slurry Wall Gravel Pits provide surface water storage. An impermeable slurry wall around the pit would key into an impermeable layer, generally present at depths of 30 to 80 feet in many locations, providing the containment that allows water storage. Water would be delivered into the pits by gravity, but would have to be pumped out. Two gravel pits are being considered: the Lakeside and Stall gravel pits, with an anticipated combined score of 6,000 af.

<u>Depletion Management Plans</u>:
The state and Federal agencies developed plans to mitigate or avoid any future depletions that would increase shortages to species and annual pulse targets or otherwise undermine

Program flow improvements. Tiered consultation projects resulting in depletions to the Platte River system above the Loup River, which relied on the Program, were tracked during the First Increment. Each state and the federal government developed depletions plans that would operate to offset project impacts (Program Water Action Plan, 2007). To date, a mix of municipal, industrial and agricultural uses have accounted for the majority of continuing or new water development projects that have relied on the PRRIP for coverage. Through calendar year 2017, 188 different projects have completed the tiered consultation process resulting in biological opinions (*Appendix C*). The state depletions plans vary widely in their ability to currently offset depletions resulting in a potential lag effect where the states depletions plan is not fully functional (e.g. Nebraska, where sufficient water has yet to be secured to return to the 1997 baseline or offset new depletions since that time).

The following provides an update on the water used for new demand in Colorado and the quantity of Federal depletions:

- In the South Platte River basin of Colorado, the gross water deliveries through to meet new demands from “Wastewater Exchange/Reuse” and “Native South Platte Flows” are now approximately 41,000 af (J. Altenhofen, Northern Water, personal communication, 2018). This amount is approximately one- half of the 98,010 af covered by the Colorado depletions plan for the First Increment.

- In Colorado’s North Platte basin there are presently 110,821irrigated acres, which is below the maximum of 134,468 within the depletions plan. The total population is 1,348 which below the maximum of 2,022 within the plan (Colorado Water Conservation Board, 2017) .

- The Federal depletions within Colorado are 18.45 af in the South Platte and Laramie basin, and 9.29 af in the North Platte basin. The combined total depletions in Colorado are 27.74 af, which is considerable less than the 350 af allowable. There were no Federal depletions in Nebraska or Wyoming.(USFWS, 2018)

<u>Service Instream Flow Recommendations (Target Flows) and Usage for the Program</u>
Target flows remain the existing benchmark for assessing progress toward meeting the water milestones in the Program Extension. The Program will evaluate the efficacy of available Program water and choke point capacity through time to ensure the Program water meets its attended purposes and target flows may change accordingly. Review and modification of target flows, if warranted, would be based on the best available science. Science conducted by the Program in the First Increment indicates peak flows and vegetation management are the best predictors of unvegetated and unobstructed channel widths (e.g. conditions needed for suitable habitat conditions). Natural peak flows such as those occurring in 2015 were largely responsible for improved habitat conditions present in the AHR. The existing science to date suggests that a successful flow management strategy would include a balanced assessment of the effects of species target

flows and natural peak flows. The Service considers peak flows an essential factor in conserving the ecosystem upon which the target species and other species depend.

D.6 Organizational Structure for the Program

This attachment to the Program Document describes an organizational structure for making decisions and carrying out activities related to the Program. This document also identifies the responsibilities and authorities of each component of the structure. Entities include: Governance Committee, Signatories, Oversight Committee, Executive Director, Finance Committee, Advisory Committees including a Land Advisory Committee, Water Advisory Committee, and Technical Advisory Committee, and Independent Scientific Advisory Committee. The organization structure as well as each respective group roles and responsibilities remain unchanged during the Program Extension.

APPENDIX E – PRRIP Depletions Tiered Consultations

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions
Calendar Year 2008

COLORADO

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing, new, or combination water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure (e.g., SPWRAP)
07-F-0354	COE	Douglas	Sandstone Ranch Residential Development	American Ranch Sandstone, LLC	1/10/2008	Existing, non-federal	2008	Non-tributary Denver Basin groundwater and surface water from the transfer of historic consumptive use (CU) tributary to the South Platte River for treated water for 106 homes on residential lots, a community farm, a recreation center, 3 owners' cabins, and an equestrian center.	SPWRAP - AR Sandstone, LLC
08-F-004	FERC	Adams, Morgan, Weld	High Plains Expansion Project	Colorado Interstate Gas Company	1/22/2008	New, non-federal	2008	Withdrawal of up to 92 acre-feet (AF) water from south Platte at two locations, southeast of Greeley and north-northwest of Fort Lupton for horizontal directional drill operations, dust control, trench compaction, and hydrostatic testing of pipelines. Additionally, small amounts of water may be appropriated from canals along the pipeline route.	SPWRAP- one-time use/payment
08-F-005	USFS	Clear Creek	Silver Dollar Lake Reservoir Project	Xcel Energy	2/4/2008	Existing, non-federal	Project cancelled	Transport 67.2 AF of waters from Green Lake basin and Leavenworth Creek to south Clear Creek for delivery and use downstream and for natural draining in the event of an overflow of Green Lake.	SPWRAP –Xcel PROJECT CANCELED
08-F-006	COE	Larimer & Weld	Bellvue Transmission [Pipe] Line Project	City of Greeley	2/25/2008	Combination existing & new, non-federal	2008	New 60-inch pipeline to support 18,837 to 37,731 AF/yr anticipated future deliveries from Colorado-Big Thompson (C-BT) and Windy Gap (WG) projects, further utilization of existing supplies (high-mountain reservoirs, senior direct water rights, Bob Creek, C-BT/WG supplies, Laramie-Poudre Tunnel water) and new agricultural water conversion acquisitions.	SPWRAP –Greeley
08-F-009	WAPA	Larimer & Weld	Tinmath Tap-Black Hollow Trans. Line Rebuild	Platte River Power Authority (PRPA)	3/3/2008	New, non-federal	2008	0.2 AF water from City of Ft. Collins municipal supply to mix concrete at the LaFarge Concrete mixing plant in Ft. Collins. The concrete would be used for foundations of new transmission-line structures.	SPWRAP (one-time use) - Ft. Collins (already a member)
08-F-011	COE	Adams	Lambertson Lakes (No.3) Dam Project	City of Thornton	4/15/2008	Existing, nonfederal	NA	Temporary detention of stormwater and expansion of wetland area in four detention ponds, up to 10.1 af volume including dam replacement	SPWRAP –Thornton
08-F-013	COE	Park	James Tingle Dam & Reservoir Project	Centennial Water and Sanitation District	5/21/2008	Combination existing and new, non-federal	2008	Re-timing of historically diverted but unconsumed water to Michigan Creek to maintain the historical flow regime; 13 AF/yr evap from transferred historic consumptive use. Also transferred historic consumptive use for municipal and other water supply purposes within the service area.	SPWRAPx2;Centennial W&SD, Center of Colo WCD
08-F-014	WAPA	Larimer	Dixon Creek-Horseshoe Trans. Line Rebuild	Platte River Power Authority (PRPA)	6/6/2008	New, non-federal	2008	0.3 AF water from City of Ft. Collins municipal supply to mix concrete at the LaFarge Concrete mixing plant in Ft. Collins. The concrete would be used for foundations of new transmission-line structures.	SPWRAP (one-time use) - Ft. Collins (already a member)

08-F-015	COE	Douglas	Aurora Raw Water Del. Sys. Pipeline	City of Aurora	7/29/2008	Combination existing and new, non-federal	2008	Water has and would continue to be used for general municipal purposes throughout Aurora's service area. Anticipated water uses would include, but would not be limited to, domestic, irrigation, industrial, commercial, and recreation. Current average total annual flow through the Rampart pipeline (from Rampart Reservoir) is approximately 50,000 AF/year, 50 percent of which is from the South Platte River Basin. At build-out, the approximate average flow through the proposed pipeline would be anticipated to be about 80,000 AF/year; two-thirds of the 30,000 AF/year increase would come from the South Platte River.	SPWRAP –Aurora
08-F-021	WAPA	Weld, Boulder	Ft. St. Vrain - Fordham Trans. Line Project	PRPA	7/29/2008	New, non-federal	2008	1.4 AF water from City of Ft. Collins municipal supply to mix concrete at the LaFarge Concrete mixing plant in Ft. Collins. The concere would be used for foundations of new transmission-line structures.	SPWRAP (one-time use) - Ft. Collins
08-F-026	BLM	Jackson, Larimer	BLM -Seven 2008 Projects	BLM	8/21/2008	Existing and new, federal	2008	All 7 projects would provide water primarily for livestock, and then wildlife, which the Colorado Plan defines as incidental to agriculture. Two spring redevelopments, Green Spring (N Platte Basin) and Pasture Corner Spring (Laramie R. Basin) are historic, Federal water-related activities covered by the PRRIP without further measures required (0.55 AF/yr est CU). The proposed North Park B & C Ponds, Linpore Spring (undeveloped seep), and the Badger well are all new projects located in the N. Platte River Basin in Jackson County; they are covered under the N. Platte portion of the Colorado Plan by virtue of being incidental to ag water use in Jackson County. The proposed Nunn Well (Laramie River Basin, Larimer County) would improve livestock distribution in the grazing allotment; as a new, Federal water-related activity in Larimer Co., depletive effects need to be addressed according to the Federal Depletions Plan. BLM will offset Nunn well depletions by reducing depletions associated with historic water development projects: specifically, by abandoning BLM's spring development project at Inglis Spring. Est 5.91 AF/yr est total new CU.	Fed. Deps.; one new dep. (Lar Co.) w/ Fed. Offset
08-F-023	COE	Park	Lake George Dam & Reservoir Repair Proj.	Lake George Company	9/12/2008	Existing, non-federal	NA	Native South Platte River flows stored in 171.23 AF upper pond + 86.55 AF lower pond; includes 30 AF/yr of transferred consumptive use. Supplies recreational and piscatorial and augmentation water for two wells which supply the Eleven Mile Ranch Homeowners Association.	SPWRAP, Lake George Company
08-F-017	COE	Adams	Ken Mitchell Lakes inlet/outlet project	City of Brighton	11/13/2008	Combination existing & new, non-federal	2008	Some combination of transferred agricultural irrigation water from Fulton Irrigation Ditch, free river water from South Platte River, consumable wastewater effluent credits, and leased sources of fully consumable water, totalling 3 - 50 cfs/day.	SPWRAP, Brighton
09-F-002	COE	Larimer	Well/Water Enhancement Project, Livermore Community Well	Larimer County Road and Bridge Dept	12/5/2008	Existing, non-federal	NA	Well on unnamed tributary to North Fork Cache la Poudre River serving 3 residences, 2 commercial/industrial taps, and landscape irrigation. 2.1 AF/yr estimated withdrawal.	SPWRAP, Larimer County

NEBRASKA

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing or new water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure* (e.g., SPWRAP)
FWS-NE:2008-217	USDA-RD	Cheyenne	Wastewater Facility Improvements	Village of Lodgepole	2/11/2008	Existing?	NA	Lodgepole Creek, South Platte Drainage	None, municipal uses covered under NE NDP
FWS-NE:2008-453	USDA-RD	Scotts Bluff	Water Supply Improvements	Village of Lyman, City of Morrill	6/20/2008	Existing?	NA	North Platte River	None, municipal uses covered under NE NDP
FWS-NE:2008-454	USDA-RD	Scotts Bluff	Water Supply Improvements	Village of Minatare	6/20/2008	Existing?	NA	North Platte River	None, municipal uses covered under NE NDP
FWS-NE:2008-489	USDA-RD	Lincoln	Water Supply Improvements	Village of Sutherland	8/2/2008	Existing?	NA	South Platte River	None, municipal uses covered under NE NDP
FWS-NE:2008-497	BLM	Cheyenne	Oil Well	Antelope Energy Company	8/18/2008	New, One-time	2008	150,000 to 168,000 gallons of water from City of Sidney municipal well (Lodgepole Creek, South Platte Drainage)	None, outside of 28/40 line
FWS-NE:2008-498	FHWA	Hall	Detention Cell Storm Sewer Project	Nebraska Department of Roads	8/28/2008	New	2008	Temporary detention of stormwater which enters into Warm Slough	covered under NE NDP, drainage enters Platte River below Chapman

WYOMING

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing or new water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure* (e.g., SPWRAP)
WY08-F0010	BLM		Rockies Express Arlington Compressor Station	Rockies Express	4/28/2008	Existing	NA	No depletion estimate required	SEO Recovery Agreement - no offsetting measures required
WY08-F0011	BLM		Immigrant Gap		4/28/2008	Existing	NA	No depletion estimate required	SEO Recovery Agreement - no offsetting measures required
WY08-F016	WAPA/DOE		Cheyenne Substation	WAPA	7/8/2008	1x Use	2008	1x Use 3.2 acre-feet	No SEO Recovery Agreement required- no offsetting measures required
WY08-F0032	USFS		Snowy Mountain Lodge		10/17/2008	New	2008	33 acre-feet	No SEO Recovery Agreement required- no offsetting measures required

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions
Calendar Year 2009

COLORADO

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing, new, or combination water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure (e.g., SPWRAP)
09-F-001	COE	Arapahoe	Tommy Davis Park Stormwater Management	Greenwood Village	1/12/2009	Combination; 1.37 af Existing, 1.47 af New, non-federal	2009	Source: 2.84 af/yr evaporative loss & 3.4 af storage capacity increase associated w/ re-configured pond aligned on Goldsmith Gulch. Use: Storage capacity increase to provide improved water quality, waterfowl habitat, & aquatic habitat by increasing water and oxygen circulation in pond	SPWRAP - Greenwood Village
09-F-006	WAPA	Logan	Colorado Highlands Wind Project	Colorado Highlands Wind, LLC	2/3/2009	New; 22.6 af New one-time, 3.5 af New, non-federal	2010-2011	Source: alluvial wells w/i S. Platte Basin. Use: One-time water use of approx. 22.6 af from the City of Sterling and/or Town of Fleming municipal supply(s) would be used during construction to mix concrete for foundations, soil compaction, and dust abatement. Additionally, water would be used at the Project's maintenance facility for domestic purposes for on-site personnel (about 375 gallons per day or approximately 3.5 af per year) and periodic washing of wind turbine rotor blades (up to 2,000 gallons per year) during operation of the wind facility.	SPWRAP - Colorado Highlands Wind, LLC
09-F-008	COE	Boulder	Leggett Inlet Diversion Structure Project	Xcel Energy	3/2/2009	Existing; 4,202 af Existing + 2,676 af evap. loss, non-federal	N/A	Source: South Boulder Creek via Leggett Canal which feeds into Valmont Reservoir. Use: power generation/cooling at Xcel's 88-megawatt, coal-fired Valmont Power Station in Boulder and irrigation water delivery to the Jones and Donnelly Ditch. Most recent ten-year average of 4,202 af/yr was diverted through Leggett Canl from South Boulder Creek; 3,214 af/yr used by Valmont Reservoir for Xcel's use and the remaining 988 af/yr to the Jones and Donnelly Ditch. The average annual amount of water released from Valmont Reservoir through the Leggett Outlet and back into South Boulder Creek during the same period was 1,499 af. The average annual loss from evaporation and seepage from the reservoir for this ten-year period was 2,676 af; w/ seepage proportionately very small compared to evaporative loss.	SPWRAP - Xcel Energy (already a member)
09-F-011	COE	Jefferson	Timber Estates Project	Timber Estates Metropolitan District	3/30/2009	Existing; 36.6 af, non-federal	N/A	Source: Annual transfer of up to 36.6 af of snowmelt runoff in North Turkey Creek from the North Turkey Creek watershed. Uses: Water supplied into Evergreen Meadows Reservoir No.1 via a new diversion structure on North Turkey Creek in Jefferson County would provide replacement water to the North Turkey Creek stream system to offset depletions caused by the operation of Timbers Estate's community pond and irrigation system, as well as domestic wells and an irrigation well operated by residents within the District. Timbers Estates holds two existing water rights regarding water diversion from North Turkey Creek. The Spruce Park Ditch No. 4 water right allows for 1.575 cfs, 18.4 af; with one filling per year of natural flow to be diverted. The Reservoir No. 1 water right allows for 1.2 cfs, 18.2 af; with one filling per year of natural flow to be diverted. Timbers Estates is limited to one annual fill on each of its two water storage rights.	SPWRAP - Timber Estates Metropolitan District

09-F-007	COE	Larimer	Robert Benson Reservoir Project	Fort Collins	4/3/2009	Existing; 144 af Existing, non-federal	N/A	Source: Big Thompson River via Louden Ditch which feeds into Robert Benson Reservoir in southern Fort Collins, Larimer County; The City's 3.75 shares of water enters the Reservoir via Louden Ditch, and currently flows out of the eastern end of the Reservoir into an unlined, manmade ditch that flows southeasterly into a natural swale. Use: the original reservoir storage ammount decreed was 554.75 af; this was reduced to 220 af in 1992. Current reservoir storage is about 100 af; following dam reconstruction, this is expected to increase to a maximum capacity of 144 af of water storage. Some of the stored water would be drawn from a wet well on the east side of the reconstructed dam to irrigate 7-10 acres of City-owned parks. Share ownership allows the City to divert water under the Robert Benson decree through the ditch into the Reservoir. The Reservoir is part of the Pelican Marsh Natural	SPWRAP - Fort Collins (already a member)
09-F-010	COE	Larimer	Fossil Creek Meadows Project	Three T Investments	4/24/2009	Combination; 105 af evap. loss Existing, non-federal	N/A	Source: 85 af- Spring Canyon Ditch (adjudicated water right owned by applicant), 20 af- I-25 and other runoff/tail water; variable amounts of rented water from North Poudre Ditch occasionally used to offset Spring Canyon water shortages/runoff during drought/below normal runoff. Use: Approx. 105 af/yr of evaporative loss from two new ponds and open water conveyances to the ponds in Larimer County; Three T is required to mitigate for excavation/placement of fill material into Fossil Creek, its associated ditches, and wetlands associated with construction of the ponds. Fossil Creek traverses the southern portion of the project area from west to east and includes a branch channel entering from the southwest. This water was historically used to irrigate about 140 ac of cropland/grassland for cattle grazing. Continued use of the 105 af of water would maintain the two ponds, replacing or relocating the existing surface water in the Arthur Lateral and Fossil Creek Reservoir Outlet irrigation ditches; water would be recycled in/out of the ponds to irrigate greenbelts and open areas of the Project. No municipal/industrial water use will occur.	SPWRAP - Three T Investments
09-F-012	COE	Park	Carter Trust Fishery Ponds Project	Carter Trust	4/27/2009	Existing; 7.77 af evap loss, non-federal	N/A	Source: Montgomery Gulch. Uses: Depletions are associated with about 7.77 af per year of evaporative loss from four "new" ponds connected by a manmade stream system to Montgomery Gulch on private property, which is located approximately 5.5 miles northwest of Como. The ponds would be constructed from five existing, mining settling ponds to improve the trout fishery over what is currently present. Two of the existing five ponds (ponds 2 and 3) would be combined (per the Corps 4/27/09 email, this has already occurred) in the process of reconfiguring and deepening the four "new" ponds; and, several other measures would be implemented, e.g., to improve water circulation and fishery development. Former use of the property, which is near timberline, was for gold mining.	SPWRAP - Carter Trust

09-F-013	BLM	Jackson	Four 2009 Projects	BLM	4/27/2009	Combination; 0.73 af Existing, 0.57 af New, federal	2009	Source: Depletions to the North Platte River are associated with: 0.40 af/year historic (E. Walden Reservoir #2), 0.33 af/year historic (Pit Reservoir - East), 0.15 af/year new (Ironclad Spring), and 0.42 af/year new (Stolns Well). Use: All four projects would provide water primarily for livestock, and then wildlife. The two proposed pond cleanouts are runoff fed and expected to be dry most years by end of summer; their depletions would likely be limited to the pond volume (i.e., no refill). The estimates for the undeveloped seep, Ironclad Spring, and the proposed Stolns Well were based on the number of permitted livestock and days of use, and assuming 15 gallons/day/cow.	North Platte MOA - FWS, Colorado, SPWRAP, and Jackson County
09-F-015	COE	Clear Creek	CDOT Clear Creek Diversion Relocation Project	CDOT	5/4/2009	New; 1.45 af, non-federal	2009?	Source: Depletions are associated with up to 1.45 af per year of evaporative loss from the Diamond B storage pond located about 2 miles downstream of Georgetown at the end of a diversion ditch, which runs from Clear Creek to the Diamond B. Use: The pond would not be full after the diversion is relocated and after the outlet is improved; the pond would be drawn down for most of the year because of the water right. The storage pond is currently not being used for any purposes. CDOT would use water stored in the pond for aesthetics, aquatic vegetation production (wetlands) and fish and wildlife habitat; it is likely that at least some of the water would be used to augment evaporative loss from creating/restoring wetlands along Clear Creek.	SPWRAP - CDOT
09-F-016	FHWA	Clear Creek/Park	Guanella Pass Road Project	Xcel Energy	7/22/2009	New; 38 af one-time (33 af Existing baseline), federal but using Xcel water	2009-2011?	Source: Cabin Creek Reservoir. Use: Three-phase Project; reconstruction of the Guanella Pass Road from Georgetown to Grant in Clear Creek and Park counties. Phase 1 and part of Phase II have already been completed with a one-time water use of approximately 33 af of water from the Cabin Creek Reservoir, which is owned by Xcel. Because the FHWA completed this reconstruction of the Guanella Pass Road prior to their May 11, 2009, request for formal consultation, FWS considers the water used in Phase 1 and the portion of Phase II completed prior to August 1, 2009, to be part of the environmental baseline and not a part of the proposed action. This BO covers proposed Federal water use for Phase II of the Project and resurfacing implemented after July 31, 2009; the FHWA would again obtain water from Xcel's Cabin Creek Reservoir for a one-time use of about 38 af associated with road construction / resurfacing activities, including mixing for material use, dust suppression, etc. To date, the FHWA has not identified a water source for Phase III of the Project.	SPWRAP - Xcel Energy (already a member)

09-F-021	COE	Boulder/Summit/Grand/Douglas/Denver	Moffat Collection System Project	Denver Water	7/31/2009	Combination; 72,000 af. non-federal	? ?	Source: A combination of existing and new depletions associated with changes in operation of Denver Water's collection system. Denver Water would divert an additional 2,367 af per year on average from the South Platte River at Strontia Springs and Conduit 20; and an additional 985 af per year on average from South Boulder Creek at Gross Reservoir and the South Boulder Diversion Canal. Use: Municipal water system. Overall, average annual diversions from the South Platte River would increase by 3,274 af per year. The amount of diverted water would be greater than the amount of depletions from the South Platte River Basin because much of the additional diverted water would return to the river via return flows from wastewater treatment plants and lawn irrigation; the average annual depletion from the South Platte River basin would be 1,607 af per year. Denver Water would enlarge the existing 41,811 af reservoir by 72,000 af, for a total storage capacity of 113,811 af in order to develop 18,000 af per year of new, annual firm yield to the Moffat Water Treatment Plant and raw water customers upstream of the Plant.	SPWRAP - Denver Water (already a member)
09-F-018	COE	Jefferson	Double E Reservoir & Dam Project	Private owner/residence	8/10/2009	New; up to 2 af + 0.92 af evap. loss, non-federal	2009?	Source: Depletions are associated with 0.92 af per year of evaporative loss from the new reservoir on an unnamed tributary to Troublesome Creek in North Evergreen. Use: The primary purpose of the Reservoir, which would have a surface area of 0.3 acres and hold less than 2 af of water, would be to provide an onsite source of water for the Evergreen Fire Department's use in wildfire and household fire fighting.	SPWRAP - Double E Reservoir
09-F-019	USFS	Boulder	Nederland Water Treatment Facility Project	Nederland	8/20/2009	Existing; 1.84 cfs + 780 taps, non-federal	N/A	Source: Depletions are associated with Nederland's diversion of up to 1.84 cfs through its water pipeline under water rights allowing diversion from Middle Boulder Creek in Boulder County. Use: This water has and continues to supply approximately 780 domestic taps in Nederland. The project is needed for the continued use and maintenance of Nederland's water treatment facility.	SPWRAP - Nederland
09-F-017	COE	Adams	Cherokee Power Plant Diversion Project	Xcel Energy	9/8/2009	Combination; 2,850 af Existing, 500 af New for 5 mo/yr., non-federal	2009-2010	Source: Depletions are associated with potentially diverting 500 af of water per month through a new diversion structure on the South Platte River, located about 500 feet downstream of the outflows of the Metro Wastewater Reclamation District in Adams County, for a five-month period through the winter months. Use: The new diversion would supply up to 20 percent of the Cherokee Station's water needs during the dry seasons and dry years. Xcel's Cherokee Power Station already diverts water from the Platte River at three points: Clear Creek, which is diverted at the Fisher Ditch head gate (typically 2,600 af), the existing upstream South Platte River diversion, and the Gardner Ditch water right (250 af). They need this fourth diversion point to tap a reliable source of raw water during drought and dry months. Xcel would store this water at the Cherokee Station plant until needed for cooling, dust suppression, irrigation of landscaping, domestic and sanitary purposes, and fire protection. The proposed diversion would replace a long-term, water contract with the Denver Water Recycle Plant that ranges from 2,600 to 5,200 af for the year.	SPWRAP - Xcel Energy (already a member)

10-F-001	COE	Jackson	Walden Surface Water Intake & Dam Repair Project	Walden	10/15/2009	Existing; 118 af + 450 taps, non-federal	N/A	Source: Depletions are associated with the diversion of water from the Michigan River northeast of the Town of Walden into the existing surface water intake system. Use: Municipal use corresponding to the most recent 5-year average diversion of 118 af. The Town currently provides a municipal supply of water to approximately 1,045 individuals or about 450 taps. The Town's existing water right would allow an annual maximum diversion of 724 af; however, the Project would not provide additional water for the Town, but rather allow the Town to better utilize its 1885 water right during drought conditions. The Town has experienced water supply shortages; notably, in 2002 and 2003 with drought conditions.	SPWRAP - Walden
09-F-020	WAPA	Weld	Willoby Substation Transmission Project	WAPA	12/7/2009	New; 2.5 af one-time, federal	2010	Source: Poudre River. Use: Depletions are associated with the withdrawal of approximately 2.5 af of water for making concrete and for some dust suppression during construction of the new substation. One of the following concrete suppliers in the Greeley, Colorado, area would be used for the Project and, consequently, the specific water source for concrete mixing: Star Ready Mix, Lafarge Concrete, or Bestway Concrete. These Concrete Ready-Mix facilities and their associated groundwater wells are located north and west of Greeley in the Poudre River basin just upstream of the Poudre's confluence with the South Platte River, east of Greeley. All three operations use groundwater from an alluvial aquifer along the Poudre River which is tributary to the South Platte River.	South Platte MOA - FWS, Colorado, and SPWRAP
09-F-004	COE	Park	Will-O-Wisp Raw Water Diversion & Pipeline Project	Will-O-Wisp Metropolitan District	12/9/2009	New; 0.7 cfs, 115 taps + 570 taps, non-federal	? ?	Source: The new diversion would be located in Elk Creek and the pipeline would be located within a wetland surrounding Elk Creek in Park County. Use: The Project includes construction of a raw water diversion and pipeline to supply drinking water to the Will-O-Wisp Metropolitan District. Depletions are associated with the direct water right maximum diversion of 0.7 cfs of raw water from Elk Creek at the Glasman Ditch #2 to the District, which currently supplies 115 residential water taps via a series of groundwater wells. However, to provide for a reliable water supply and to supply future demands including the proposed Tanglewood Reserve development, which would add another 570 residential taps at build-out to the District's water demand, the District needs to develop their Elk Creek water right. The average daily demands are 0.3 cfs at build-out based on an average demand per tap of 280 gallons per day; and peak hour demands are 0.7 cfs.	SPWRAP - Will-O-Wisp Metropolitan District

10-F-005	COE	Adams	Thornton Potable Water Pipeline Project	Thornton	12/18/2009	Combination; up to 21,426 af + 56,497 taps, Existing & New, non-federal	2010	Source: Depletions are associated with water supplied by the Fulton Ditch, Burlington Ditch, Lower Clear Creek Ditch, Colorado Agricultural Ditch, and alluvial wells adjacent to the South Platte River. This water originates from a mix of native South Platte River Basin surface and groundwater sources. About 60 percent of the City's water supply is from the Burlington Ditch; 30 percent from storage in Standley Lake; and about 10 percent from Lower Clear Creek Canal, alluvial wells along the South Platte, and the Colorado Agricultural Ditch. Use: Conveyance of about 24 million gallons per day of drinking water through a new potable water pipeline for residential and commercial water users in the northern portion of the City of Thornton in Adams County. The water to be conveyed through the proposed pipeline would approximately reflect this mix of water sources. The City does not receive any water imported into the South Platte River Basin or non-tributary groundwater. At build-out, the new 42-inch pipeline would convey about 21,426 af of water per year and serve about 56,497 taps.	SPWRAP - Thornton (already a member)
Letter regarding no After-the-fact Consultation Reference # 65412-2009-TA-0360	COE	Weld	Fort Vasquez River Ranch Pond Project	Vasquez River Ranch, LLC	6/18/2009	Existing; 0.26 af, non-federal	Project already constructed/ implemented	The water sources for the 0.13 acre pond are ground water seep and irrigation water run-off within an area extending up to 3 miles south of the Project, which are captured by the unnamed drainage ditch that the pond is built on. The ditch does not have a registered name nor is there any defined water right existing on it. Evaporative loss from the 5-foot deep pond is 0.26 acre-feet per year. Water in the pond is used to enhance fish and waterfowl habitat	SPWRAP - Fort Vasquez River Ranch, LLC

NEBRASKA

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing or new water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure* (e.g., SPWRAP)
FWS-NE:2009-61	USDA-RD	Morrill	Water Supply Improvements	City of Bridgeport	7/1/2009	Existing, non-federal	NA	Source: North Platte River. Use: Municipal uses associated with water supply improvements	None, municipal uses covered under NE NDP
FWS-NE:2009-69	HUD	Buffalo	Kearney Southwest Infrastructure	City of Kearney	7/29/2009	New, non-federal	2010	Source: Platte River. Uses: Industrial uses associated with a housing infrastructure	None, municipal uses covered under NE NDP

WYOMING

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing or new water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure* (e.g., SPWRAP)
61411-2009-F-015	Other - Consultant	Converse	Sundance Meadows Water District	Other - Consultant	8/11/2009	Existing, non-federal	N/A	Source: City of Douglas Municipal Water Supply Use: municipal water use	N//A

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions
Calendar Year 2010

COLORADO

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing, new, or combination water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure (e.g., SPWRAP)
10-F-006	U.S. Army Corps of Engineers	Adams	Thornton Raw Water Pipeline Project	City of Thornton	1/20/2010	existing and new; 30 MGD for 3 mos./yr plus new (additional) evap. loss, non-federal	2010?	**Source:** a mix of native South Platte River basin surface and groundwater: 60% of Thornton's total supply is from Burlington Ditch; 30% from storage in Standley Lake; and 10% from Lower Clear Creek Canal, alluvial wells along the South Platte, and the Colorado Agricultural Ditch, **Use:** residential and commercial water supply for Thornton and other communities.	SPWRAP, City of Thornton
10-F-007	U.S. Army Corps of Engineers	Jefferson	Dunafon Diversion Structure/Dam Repair Project	Mike Dunafon	2/2/2010	existing; 1.02 af/yr evaporative loss, non-federal	N/A	**Source:** Bear Creek, a tributary of the South Platte River, **Use**: Hydropower via water wheel powering an electric generator. Applicant proposes to repair an existing diversion structure built in the 1920's to it's original capacity.	SPWRAP, Mike Dunafon
10-F-008	U.S. Army Corps of Engineers	Morgan	Hillrose Drainage Ditch Diversion Structure and Pond Project	Hillrose Ranch, LLC	2/16/2010	new; 11.77 af/yr, non-federal	2010 or 2011?	**Source**: Hillrose drainage ditch collects water from a groundwater spring and eventually discharges into the South Platte River farther downstream, **Use**: to supply water for a new waterfowl pond	SPWRAP, Hillrose Ranch, LLC
10-F-010	U.S. Dept of Agriculture-RD	Morgan	Town of Wiggins Water System Improvement Project	Town of Wiggins	5/26/2010	existing and new; 372.5 af/yr beginning 2011 and additional 432.5 af/yr in the future for total of 805 af/yr at buildout, non-federal	2011	**Source:** Groundwater well in alluvium of the South Platte River **Use:** Municipal water supply for the Town of Wiggins. New well to supply 250 af/yr initially and 560af/yr at buildout to account for expected 2029 population increase. 122.5 af/yr initially and 245 af/yr at buildout will be lost from a total of four augmentation ponds (evaporation) that will be constructed. Water supply will be pumped eight miles through a newly constructed pipeline.	SPWRAP, Town of Wiggins
10-F-012	U.S. Army Corps of Engineers	Jefferson	Bowles No.1 Dam Rehabilitation Project	Bowles Reservoir Company, Jefferson County, and City and County of Denver	7/22/2010	existing; 917.5 af/yr, non-federal	N/A	**Source:** Bowles Reservoir No.1 obtains water from Bear Creek, a tributary of the South Platte River through the Harriman Ditch and the Bowles Lateral. **Use:** outdoor irrigation (golf courses, parks, pasture and lawn) on 470 acres in Jefferson and Denver Counties (no municipal or domestic use)	SPWRAP, J.W. Bowles Reservoir Company
10-F-013	BLM	Jackson	BLM's proposed 2010 projects	BLM	8/3/2010	new; 0.98 af/yr, federal	2010	**Source:** Dry Fork Well, Bostwich Well, Soap Creek Well which are all hydrologically connected to the North Platte River **Use:** Agriculture/Livestock, then wildlife incidental to agriculture.	Federal Depletions Plan, USFWS-Colorado-SPWRAP-Jackson Co. MOA, USFWS-BLM MOA
10-F-011	U.S. Army Corps of Engineers	Larimer	Lower Lone Pine Reservoir Expansion Project	CLWSA for Crystal Lakes subdivision	8/26/2010	existing and new; 7.94 af/yr initially and an additional 8.81 af/yr after expansion, non-federal	2011?	**Source:** Lower Lone Pine Reservoir is an impoundment on the North Fork of Lone Pine Creek, tributary to the Cache La Poudre River, which is tributary to the South Platte River. **Use:** provide water storage from junior water rights on the North Fork of Lone Pine Creek in order to provide augmentation water supplies to senior water users downstream per State Water Court Decree. The reservoir's storage capacity will increase from existing 60 af to full, expanded capacity of 90 af.	SPWRAP, Crystal Lakes Water and Sewer Association
10-F-016	FHWA-Federal Aid	Douglas	North Meadows Extension to US 85 and I-25 Project	CDOT, FHWA, Castle Rock, and Douglas Co.	9/14/2010	new; one-time 15.4 af (35% of total 44 af), non-federal	2010?	**Source:** Mix of groundwater and alluvial water associated with one or more fire hydrants located onsite or from Castle Rock's water filling station. 35% of overall water use would come from East Plum Creek which is tributary to the South Platte River. **Use:** road construction - dust abatement, compaction of excavation, embankment base, reconditioning of subgrade, establishment of temporary and permanent erosion control associated with road construction.	SPWRAP, Town of Castle Rock (CDOT-State of Colorado)

10-F-018	U.S. Army Corps of Engineers	Park	Stagestop Ponds Dam Rehabilitation Project	Stagestop Homeowner's Association	10/8/2010	existing; 3.4 af/yr evaporative & seepage losses and 6.6 af/yr consumptive use for 199 lots (15.6 af/yr if 500 residential lots completed in the future), non-federal	N/A	**Source**: Old House Creek and Tarryall River basin (groundwater) **Use**: rural domestic consumption.	SPWRAP, Stagestop Owners Association
10-F-14	U.S. Army Corps of Engineers	Jefferson	Fox Hollow Golf Course Project	City of Lakewood	11/22/2010	existing; irrigation of 168 acres, non-federal	N/A	**Source:** Bear Creek, tributary to South Platte River. Direct flow rights of 13.46 cfs and 1.49 cfs from the Pioneer Union Ditch and Hodgson Ditch, respectively. Also, Soda Lake shares for 496.7 af stored water and 200 af stored water at Bear Creek Lake. **Use:** irrigation of golf course and potable water tap on Bear Creek Water & Sanitation District's distribution system.	SPWRAP, City of Lakewood
11-F-003	FHWA-Federal Lands	Park	Tarryall Creek Road Improvement Project	USFS, CDOT, and Park County	12/13/2010	new; one-time 15 af, federal	2011	**Source:** Tarryall Reservoir and/or private landowners in Tarryall River basin, tributary to South Platte River. **Use:** roadway reconstruction, rehabilitation, and obliteration; construction of pullouts and a rockery wall; replacement of existing culverts and installation of new culverts; and replacement of a bridge over Tarryall Creek.	Federal Depletions Plan, USFWS-Colorado-SPWRAP MOA, USFWS-FHWA/CFLHD MOA
10-F-019	EPA / CDPHE	Logan	Sterling WTP Project	City of Sterling	12/14/2010	existing and new; 4,058 af/yr initially, an additional 720 af/yr with new WTP in 2012, and an additional 1,427 af/yr at build-out, non-federal	2012	**Source:** potable water system is served by 15 wells that supply alluvial water, tributary to the South Platte River. **Use:** an existing residential population of 13,900 people and 4,626 service taps, which includes residential, commercial, industrial, government, and parks (all non-potable water for irrigation and an ethanol plant/industrial use is supplied by an additional 12 wells which are not part of the potable water system).	SPWRAP, City of Sterling
11-F-005	USDA-RD	Jefferson	Hidden Valley Mutual Water Co. Water System Improvements	Hidden Valley Estates Subdivision	12/28/2010	existing; 11.22 af/yr (12.84 af/yr if a water tap is added for each of 3 vacant lots in the future), non-federal	N/A	**Source:** 3 groundwater supply wells within the drainage of an intermittent stream, approximately 2 miles upstream from its confluence with Beaver Creek, which is tributary to the South Platte River. **Use:** domestic use, currently serving 61 residential water taps and a population of 150.	SPWRAP, Hidden Valley Mutual Water Company
11-F-004	USDA-RD	Jefferson	Park Water Co. Water System Improvements	Wonderview Subdivision	12/30/2010	existing; 4.74 af/yr (up to 7.1 af/yr if a water tap is added for each of 3 vacant lots in the future), non-federal	N/A	**Source:** 2 groundwater supply wells tributary to Lans Gulch, which is tributary to the South Platte River. **Use:** municipal and domestic use, and fire protection, currently serving 35 residential water taps.	SPWRAP, Park Water Company
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
FWS-NE: 2010-455	USDA-RD	Morrill	Bayard Water Project	Village of Bayard	7/14/2010	Existing and new, non-federal	N/A	**Source**: Scottsbluff wellfield which is within the hydrologically connected groundwater area of the N. Platte River basin **Use**: Municipal and industrial water supply	Nebraska New Depletions Plan
WYOMING									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
61411-2010-F-0170	BLM	Carbon	Bridger Pass Project	BLM	4/1/2010	Existing, non-federal (1 time depletion of 2.3 af)	2010	**Source:** municipally treated water from City of Rawlins. **Use**: for dust abatement along the road related to resurfacing.	None required

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions
Calendar Year 2011

COLORADO

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing, new, or combination water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure (e.g., SPWRAP)
11-F-006	USACE	Park	Montgomery Reservoir Improvements Project	Colorado Springs Utilities	1/24/2011	existing, non-federal	NA	**Source**: In-priority diversions of natural inflows of the Middle Fork of the South Platte River and diversions from the Blue River Basin which is tributary to the Colorado River. **Use:** Municipal purposes. The project would result in the continuation of existing depletions averaging an annual evaporative loss (from the reservoir) of 42.64 af and an avg. annual diversion of 1,457 af.	SPWRAP, Colorado Springs Utilities
11-F-007	USACE	Clear Creek	Construction of Intake Structure in Clear Creek	City of Black Hawk	3/17/2011	existing, non-federal	NA	**Source**: Clear Creek, which is tributary to the South Platte River. **Use:** Residential and commercial use by the City of Black Hawk associated with 482 af/year.	SPWRAP, City of Black Hawk
11-F-009	USACE	Weld	St. Vrain State Park Diversion Structure and Pump Station	Colorado State Parks (CSP)	4/28/2011	new, non-federal	2011	**Source**: St. Vrain Creek, which is tributary to the South Platte River. **Use:** Recreational purposes associated with filling and maintaining Blue Heron Reservoir within the St. Vrain State Park. Depletions are associated with initial fill of 900 af (100-200 af annually under CSP's water right and about 295 af/yr. through the Longmont agreement). 254 af/yr. evaporative losses are expected.	SPWRAP, State of Colorado
11-F-012	FHWA	Clear Creek, Park	Phase III Guanella Pass Road/Horse Trail Project	FHWA-CFLHD, CDOT, Pike and Arapahoe National Forests, Town of Georgetown, Clear Creek and Park Co.s	4/29/2011	new, federal, one-time	2011	**Source**: Private landowners nearby the project with water rights to South Platte tributaries such as Burning Bear Creek, Scott Gomer Creek, Threemile Creek or Geneva Creek. **Use:** One-time water use of approximately 5 af for construction activities including mixing materials and dust abatement.	FWS-Colorado/SPWRAP MOA; FHWA_CFLHD-FWS MOA
11-F-013	FERC	Logan	East Cheyenne Gas Storage Well Plan Amendment Project	East Cheyenne Gas Storage, LLC	5/18/2011	new, non-federal	2011	**Source**: Groundwater supply well adjacent to the South Platte River. **Use:** Up to 21 af/yr (est. 3.9 in 2011 and 4.51 in 2012). Commercial use associated with construction activities and industrial uses.	SPWRAP, East Cheyenne Gas Storage, LLC
11-F-016	FHWA	Weld	OMAD Minute Man Missile Road Re-gravelling Project	FHWA-CFLHD, U.S. Air Force, and Weld County	6/3/2011	new, federal, one-time	2011-2012	**Source:** Groundwater would be pumped from established wells within the South Platte River Basin in Weld County. **Use:** One-time use of up to 2 af of water for construction activities, including mixing for material use and dust abatement.	FWS-Colorado/SPWRAP MOA; FHWA_CFLHD-FWS MOA
11-F-017	USACE	Jefferson	Harriman Reservoir Renovation Project	City and County of Denver	7/12/2011	existing, non-federal	NA	**Source**: Bear Creek near Morrison and Turkey Creek near U.S. Highway 285; both creeks are tributary to the South Platte River. **Use:** Irrigation associated with municipal and residential lawn/landscaping. 85 af/yr. evaporative losses from the reservoir are expected.	SPWRAP, Denver Water
11-F-018	BLM	Jackson	BLM County Road 12 - Well Project	BLM	7/12/2011	new, federal	2011	**Source:** Depletions are associated with 0.19 af/yr from the North Platte River. **Use:** A new well will be operated to provide water primarily for livestock, then wildlife, which is incidental to agriculture.	FWS-Colorado/SPWRAP-Jackson Co. MOA; BLM-FWS MOA

11-F-021	USACE	Morgan	Ducks Unlimited - DT Ranch Infiltration Gallery Project	Ducks Unlimited, Inc.	8/22/2011	new, non-federal	2011	**Source:** Depletions associated with 73.36 af/yr of unappropriated water from the South Platte River. **Use:** Irrigation of several pastures/wetlands and row crop facilities for wildlife.	SPWRAP, DT Ranch, Inc.
11-F-022	USACE	Larimer	YMCA Diversion Structure Improvements Project	YMCA of Rockies - Estes Park	8/29/2011	existing, non-federal	NA	**Source**: Wind River, tributary to Big Thompson River, which is tributary to South Platte River. **Use**: YMCA Water Treatment Facility treats an average of 158 af/yr of diverted raw water for drinking and other domestic potable water uses.	SPWRAP, YMCA of Rockies - Estes Park Center
11-F-019	USACE	Weld	Metro WW Reclamation District Northern Treatment Plant Project	Metro Wastewater Reclamation District (MWWRD)	10/4/2011	existing and new, non-federal	2012	**Sources:** Aurora receives 95 % of its water from snowmelt runoff in headwaters of South Platte. Brighton obtains some raw water supply from tributary ground water in South Platte and Beebe Draw basins, supplementing with additional sources. A portion of Denver's water comes from the S. Platte basin. A major source of South Adams Co.'s water supply is from wells in South Platte alluvium. Thornton obtains raw water from 3 major sources: South Platte River, Lower Clear Creek, and Upper Clear Creek. Depletions are associated with 12,736 af/yr. (current), and 70,176 af/yr. (at buildout) from the South Platte Basin. **Use:** Municipal indoor [only] water use by member municipalities currently under contract with MWWRD, for wastewater treatment at new plant.	SPWRAP- Aurora; Brighton; Denver Water; So. Adams Co.W&SD; and Thornton
11-F-020	USACE	Boulder	CU's Williams Village Irrigation Utility Project	University of Colorado, Boulder	10/11/2011	existing, non-federal	NA	**Source:** Depletions associated with a maximum diversion of 46.43 af/yr from Bear Canyon Creek, which is tributary to the South Platte River. **Use:** Landscape irrigation activities at the Williams Village campus.	SPWRAP, Univ. of Colorado at Boulder
12-F-002	USACE	Boulder	Baseline Reservoir Northwest Dam Repair Project	Baseline Land and Reservoir Company	11/3/2011	existing, non-federal	NA	**Source:** Bear Canyon Creek, Boulder Creek, and South Boulder Creek; all tributary to the South Platte River. **Use:** Maximum average annual evaporative losses of 967.5 af from the reservoir and total consumptive use of 3,497 af/yr associated with municipal and agricultural/irrigation uses.	SPWRAP- Base Line Land & Reservoir Co.; Boulder; Lafayette; and Louisville
12-F-005	USACE	Park	Center of Colorado Water Conservancy District's Smelter Pipeline Reservoir Project	Center of Colorado Water Conservancy District	11/21/2011	existing and new, non-federal	2012	**Source**: Mosquito Creek, tributary to the Middle Fork of the South Platte River. **Use**: 0.275 af/yr of water for augmentation purposes associated with municipal use and up to 9.4 af/yr of evaporative losses from the rehabilitated reservoir.	SPWRAP, Center of Colorado Water Conservancy District
12-F-007	USDA Forest Service	Park	Jefferson Lake Dam Rehabilitation and Permit Reauthorization Project	City of Aurora	12/29/2011	existing and new one-time, non-federal	2012	**Source:** Jefferson Creek, tributary to Tarryall Creek, which is tributary to South Platte River. **Use:** Maximum annual evaporative loss of 357 af from Jefferson Lake and a one-time water use of about 0.5 af for construction-related activities. Water in the lake is primarily associated with municipal uses by the City of Aurora.	SPWRAP, City of Aurora
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions (estimated)**	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
FWS-NE: 2011-297	USACE	Keith	Anderson Sand & Gravel pond expansion	Anderson Sand and Gravel Company	3/28/2011	new, non-federal (1.7 af)	2011	**Source:** South Platte River near Paxton, NE. **Use:** Consumptive use associated with pond expansion and sand and gravel mining	Nebraska New Depletions Plan
FWS-NE: 2011-419	USDA	Hall	Gwecke Farms pivot replacement	Gwecke Family farms, Inc.	6/30/2011	new, non-federal	2012	**Source:** An existing groundwater well hydrologically connected to the Platte River which is permitted by the Nebraska DNR and Central Platte NRD. **Use:** Irrigation for agriculture.	Nebraska New Depletions Plan
FWS-NE: 2011-420	USDA	Dawson	Morgan Meier Pivot Project	Morgan Meier	7/5/2011	new, non-federal	2012	**Source:** Platte River. **Use:** Irrigation for agriculture	Nebraska New Depletions Plan
WYOMING									

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions									
Calendar Year 2012									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
12-F-003	USACE	Adams	Hammer and Rogers Reservoirs Project	City of Thornton	1/9/2012	combination existing/new, non-federal	2013/2014	**Source:** South Platte River near Thornton, CO. **Use:** Total estimated average annual loss of 1,179 af and a one-time use of 4,000 af to fill the two reservoirs are associated with City of Thornton municipal and industrial uses to meet projected future "firm yields"	SPWRAP
12-F-012	BLM	Jackson	Curtain Spring Pond Maintenance Project	BLM	2/29/2012	existing, federal	NA	**Source**: Curtain Spring, which is tributary to the North Platte River. **Use:** 0.17 af of continuing historic depletions associated with livestock/agriculture, as well as wildlife.	Automatically covered under the PRRIP
12-F-013	USACE	Larimer	Poudre River SFU Diversion Structure Rehab. Project	Colorado Parks and Wildlife (CPW)	3/8/2012	existing, non-federal	NA	**Source**: Poudre River which is a tributary within the South Platte River watershed. **Use:** 12.4 af/yr currently and up to 19.7 af/yr in the future are piscatorial uses associated with a fish hatchery and rearing facility owned and operated by Colorado Parks and Wildlife.	State of Colorado
12-F-015	USACE	Gilpin	Pactolus Lake Diversion Gate Replacement Project	Lincoln Hills Fly Fishing Club	3/15/2012	existing, non-federal	NA	**Source:** Water is being diverted from South Boulder Creek, which is tributary to the South Platte River, to keep Pactolus Lake at its capacity of about 10 af. **Use:** A depletion of up to 13 af/yr is due to evaporative losses from the lake, which is used for piscatorial/recreational use.	SPWRAP
12-F-017	FHWA	Logan, Weld	OMAD Minute Man Missile Access Road Project	FHWA-CFLHD, U.S. Air Force, and Logan/Weld counties	3/15/2012	new, one-time, federal	2012	**Source**: The water source would be from existing groundwater wells in Logan and Weld counties, which are hydrologically connected to the South Platte River watershed. **Use:** A one-time use of 2 af of water is associated with industrial uses.	FWS-Colorado/SPWRAP MOA; FHWA_CFLHD-FWS MOA
12-F-019	USACE	Douglas	Platte Canyon Reservoir Spillway Replacement Project	Denver Water	3/21/2012	existing, non-federal	NA	**Source**: The depletion is associated with Platte Canyon Reservoir which is directly on the South Platte River. **Use:** The depletion is associated with 127 af of water related to evaporation from the reservoir which is proposed to be modified to meet state flood protection requirements. The water within the reservoir is primarily for municipal uses.	SPWRAP

12-F-020	FHWA	Multiple	FHWA Federal -Aid Highway Program in Colorado	FHWA-CDOT	4/4/2012	new, non-federal	2012-2019	**Source**: The source of the water would be from municipal sources throughout the South Platte River basin or directly from waterways within the basin. **Use:** An average of 169 af annually would be used for industrial activities associated with road construction such as dust abatement and compaction. ***Note:*** *In 2013, FHWA-CDOT reported actual 2012 water use was 157.8 af.*	State of Colorado
12-F-021	BLM	Park	Fairplay-Destiny Placer Mine Project	Destiny Mining, LLC	4/18/2012	new, non-federal	2012	**Source:** Water for the new mining operation would come from Spinney Reservoir, Antero Reservoir, and/or Como Lake. Applicant might also drill a well onsite, pulling water from Beaver Creek watershed, which is tributary to the South Fork of the South Platte River; however it holds no water right nor planned location/date of well start-up. **Use:** 0.37 af annually for all functions of mine operation including mining, dust abatement, and a septic system.	SPWRAP
NA	USACE	Denver	Berkeley Lake Intake Replacement Project	City of Denver, Public Works Department	4/30/2012	existing, non-federal	NA	**Source**: Rocky Mountain Ditch, which gets water from tributaries to the South Platte River. **Use:** Approximately 100 af of water is used annually for irrigation associated with Berkeley Lake Park, a municipal park. NOTE: Coverage not given under PRRIP as this action cannot be consulted upon because it had already occurred prior to USACE permitting or consultation with FWS. Information is provided for reporting purposes only.	None- Not consultable action, depletion occurred prior to consultation, no BO coverage provided
12-F-22	FHWA	Park	Tarryall Creek Road Improvement-Section 3 Project	FHWA-CFLHD	5/1/2012	new, one-time, federal	2013	**Source:** Depletions are associated with a one-time use of 15 af/yr from Tarryall Reservoir and nearby private landowners. **Use:** The depletion is associated with road construction activities including mixing material, compaction and dust suppression and is considered to be an industrial use.	FWS-Colorado/SPWRAP MOA; FHWA_CFLHD-FWS MOA
12-F-24	HUD/CDPHE	Douglas	Town of Sedalia's Water System Improvements Project	Douglas County, Town of Sedalia	6/13/2012	existing, non-federal	NA	**Source:** Depletions associated with 2.87 af/yr from alluvial/non-alluvial wells of which 2/3 are tributary to the South Platte River. **Use:** Municipal, residential and industrial uses within Sedalia.	SPWRAP
12-F-26	USFS	Larimer	Pine Creek Ditch SUP Reauthorization Project	Diamond Tail Ranch, LLC	6/26/2012	existing, non-federal	NA	**Source**: Pine Creek which is ultimately tributary to the South Platte River. **Use**: 0.8 cfs depletion is associated with agricultural operations related to irrigation for haying/pasture on 12 acres.	SPWRAP
12-F-30	USDA-RD	Teller	Forest Glen Water System Improvements Project	Forest Glen Sports Association, Inc.	7/30/2012	existing, non-federal	NA	**Source:** Wells tributary to the South Platte River and potential augmentation water that is proposed to be acquired by purchase of water rights from Mountain Mutual Reservoir Company. **Use:** An average of 0.385 af/yr of consumptive use would continue from the municipal/domestic water supply. Forest Glen's well permit allows for a maximum annual consumptive use of 1.11 af.	SPWRAP

12-F-31	USACE	Jefferson, Park	Staunton State Park Dam Improvement Project	State of Colorado-Division of Parks and Wildlife	8/27/2012	combination existing/new, non-federal	2012-2013	**Source:** Black Mountain Creek, an intermittent stream tributary to Elk Creek, which flows into the North Fork of the South Platte River. **Use:** 9.51 af depletion is associated with evaporative losses from the reservoirs. This is a decrease in total consumptive uses from current 11.88 af. The water would be used for recreation, piscatorial, wildlife, and augmentation purposes.	State of Colorado
12-F-028	USACE	Jefferson	MillerCoors Intake Water Diversion Structure Rehabilitation Project	MillerCoors, LLC	8/29/2012	existing, non-federal	NA	**Source:** Clear Creek which is ultimately tributary to the South Platte River. **Use:** Approximately 846.6 af/yr of water will continue to be a consumptive use as a result of evaporative losses from the MillerCoors plant's cooling system. This is an industrial use.	SPWRAP
12-F-32	USACE	Park	Fairplay's Dredging of the Beach Reservoir Project	Town of Fairplay	9/6/2012	existing, non-federal	NA	**Source:** Fairplay's Beach Reservoir is an existing reservoir on the Middle Fork of the South Platte River. **Use:** Approximately 13.47 af/yr of evaporative losses is associated with maintaining the reservoir level for recreation and fish/wildlife.	SPWRAP
NA	USACE	Jefferson	Sabell Irrigation Farm Pond Spillway Improvements at Weaver Gulch	Sabell Farm	9/27/2012	existing, non-federal	NA	**Source:** Water is diverted from Turkey Creek into the Sabell Farm pond via the Bergin Reservoir, which is tributary to the South Platte River. **Use:** 20 af of pond water is used annually to irrigate hay fields in addition to evaporative losses of 0.829 af/yr. NOTE: Coverage not given under PRRIP as this action cannot be consulted upon because it had already occurred prior to USACE permitting or consultation with FWS. Information is provided for reporting purposes only.	None- Not consultable action, depletion occurred prior to consultation, no BO coverage provided
12-F-033	USACE	Jefferson	Farmers Highline Canal Headworks Rehab. Project	Farmers' High Line Canal & Reservoir Company and 15 other water users	10/25/2012	existing, non-federal	NA	**Source:** The existing canal diverts water from Clear Creek, which is tributary to the South Platte River. **Use:** An average of 24,000 af/yr (7,200-40,500 af/yr over the past 20 yrs) is diverted and delivered to 15 other shareholders for a variety of uses in Adams, Jefferson, and Weld counties; residential, commercial, industrial, and irrigation uses, and some for augmentation purposes.	SPWRAP
13-F-002	USACE	Jefferson	Upper Long Lake Diversion Dam & Ditch Headgate Rehab. Project	Denver Water & Asphalt Paving Company	10/31/2012	existing, non-federal	NA	**Source:** The existing ditch diverts water from Ralston Creek, which is tributary to the South Platte River, to Upper Long Lake. **Use:** An average of 905 af annually is diverted to Upper Long Lake and then delivered to Asphalt Paving Co. (for dust suppression), Lower Long Lake (for irrigation), and some back to Ralston Creek (to meet DW's Agricultural Ditch obligation or municipal use) . Of the 905 af diverted annually, evaporative losses for Upper and Lower Long Lakes averaged 244 af.	SPWRAP

12-F-036	USACE	Weld	Coffin Davis Ditch Augmentation Structures Project	City of Longmont	11/15/2012	combination existing/new, non-federal	2012/2013	**Source:** The existing ditch diverts water from Dry Creek which is tributary to St. Vrain Creek and the South Platte River. **Use:** Historically, 944 af of water was diverted, and 519 af of that was used for irrigation purposes. Over time, gravel mining and reclamation has resulted in the irrigated agriculture land to be reduced to 36 acres presently (88% reduction). The remaining diverted was historically returned to St. Vrain and the South Platte (425 af). Currently, the mining and reclamation has resulted in a series of ponds and wetlands that are held fairly constant with groundwater levels. The 199 af/yr of new depletions associated with the project are evaporation/evapotranspiration from these ponds and wetlands. Water from the original water right associated with irrigation is proposed to offset the new depletions through augmentation.	SPWRAP
13-F-004	USFS	Larimer	Mill Creek Ditches SUP Reauthorization Project	Mr. Chad Uthmann	11/21/2012	existing, non-federal	NA	**Source:** Two existing ditches divert water from Mill Creek, which is in the North Fork Poudre River Basin and tributary to the South Platte River. **Use:** Approximately 1-2 cfs is diverted annually (April 1-July 4) to irrigate about 25 acres of hay/pasture.	SPWRAP
13-F-005	USFS	Larimer	McIntyre & Pine Creek Ditches SUP Reauthorization Project	Rose Valley Ranch, LLC	11/21/2012	existing, non-federal	NA	**Source:** Two existing ditches enable diversion of water from Pine Creek into McIntyre Creek, both of which are ultimately tributary to the South Platte River. **Use:** 3.2 cfs from Pine Creek and 7 cfs from McIntyre Creek are diverted annually (May 20-July 30) to irrigate 50 acres of hay/pasture.	SPWRAP
13-F-010	USACE	Denver	High Line Canal Headgate at Wellshire Golf Course Check Dam Project	Denver Water	12/11/2012	existing, non-federal	NA	**Source:** The existing High Line Canal conveys water from the South Platte River. **Use:** The non-potable water is diverted to the Golf Course pond and then used for irrigation of grass and other vegetation on the golf course. An average of 9,820 af/yr are diverted to the High Line Canal from the South Platte River.	SPWRAP
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-	**Start Year if new water-related activity creating**	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
FWS-NE: 2012-468	USDA	Lincoln	Village of Brady Proposed Wastewater Improvements	Village of Brady	7/26/2012	existing, non-federal	2013	**Source:** Platte River near Brady, NE. **Use:** Associated with wastewater treatment plant improvements that should reduce on-site consumptive uses.	Nebraska New Depletions Plan

WYOMING									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
06E13000-2012-F033	BLM	Carbon	Chokecherry and Sierra Madrid Wind Energy Project	Chokecherry/Sierra Madrid Wind Energy	9/12/2012	existing, non-federal	2013	**Source: Use:** Approximately 600 af (no more than 200 af/yr) of depletion will be required for initial construction. The source of the water is Savage ditch #2 and Sage Creek reservoir which are tributary to the South Platte River. Approximately 20 af/yr depletion is expected for the 30 year life of the project	covered by WY new depletions plan

Calendar Year 2013									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
13-F-013	FHWA	Clear Creek, Park	Guanella Pass Road Improvement, Remaining Portion Phase III	CFLHD, CDOT, Pike/Arapaho National Forests	1/30/2013	one-time new, federal	2013	**Source**: private landowners with water rights on Burning Bear Creek, Scott Gomer Creek, Threemile Creek, and/or Geneva Creek which are tributary to the South Platte River. **Use:** 10 af of new depletions associated with road reconstruction.	FWS-Colorado/ SPWRAP MOA; FWS-CFLHD MOA
12-F-027	USACE	Clear Creek	Georgetown Hydro Plant-Clear Lake Dam Repair Project	Xcel Energy	2/7/2013	existing, non-federal	N/A	**Source**: South Clear Creek, which is tributary to the South Platte River. **Use**: Maximum active storage of 810 af in Clear Lake and evaporative losses of 30.7 af/yr from Clear Lake and the Forebay, associated with Xcel's need to replace an outlet works intake structure and install water level monitoring devices at Clear Lake Dam. Xcel's 1,208.19 af/yr of water rights are for irrigation, industrial use, power generation, augmentation, evaporation, storage and direct-flow.	SPWRAP
13-F-015	BLM	Jackson	BLM's Alkali Lake Well, Ditch Well, and Spring Creek Well Projects	BLM	3/4/2013	existing, federal	N/A	**Source**: Continued operation of 3 existing wells, which are tributary to the North Platte River. **Use:** 0.75 af/yr associated with providing water for livestock, and then wildlife.	Automatically covered under the PRRIP
13-F-014	USACE	Boulder	Farmers Ditch Diversion Structure at Elks Neighborhood Park Project	Boulder Parks and Recreation	3/13/2013	existing and new, non-federal	2013	**Source:** Water from Boulder Creek, which is tributary to the South Platte River, is conveyed through the Farmers Ditch to Elks Park. **Use:** Up to 9.77 af/yr for irrigation at the Park; 7.41 af/yr from Farmers Ditch, and up to 2.36 af/yr from the City's treated supply. After grasses are established, total depletions are anticipated to decrease to 6.49 af/yr.	SPWRAP
13-F-016	USACE	Jefferson	Green Valley Association Dam Spillway Rehabilitation Project	Green Valley Association	3/13/2013	existing, non-federal	N/A	**Source:** Natural flow from Casto Creek, which is tributary to the South Platte River. **Use:** 1.56 af/yr of evaporative losses from the 5.68 af pond, which is used for irrigation, fire protection, and recreational fishing.	SPWRAP
13-F-017	USDA Forest Service	Jackson	Ditch Bill 2013 Facilities Project	Robert Manville, Deline Land and Cattle, and Robert Wilford	4/12/2013	existing, non-federal	N/A	**Source:** Beaver Creek of the Roaring Fork for Saint Joseph Ditch, East Branch of Willow Creek for School Section Ditch, and Beaver Creek of Big Creek for Wilford Ditch; all of which are tributary to the North Platte River. **Use:** Average annual diversions of 414 af (Saint Joseph Ditch), 427 af (School Section Ditch), and 606 af (Wilford Ditch) for irrigating cropland/pasture.	SPWRAP (Jackson Co.)
13-F-018	USDA Forest Service	Jackson	Northgate Allotment Management Plan Revision Project	Medicine Bow-Routt National Forests	4/22/2013	combination existing and new, federal	2013	**Source:** Several small drainages that are tributary to the North Platte River. **Use:** 3.4 af/yr of new depletions; 1.8 af/yr from 2 new water developments in the North Fork allotment and 1.6 af/yr from 3 new water developments in the Camp Creek allotment. Existing water use of 4.6 af/yr from drainages that are tributary to the North Platte River. Water is for rangeland management and livestock (cattle), and then wildlife.	FWS-Colorado/ SPWRAP/ Jackson Co. MOA; SPWRAP interim coverage
13-F-020	USFWS	Adams	Rocky Mountain Arsenal NWR's Habitat Management Plan Project	Rocky Mountain Arsenal NWR	6/28/2013	combination existing and new, federal	2013	**Source:** First Creek and Irondale Gulch, which are tributary to the South Platte River. **Use:** 2.1 af/yr of new depletions associated with additional bison watering and domestic use. Up to 1,400 af/yr of existing use for reservoir maintenance, irrigation, bison watering, domestic, and habitat management.	FWS-Colorado/ SPWRAP MOA
13-F-021	FHWA	Logan, Weld	OMAD 300 Minute Man Missile Road Re-gravelling Project	FHWA-CFLHD, US Air Force, Logan and Weld Counties	6/28/2013	one-time new, federal	2013	**Source:** Established wells within the South Platte River basin in Logan and Weld Counties. **Use:** A new one-time use of up to 3 af for road reconstruction activities, including mixing for road material and dust abatement.	FWS-Colorado/ SPWRAP MOA; FWS-CFLHD MOA

13-F-022	USACE-Omaha	Douglas, Jefferson, Arapahoe	Chatfield Reservoir Storage Reallocation Project	USACE, 16 different water user groups	7/31/2013	combination existing and new, non-federal	?	**Source:** South Platte River and Chatfield Reservoir. **Use:** Municipal, industrial, domestic, agricultural, and recreational uses from reallocation of up to 20,600 af/yr of reservoir water storage from flood control to multipurpose use; and an increase of 692 af/yr of evaporative losses (from existing 2,215 af/yr to 2,907 af/yr).	SPWRAP
13-F-025	USDA Forest Service	Park	Randall and Nicholas Ditch Bill Easement Project	74 Ranch, LLC	8/14/2013	existing, non-federal	N/A	**Source:** Ditch transfers water from Michigan Creek, which is tributary to the South Platte River. **Use:** Existing depletions averaging 330-440 af/yr for storage, pasture irrigation, domestic and stock use; available only about 2 of every 10 years.	SPWRAP
13-F-036	USDA Forest Service	Boulder	Gold Hill Minerals Bueno Mine Plan of Operations Project	Gold Hill Minerals, Inc.	12/3/2013	new, non-federal	2014	**Source:** Water purchased from McDonald Farms Enterprises, who obtains it from Ft. Collins and Greeley; water will be from Colorado-Big Thompson, the South Platte River, or a combination of both. **Use:** Forest Service assumes 1.1 af of water will come from the South Platte River basin for industrial use associated with exploratory mineral drilling.	SPWRAP
13-F-006	USACE	Summit, Grand, Park, Douglas, and Boulder	Moffat Collection System Project	City and County of Denver (Denver Water)	12/6/2013	combination existing and new, non-federal	?	**Source:** South Boulder Creek, Fraser River, and Williams Fork River via the Moffat Tunnel and South Boulder Creek to Gross Reservoir. **Use:** Past, existing and future diversions are covered for Denver Water's *entire* system, to meet an average annual demand level of 363,000 af for municipal and industrial purposes. 18,000 af/yr of "new" firm yield to the Moffat Water Treatment Plant and raw water customers upstream. Existing Gross Reservoir will be enlarged by 72,000 af. Total South Platte River diversions and reservoir evaporative losses, associated with Denver Water's past, present, and future demand levels since start of PRRIP will be 48,767 af/yr (a 3,460 af/yr increase). Additionally, water diversions from the Upper Colorado River basin for meeting the 363,000 af demand are covered under the BO via the Upper Colorado River Recovery Program.	SPWRAP
13-F-037	USACE	Larimer	Rigden Storage Reservoir Project	City of Fort Collins	12/20/2013	combination existing and new, non-federal	2014	**Source**: Water from "Southside Ditches" sources and Coy and Boxelder Ditches sources, which are tributary to the South Platte River and/or Laramie River basins, will be supplied to the reservoir via Fossil Creek Reservoir Inlet Ditch and Boxelder Ditch; and primarily transbasin water delivered via Michigan Ditch from Michigan River. **Use:** Average annual diversions to the reservoir of 800-1,500 af; storage is for managing return flow obligations and reusable wastewater effluent. Reservoir evaporative losses of up to 300 af/yr.	SPWRAP
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
FWS-NE: 2013-332	USDA Rural Development	Kearney	Ward Eckloff Irrigation Improvements Project	Ward Eckloff	5/24/2013	existing and new, non-federal	?	**Source:** Platte River near Kearney, NE. **Use:** combination of existing and new depletion associated with conversion from gravity to pivot irrigation, propane to electric engine, installation of underground pipe and sodbusting 10.1 acres for a pivot path.	Nebraska New Depletions Plan
FWS-NE: 2013-454	USDA Rural Development	Lincoln	Milton Motel Project	Milton Motels, LLC	8/30/2013	existing, non-federal	2014	**Source:** Platte River near Grand Island, NE. **Use:** new depletion associated with consumptive uses from commercial hotel development.	Nebraska New Depletions Plan
WYOMING									

*BLUE indicates those depletions considered "federal"

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	Depletion category (existing or new water-related activity? federal or non-federal?)	Start Year if new water-related activity creating depletions (estimated)	Water sources and uses	Offsetting measure* (e.g., SPWRAP)
06E13000-2013-F-0033	BLM	Converse, Natrona, Carbon	Gateway West (Transmission Line)	Idaho Power Company and Rocky Mountain Power	9/12/2013	new, one-time, non-federal	2015	**Source:** undetermined at this time **Use:** 50.62 af/yr for two years (101.24 af total) during construction of the project. The depletions are associated with construction of transmission line, including concrete mixing and dust suppression. The entire life of the project is expected to be 50 years but there are no expected depletions after initial project construction. The project may use municipal or other sources already covered by consultation but are incorporated here due to uncerantainty with the source.	Wyoming depletions plan

*BLUE indicates those depletions considered "federal"

Calendar Year 2014									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
14-F-0188	FERC	Clear Creek	Cabin Creek Pumped Storage Hydroelectric FERC Relicense Project	PSCo of Colorado or Xcel Energy	2/3/2014	one-time and annual new (EL), non-federal	2014	**Source**: South Clear Creek and/or Cabin Creek, both tributary to the South Platte River. **Use**: a one-time depletion of 76 af to increase the water storage capacity from 1,087 af to 1,163 af, and for associated hydroelectric production (municipal). This would result in additional 2 af evaporative losses beyond the existing 106 af/year losses from the two reservoirs. Xcel would use the additional water to ultimately increase power generation at its hydroelectric facility.	SPWRAP
14-F-0066	FTA	Denver, Jefferson, Arapahoe, Douglas, Adams, Boulder	FasTracks Project	Denver Metro Regional Transportation District	3/11/2014	one-time new (over multiple yrs.), non-federal	2013-2017	**Source**: municipal sources in the South Platte River basin. **Use:** up to 328 af of water use associated with road construction activities such as dust suppression and minimal concrete work, to expand and improve public transit service within the Denver Metro Region.	State of Colorado
14-F-0047	USACE	Douglas	Storage of WISE Project water	Denver Water, Aurora Water, and 8 members of SMWA	4/18/2014	existing and new, non-federal	2014?	**Source**: includes transferred agricultural water, a municipal water supply reservoir (RHR) with diversions from Newlin Gulch and Cherry Creek (tributary to the South Platte River), and excess reusable return flows diverted directly from the South Platte River. **Use:** an average annual delivery of 10,000 af of WISE water to the 10 SMWA members; an increase in evaporative losses from 600-700 af to 1,400-1,500 (800 af); and an annual maximum reservoir storage increase of 10,539 af. The water stored in RHR would be used by the SMWA members to meet existing and future municipal and industrial demands within their service areas.	SPWRAP
14-F-0248	USDOE	Jefferson	DOE Improvements for NREL - NWTC Project	USDOE	4/25/2014	existing and new, federal	2013	**Source:** water is obtained from Boulder, whose sources are a combination of Front Range and western slope water; Arapahoe Glacier and Sliver Lake Reservoir (40%), Barker Reservoir (40%), and the Colorado River (20%) via the C-BT Transbasin Diversion project. **Use:** existing usage of 1.89 af/yr., with an increase of 0.99 af/yr. by 2020 (PRRIP first increment) and an increase of 1.41 af/yr. at buildout. This depletion is associated with construction/modification of NREL buildings, installation of wind turbines and meteorological towers, and expanding power capacity. There would be continued water use associated with site operations and maintenance activities, including drinking water; and new water use for construction/dust suppression and onsite fire suppression.	SPWRAP
14-F-0406	USACE	Adams	Sand Creek Park Ponds Project	City of Aurora	5/2/2014	new, non-federal	2014	**Source:** water from Toll Gate Creek and Sand Creek, which are tributary to the South Platte River. **Use:** average annual diversion of 160 af from Sand Creek (via a new diversion structure off of Toll Gate Creek) to the 3 ponds, and then back to Sand Creek. Evaporative losses would total 15.49 af/yr.; 6.83 af/yr. would be a new depletion while 8.66 af/yr. is existing. The water would fill the ponds as part of a improvement/enhancement project to improve aquatic habitat and increase wetland/riparian diversity.	SPWRAP
14-F-0469	FHWA	Logan, Weld	OMAD 300 (59) Minute Man Missile Road Re-gravelling Project	US Air Force, FHWA-CFLHD, Logan and Weld counties	5/6/2014	one-time new, federal	2014	**Source:** water would come from existing wells in Logan and Weld counties within the South Platte River basin. **Use:** one-time use of up to 3.4 af for construction activities associated with resurfacing 68.7 miles of existing county roads, including mixing for material use and dust abatement.	FWS-Colorado/SPWRAP MOA; FWS-CFLHD MOA

*BLUE indicates those depletions considered "federal"

14-F-0287	ACOE	Adams	Little Dry Creek Park Flood Control Improvements Project	Urban Drainage FCD & City of Westminster	5/23/2014	new, non-federal	2014	**Source:** water captured in the LDC Pond would be surface water that is tributary to Little Dry Creek, which is tributary to Clear Creek and the South Platte River. **Use:** 6.0 af/yr. of evaporative losses for the new, 25.0-af pond.	SPWRAP
14-F-0659	USDOE	Jefferson	DOE Improvements for NREL - South Table Mountain Campus Project	USDOE	6/24/2014	existing and new, federal	2013	**Source:** water that comes from Consolidated Mutual Water Company's Maple Grove Reservoir, which is supplied by water from tributaries of Clear Creek, a tributary of the South Platte River. **Use:** existing usage of 70.14 af/yr., with an increase of 48.33 af/yr. by 2020 (PRRIP first increment) and 77.8 af/yr. at buildout. This depletion is associated with research activities, site operations and maintenance activities, consumptive use, fire suppression, building heating and cooling, process water, landscaping, and an expanding super computer at the ESIF.	SPWRAP
14-F-0262	USDA Forest Service	Boulder, Gilpin	Eldora Mountain Resort amended operations and Special Use Permit	EMR or Eldora	12/22/2014	existing and new, non-federal	2013, 2018	**Source:** existing water usage comes from Peterson Lake, which is filled by deliveries from Middle Boulder Creek and South Boulder Creek; and deliveries via the Jenny Creek Pipeline/Jenny Creek, tributary to S. Boulder Creek (all of which are tributary to the South Platte River). New depletions would be delivered from Jenny Creek. **Use:** existing average use of 287 af/yr. for snowmaking, 2-5 af/yr. for municipal and irrigation, and average annual evaporative losses of 34.88 af from the resort's snowmaking water storage system. A new depletion of 3 af/yr. from increased potable water use at the resort would also occur beginning in 2018.	SPWRAP
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
None in 2014									
WYOMING									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)

*BLUE indicates those depletions considered "federal"

None in 2014										

*BLUE indicates those depletions considered "federal"

USFWS Platte River Basin 'PRRIP Tiered Consultation' Biological Opinions

Calendar Year 2015									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity; federal or non-federal)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
14-F-0671	BLM	Multiple counties throughout South Platte River basin	Fluid Minerals Program Project	Multiple Energy Companies	2/2/2015	annual new spanning 10 years, non-federal	2015-2025	**Source**: South Platte River basin. **Use:** an average 855 af per year for 10 years (cumulative 8,550 af) associated with access road dust abatement, hydrostatic testing of newly constructed pipelines, drilling and completing wells (drilling and fracking fluids), and seismic activity.	SPWRAP
15-F-0355	FHWA-CFLHD	Logan, Weld	OMAD 300 (60) Minute Man Missile Road Re-gravelling Project	US Air Force, FHWA-CFLHD, Logan and Weld counties	5/11/2015	one-time new, federal	2015	**Source:** water would be obtained from existing wells in Logan and Weld counties, within the South Platte River basin. **Use:** a one-time use of approximately 2.7 af of water associated with construction activities, including mixing for material use and dust abatement, and would be spread along the road segments. The construction is associated with road resurfacing.	FWS-Colorado-SPWRAP MOA; FWS-CFLHD MOA
15-F-0342	BLM	Jackson	2015 Projects	BLM	5/13/2015	annual new, federal	2015	**Source:** North Platte River via the Alkali well/pipeline. **Use:** an additional annual depletion of 0.27 af per year associated with providing water for livestock and wildlife.	FWS-Colorado-SPWRAP-Jackson Co. MOA; FWS-BLM MOA
15-F-0928	FHWA-CFLHD	Boulder	Lefthand Canyon Drive Rehab Project	USDA, USFS-ARNF, Boulder Co., FHWA-CFLHD	9/29/2015	one-time new, federal	2015	**Source**: water would be pulled from Lefthand Creek, a perennial tributary to St. Vrain Creek and the South Platte River. **Use:** a one-time use of approximately 10 af of water associated with construction activities, including mixing for material use and dust abatement, and would be spread along the project area. The construction is associated with road repairs to Lefthand Canyon Drive needed due to flooding.	FWS-Colorado-SPWRAP MOA; FWS-CFLHD MOA
15-F-0743	USACE	Weld	Geisert Pit Inlet-Outlet Structure Project	Central Colorado Water Conservancy District	10/6/2015	annual new, non-federal	2015?	**Source:** water would come from the Cache la Poudre River, which is tributary to the South Platte River. **Use:** average annual evaporative losses of 45 af from the two pits associated with intake, storage, and release of up to 1,150 af per year of augmentation water for release to the Cache la Poudre.	SPWRAP
15-F-0698	USACE	Adams	Todd Creek Village Intake Structure Project	Todd Creek Village Metropolitan District	10/20/2015	annual new, non-federal	2015?	**Source:** water would be diverted from the South Platte River. **Use:** an average annual diversion of about 2,600 af from South Platte River and approx. 650 af per year from 3 existing (post-1997) alluvial wells.	SPWRAP
15-F-0896	USFS	Clear Creek	Upper Beaver Brook-Reservoir 3A Expansion Project	Lookout Mountain Water District	11/9/2015	annual existing and new, non-federal	2015-16	**Source:** water entering Beaver Brook Reservoir 3A comes from the headwaters of Beaver Brook, a tributary to Clear Creek, which is tributary to the South Platte River. **Use:** existing District-wide annual water treatment and consumption is from 107-199 af (560 taps) for household use and fire protection; an increase in evaporative losses from 32.4 - 44.7 af per year associated with additional storage in the reservoir (257 af + 121.4 af for a total 378.4 af of raw water storage); and possible additional water for 100 taps at buildout.	SPWRAP

15-F-0947	USDA Rural Development	Logan	Iliff Wastewater Treatment Facility Project	Town of Iliff	12/8/2015	annual existing, non-federal	N/A	**Source:** water for the Project is taken from an existing well that is hydraulically connected to the South Platte River. **Use:** continuation of an existing annual depletion of approximately 85.2 af of water diverted for municipal use and eventual treatment in Town's wastewater treatment facility. The Town has water rights to divert up to 90 af of water per year for a future increase in municipal use.	SPWRAP
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
None in 2015									
WYOMING									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
None in 2015									

Calendar Year 2016									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity; federal or non-federal)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
15-F-0987	FHWA-CFLHD	Park	Phase 4 Tarryall Creek Road Improvement Project	CDOT, USFS, Park Co., FHWA-CFLHD	1/8/2016	New, federal, one-time depletion	2016	**Source**: Tarryall Reservoir and Tarryall Creek, a perennial tributary to the South Platte River basin. **Use:** one-time use of 15 af for construction activities, including mixing for material use, compaction, and dust suppression.	FWS-Colorado-SPWRAP MOA; FWS-CFLHD MOA
15-F-0985	USACE	Boulder	Gross Reservoir Environmental Pool Project	Cities of Boulder and Lafayette	1/29/2016	Existing and new, annual, non-federal	USACE permit decision in 2017	**Source**: South Boulder Creek, South Platte River basin. **Use:** an average 25 af per year of evaporative losses in addition to the continuing consumptive uses following instream flow use associated with reservoir's "environmental pool" storage (2,000 af for Boulder; 3,000 af for Lafayette).	SPWRAP, Boulder and Lafayette
15-F-0924	USACE	Larimer	Southernmost Pond Dam Restoration Project	Daniel O'Donnell	1/29/2016	Existing, annual, non-federal	2016	**Source**: the catch pond collects stormwater runoff from an area south of Ryan Gulch Reservoir, within the South Platte River basin. **Use:** existing annual depletions of approximately 4.59 af associated with evaporative losses would continue.	SPWRAP, Lakeside Terrace South Pond Restoration
15-F-1007	USACE	Park	Harris Park Dam No. 2 Maintenance Project	Harris Park Metropolitan District	1/29/2016	Existing, annual, non-federal	2016	**Source**: Harris Park Estates Reservoir #2, which fills via tributaries to the North Fork of the South Platte River. **Use:** existing annual depletions of approximately 7.3 af associated with evaporative losses would continue. The Reservoir is used for recreational purposes.	SPWRAP, Harris Park Metropolitan District
16-F-0158	USACE	Adams	Clear Creek Park Project	Hyland Hills Park and Recreation District	1/29/2016	Existing and new, annual, non-federal	2016	**Source**: Clear Creek and Ralston Creek, both tributary to the South Platte River. **Use**: consumptive uses associated with 65.7 af per year of continuing evaporative losses from six ponds (0.7 af reduction from current) and 32.9 af of water per year for landscape irrigation in the park.	SPWRAP, Hyland Hills Park and Recreation District
16-F-0084	USDA Rural Development	Logan	Mechanical Wastewater Treatment Plant Project	Town of Crook	2/5/2016	Existing, annual, non-federal	2016	**Source**: one existing well, hydrologically connected to the South Platte River basin. **Use:** existing annual depletions of approximately 60.22 af associated with municipal uses and treatment at the WWTP would continue.	SPWRAP, Town of Crook
16-F-0039	EPA	Douglas	Pinery Pump Station 1 and Zone A Pipeline Project	Pinery Water and Wastewater District	2/24/2016	Existing, annual, non-federal	2016	**Source:** alluvial wells along Cherry Creek, in the South Platte River basin. **Use:** up to 1,220 af per year associated with municipal uses would continue.	SPWRAP, Denver Southeast Suburban Water & Sanitation District
16-F-0112	USACE	Weld	Milton Reservoir Stilling Well and Pump Wetwell Project	Anadarko Petroleum Corporation	4/1/2016	New, annual, non-federal	2016	**Source:** Aurora's treated water that was already diverted from the South Platte River, used, and eventually stored in Milton Reservoir. **Use:** depletions associated with the use of up to 2,000 af annually of fully reusable and consumable municipal return flows.	SPWRAP, Anadarko Petroleum Corporation, including subsidiaries
16-F-0258	EPA	Douglas	Plum Valley Heights NWDC's (Northwest Douglas County) Water Project	Plum Valley Heights Subdistrict of the Roxborough Water and Sanitation District	4/15/2016	Existing, annual, non-federal	2016	**Source:** non-specific water provided by Aurora Water. Aurora water is estimated to be 33% from transbasin transfer, 33% from South Platte River basin, and 33% from non-tributary groundwater. **Use:** depletions up to approximately 150 af annually associated with municipal and residential water use, of which 33% will be from the South Platte River basin, would continue.	SPWRAP, Roxborough Water & Sanitation District
16-F-0374	BLM	Jackson	Repair/maintenance of Peterson Well and Case Spring Project	BLM, livestock/wildlife	4/20/2016	Existing, annual, federal	NA (2017?)	**Source:** Case Spring and Peterson Well, within the North Platte River basin. **Use:** 0.81 af/yr of continuing historic depletions for livestock, and then wildlife.	N/A (automatically covered by the PRRIP)
16-F-0396	USACE	Clear Creek	Lebanon Mill Dam Project	History Colorado	4/25/2016	Existing and new, annual, non-federal	2016	**Source:** the alluvial Georgetown Loop Railroad Well that is hydrologically connected to Clear Creek, tributary to the South Platte River; and water diverted from the creek. **Use:** continued well pumping of approximately 0.4 af/yr for drinking/restrooms, maximum annual storage of 0.7 af of water in the new reservoir and the resulting 0.58 af/yr of evaporative losses, all associated with municipal use.	SPWRAP, State of Colorado
16-F-0520	EPA	Boulder	Spurgeon Water Treatment Plant Chlorine Conversion Project	Left Hand Water District	6/2/2016	Existing, annual, non-federal	2016	**Source:** surface diversions from Left Hand Creek, tributary to the South Platte River. **Use:** continuing depletions associated with the District's annual use of 2,590 af of raw water deliveries from the LHD Company.	SPWRAP, Left Hand Water District

16-F-0523	USDA Forest Service	Clear Creek	Municipal Water Diversion and Filtration Plant Project	Town of Empire	6/2/2016	Existing, annual, non-federal	2016	**Source:** surface diversion on Mad Creek, tributary to Clear Creek and the South Platte River. **Use:** continuing depletions associated with the Town's annual diversion of 51.2 af for municipal use.	SPWRAP, Town of Empire
16-F-0522	USACE	Jefferson	Lakewood Country Club Hole #18 Tee Improvements Project	Lakewood Country Club	6/16/2016	Existing, annual, non-federal	2016	**Source:** irrigation pond along South Lakewood Gulch, tributary to the South Platte River. **Use:** continuing depletions associated with 0.28 af/yr of evaporative losses from the pond and 1.66 af/yr of pond water to irrigate the golf course turf.	SPWRAP, Lakewood Country Club
16-F-0766	NRCS	Boulder	Fourmile Creek Fire Station Project	Four Mile Fire Protection District	6/22/2016	Existing, annual, non-federal	2016	**Source:** water storage pond along the north side of Upper Fourmile Creek, tributary to Boulder Creek and the South Platte River. **Use:** continuing depletions associated with 1.5 af/yr from the pond, which includes evaporative losses, for fire protection.	SPWRAP, Four Mile Fire Protection District
16-F-0558	USACE	Arapahoe	Golf Course Pond Sediment Removal Project	Columbine Country Club	8/26/2016	Existing, annual, non-federal	2016	**Source:** golf course pond on Dutch Creek, tributary to the South Platte River. **Use:** continuing depletions associated with 1.5 af/yr of evaporative losses from the pond and 611.4 af/yr of pond water to irrigate the golf course and for recreation, landscaping, and aesthetic purposes.	SPWRAP, Columbine Country Club
16-F-0171	USACE	Gilpin	Manchester Dam Maintenance Project	Manchester Lake	10/31/2016	Existing, annual, non-federal	2016	**Source:** Manchester Lake on Burns Gulch, filled with 100% native South Platte River basin water. **Use:** continuing depletions associated with 73.69 af/yr of evaporative losses from the private reservoir, which is used for aesthetic and recreational purposes.	SPWRAP, Manchester Lake
17-F-0376	USFS	Jackson	Beaver Creek Fire	USFS	/ /2017	New, federal, one-time depletion	2016	**Source**: North Platte River. **Use:** one-time use of 10.7 af for emergency fire suppression activities.	FWS-Colorado-SPWRAP-Jackson Co. MOA; FWS-USFS MOA
17-F-0XXX	BLM	Jackson	Beaver Creek Fire	BLM	/ /2017	New, federal, one-time depletion	2016	**Source**: North Platte River. **Use:** one-time use of 10.7 af for emergency fire suppression activities.	FWS-Colorado-SPWRAP-Jackson Co. MOA; FWS-BLM MOA
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
FWS NE: 2016-046	USDA Rural Development	Scotts Bluff	City of Mitchell wastewater improvement project	City of Mitchell	5/31/2016	annual existing, non-federal	2016	**Source:** North Platte River. **Use:** Continuation of existing depletions, associated with the City of Mitchell's consumptive uses (municipal, industrial, etc.).	Nebraska New Depletions Plan
WYOMING									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
06E13000-2016-F-0135	BLM	Natrona	Mobile Concrete Government Bridge Pit	Mobile Concrete	3/8/2016	Existing, non-federal	2016	**Source**: Municipal water from the town of Mills, Wyoming. **Use:** 0.76 acre feet/year for rock crushing and dust control.	Wyoming Depletions Plan

Calendar Year 2017									
COLORADO									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion Category** (existing, new, or combination water-related activity; federal or non-federal)	**Start Year if new water-related activity creating depletions** (estimated)	**Water Sources and Uses**	**Offsetting Measure** (e.g., SPWRAP or MOA)
17-FE-0526	BLM	Jackson	Beaver Creek Fire / Emergency Consultation	BLM	5/15/2017	New, federal, one-time depletion	2016	**Source**: North Platte River. **Use:** one-time use of 10.7 af for emergency fire suppression activities.	FWS-Colorado-SPWRAP-Jackson Co. MOA; FWS-BLM MOA
(17-FE-0376 is Colorado part of a WYFO BO)	USFS	Jackson	Beaver Creek Fire / Emergency Consultation	USFS	5/17/2017	New, federal, one-time depletion	2016	Source: North Platte River. Use: one-time use of 11.3 af for emergency fire suppression activities.	FWS-Colorado-SPWRAP-Jackson Co. MOA; FWS-USFS MOA
17-F-0377	USACE	Jefferson	Pine Valley Ranch OS Diversion Project	Jefferson County Open Space	5/23/2017	Existing and new, annual, non-federal	2017	**Source:** 39% native South Platte River water and 61% transbasin imports. An existing 21.0 af (84%) from the North Fork of the South Platte River diversion and a new 4.0 af (16%) from the Buck Gulch diversion. **Use:** maximum annual water use of 25.0 af for fish and wildlife enhancement; and water in the lake for water-quality improvements and domestic, irrigation, and commercial purposes associated with operation of the park. This includes evaporative losses, with Pine Lake as the main source.	SPWRAP, JeffCo Open Space
17-F-0901	USACE	Adams	Erger's Pond Augmentation Station Project	City of Brighton	7/11/2017	New, annual, non-federal	2017	**Source:** 100% native South Platte River water. **Use:** 2,851 af per year of new South Platte River water, which is stored in Erger's Pond.	SPWRAP, City of Brighton
17-F-0909	USFS/ USDA-RD	Clear Creek	Mill Creek Park WTF Project	Mill Creek Park Water and Improvement Association	8/10/2017	Existing, annual, non-federal	N/A	**Source:** 100% native South Platte River water drawn from Mill Creek, a tributary of Clear Creek and the South Platte River. **Use:** average (for 2012-2015) of 15.95 af of existing water per year from Mill Creek (due to recent distribution system improvements, Mill Creek Park only used 2.02 af of water in 2016).	SPWRAP, Mill Creek Park Water & Improvement Association
18-F-0134	USDA-RD	Morgan	Water & Wastewater System Improvements Project	Town of Wiggins	12/11/2017	Existing and new, annual, non-federal	2018	**Source:** 85 % native South Platte River water from 7 alluvial wells and 15% non-tributary groundwater. **Use:** existing total of approx. 1,790 af/yr; current 215 af/yr from two wells (appropriated for 590 af/yr) plus 1,200 af/yr from three other wells. An additional 800 af/yr supplied by two new wells, with estimated 43.2 af/yr evaporative losses for 2 existing and 3 new water augmentation/recharge ponds.	SPWRAP, Town of Wiggins
NEBRASKA									
BO No.	**Lead Federal Agency**	**County**	**Project Name**	**Project Proponent(s) and/or Beneficiary(ies)**	**Date of BO**	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	**Water sources and uses**	**Offsetting measure*** (e.g., SPWRAP)
2018-028	EDA	Dawson	Gothenurg, Nebraska West Side Water and Sewer Improvements Project	City of Gothenburg	11/28/2018	New	2019	**Source:** Platte River. **Use:** Consumptive use will vary as new development is added over time. Water source is City of Gothenburg municipal well.	Nebraska New Depletions Plan
WYOMING									

*BLUE indicates those depletions considered "federal"

BO No.	Lead Federal Agency	County	Project Name	Project Proponent(s) and/or Beneficiary(ies)	Date of BO	**Depletion category** (existing or new water-related activity? federal or non-federal?)	**Start Year if new water-related activity creating depletions** (estimated)	Water sources and uses	**Offsetting measure*** (e.g., SPWRAP)
06E13000-2018-F-0013	BLM	Converse	Chesapeake Energy Oil and Gas Wells	Chesapeake Energy	10/20/2017	Existing	2017	The applicant has stated that they will require approximately 25.3 acre-feet of water to drill and complete oil and gas wells including dust abatement. The water source identified is from Lee Hansen under irrigation permit 15723 and 529.	Wyoming's Depletion Plan

*BLUE indicates those depletions considered "federal"

APPENDIX F – CNPPID Least Tern and Piping Plover Data

CNPPID Tern and Plover Data

Fledging Ratios for Least Terns (*Sternula antillarum*) and Piping Plovers (Charadrius melodus) at Lake McConaughy 1992 - 2017. (CNPPID, 2017a, as modified by Service)

Lake McConaughy								
	LEAST TERNS				**PIPING PLOVERS**			
Year	**Adult Pair**	**Nests**	**Fledge**	**Ratio**	**Adult Pair**	**Nests**	**Fledge**	**Ratio**
1992	10	14	13	1.30	53	66	71	1.34
1993	8	10	6	0.75	69	83	110	1.59
1994	5	5	1	0.17	46	50	65	1.41
1995	4	4	4	1.00	16	37	6	0.38
1996	5	5	8	1.60	44	60	37	0.84
1997	6	7	11	1.57	35	40	17	0.49
1998	4	7	5	1.25	18	25	13	0.72
1999	3	3	5	1.66	24	34	24	1.00
2000	2	2	4	2.00	29	33	74	2.55
2001	7	8	13	1.86	51	51	112	2.20
2002	11	12	20	1.82	67	69	132	1.97
2003	14	14	19	1.29	111	118	205	1.85
2004	17	19	26	1.53	168	183	371	2.21
2005	28	18	17	0.61	190	198	281	1.48
2006	19	23	16	0.84	236	253	318	1.35
2007	25	29	15	0.60	235	245	235	1.00
2008	11	26	12	1.09	134	176	141	1.05
2009	14	21	14	1.00	134	303	107	0.80
2010	12	13	1	0.08	57	106	18	0.32
2011	9	9	4	0.44	19	20	8	0.42
2012	5	5	4	0.80	43	67	93	2.16
2013	16	17	17	1.06	71	86	118	1.66
2014	13	19	13	1.00	57	89	106	1.86
2015	4	4	0	0.00	42	54	0	0.00
2016	0	0	0	0.00	10	9	1	0.10
2017	10	9	5	0.50	33	36	40	1.21
Subtotal	**262**	**303**	**253**	**0.97**	**1992**	**2491**	**2703**	**1.36**

Fledging Ratios for Least Terns (*Sternula antillarum*) and Piping Plovers (Charadrius melodus) at CNPPID Monitoring sites 1992 - 2017. (CNPPID, 2017a, as modified by Service)

Koch's So. Cozad								
LEAST TERNS					PIPING PLOVERS			
Year	**Adult Pair**	**Nests**	**Fledge**	**Ratio**	**Adult Pair**	**Nests**	**Fledge**	**Ratio**
1992	11	13	7	0.64	2	2	4	2.00
1993	8	12	4	0.50	4	4	1	0.25
1994	13	13	15	1.15	4	4	8	2.00
1995	12	12	4	0.33	3	3	6	2.00
1996	3	3	7	2.33	6	6	6	1.00
1997	6	8	10	1.67	3	3	8	2.67
1998	7	10	4	0.57	3	4	4	1.33
1999	6	6	5	0.83	3	4	0	0.00
2000	4	4	4	1.00	3	3	5	1.67
2001	4	4	6	1.50	2	2	1	0.50
2002	3	4	3	1.00	2	3	0	0.00
2003	3	2	1	0.33	1	1	3	3.00
2004	10	5	5	1.00	0	0	0	0.00
2005	8	7	5	0.63	2	2	3	1.50
2006	4	6	2	0.50	3	4	2	0.67
2007	5	7	3	0.60	0	0	0	0.00
2008	4	4	6	1.50	2	2	2	1.00
2009	3	3	0	0.00	2	4	3	1.50
2010	2	2	0	0.00	3	3	2	0.67
2011	1	1	0	0.00	3	3	4	1.33
2012	1	1	0	0.00	3	3	4	1.33
2013	2	2	2	1.00	2	2	2	1.00
2014	6	6	5	0.83	2	3	2	1.00
2015	5	5	2	0.40	6	3	4	0.67
2016	4	3	0	0.00	6	7	7	1.17
2017	4	4	4	1.00	3	4	3	1.00
Subtotal	**139**	**147**	**104**	**0.75**	**73**	**79**	**84**	**1.15**

Central Diversion North Platte								
LEAST TERNS					PIPING PLOVERS			
Year	**Adult Pair**	**Nests**	**Fledge**	**Ratio**	**Adult Pair**	**Nests**	**Fledge**	**Ratio**
1992	0	0	0	0.00	0	0	0	0.00
1993	4	4	1	0.25	1	1	0	0.00
1994	0	0	0	0.00	1	1	0	0.00
1995	4	4	3	0.75	1	1	0	0.00
1996	5	5	4	0.80	2	2	1	0.50
1997	7	9	6	0.86	2	2	5	2.50
1998	6	6	5	0.83	3	3	0	0.00
1999	5	5	6	1.20	2	3	2	1.00
2000	5	5	7	1.40	1	1	0	0.00
2001	5	9	1	0.20	0	0	0	0.00

2002	2	2	3	1.50	0	0	0	0.00
2003	4	2	3	0.75	0	0	0	0.00
2004	10	4	0	0.00	2	1	0	0.00
2005	1	0	0	0.00	1	1	3	3.00
2006	3	4	1	1.50	2	2	0	0.00
2007	4	8	1	1.50	2	2	0	0.00
2008	8	7	5	0.63	3	3	3	1.00
2009	4	4	6	1.50	2	4	1	0.50
2010	4	6	3	0.75	2	2	3	1.50
2011	5	5	3	0.60	6	3	4	0.67
2012	1	1	3	3.00	3	3	6	2.00
2013	3	3	0	0.00	2	3	0	0.00
2014	0	0	0	0.00	2	3	3	1.50
2015	2	2	1	0.50	2	1	0	0.00
2016	4	4	3	0.75	5	5	4	0.80
2017	5	6	5	1.00	3	4	4	1.33
Subtotal	**101**	**105**	**70**	**0.69**	**50**	**51**	**39**	**0.78**
				Kirkpatrick's Gothenbug				
	LEAST TERNS				**PIPING PLOVERS**			
Year	**Adult Pair**	**Nests**	**Fledge**	**Ratio**	**Adult Pair**	**Nests**	**Fledge**	**Ratio**
1992	3	4	5	1.67	1	1	2	2.00
1993	7	7	6	0.86	1	0	0	0.00
1994	6	6	9	1.50	0	0	0	0.00
1995	4	5	2	0.50	0	0	0	0.00
1996	3	4	2	0.67	1	0	0	0.00
1997	3	5	2	0.67	0	0	0	0.00
1998	2	1	1	0.50	0	0	0	0.00
1999	1	0	0	0.00	0	0	0	0.00
2000	0	0	0	0.00	0	0	0	0.00
2001	0	0	0	0.00	0	0	0	0.00
2017	0	0	0	0.00	2	1	2	1.00
Subtotal	**29**	**32**	**27**	**0.93**	**5**	**2**	**4**	**0.80**
	LEAST TERNS				**PIPING PLOVERS**			
	Adult pair	**Nests**	**Fledge**	**ratio**	**Adult pair**	**Nests**	**Fledge**	**ratio**
				Lemmon Willow Isl. Pit				
1992	2	4	2	1.00	1	1	0	0.00
1993	2	4	4	2.00	0	0	0	0.00
1994	2	2	0	0.00	0	0	0	0.00
Subtotal	**6**	**10**	**6**	**1.00**	**1**	**1**	**0**	**0.00**
				Potter's Pond Gothenburg				
1992	1	1	3	3.00	0	0	0	0.00
Subtotal	**1**	**1**	**3**	**3.00**	**0**	**0**	**0**	**0.00**
				Ogallala Ready Mix				

2000	0	0	0	0.00	1	1	2	2.00
2001	0	0	0	0.00	1	1	3	3.00
2002	1	0	0	0.00	0	0	0	0.00
2016	0	0	0	0.00	2	2	0	0.00
Subtotal	**1**	**0**	**0**	**0.00**	**4**	**4**	**5**	**1.25**
Paulsen's Pit Ogallala								
2002	1	0	0	0.00	0	0	0	0.00
2016	3	2	1	0.33	3	3	2	0.67
Subtotal	**4**	**2**	**1**	**0.25**	**3**	**3**	**2**	**0.67**
Ogallala City Pond								
2016	0	0	0	0.00	1	1	0	0.00
Subtotal	**0**	**0**	**0**	**0.00**	**1**	**1**	**0**	**0.00**
Roscoe Sand Pit								
1999	0	0	0	0.00	1	1	2	2.00
2000	0	0	0	0.00	1	1	2	2.00
2001	0	0	0	0.00	0	0	0	0.00
Subtotal	**0**	**0**	**0**	**0.00**	**2**	**2**	**4**	**2.00**
Whitney Sand & Gravel, Sutherland								
2000	4	4	5	1.25	1	1	1	1.00
2001	1	1	2	2.00	0	0	0	0.00
2002	0	0	0	0.00	0	0	0	0.00
2003	1	1	1	1.00	0	0	0	0.00
Subtotal	**6**	**6**	**8**	**1.33**	**1**	**1**	**1**	**1.00**
North Platte Paulson's West								
2011	4	4	2	0.50	2	2	3	1.50
2012	8	8	4	0.50	3	3	4	1.33
2013	2	2	4	2.00	3	3	2	0.67
2014	0	0	0	0.00	3	3	2	0.67
2015	0	0	0	0.00	2	2	1	0.50
2016	0	0	0	0.00	3	3	1	0.33
2017	0	0	0	0.00	3	3	0	0.00
Subtotal	**14**	**14**	**10**	**0.71**	**19**	**19**	**13**	**0.68**
TOTAL ALL CNPPID	**563**	**620**	**482**	**0.86**	**2151**	**2654**	**2855**	**1.33**

APPENDIX G – Literature Cited

Aron, C. 2012. Interior least tern monitoring data for Missouri River, 1986-2012. U.S. Fish and Wildlife Service, Bismark, ND. Spreadsheet emailed to P. Hartfield, Mississippi Field Office, Jackson, MS. Reproduced from the USFWS Interior least tern 5-year review, 2014.

Alexander, Jason, Joel G. Jorgensen, and Mary Bomberger Brown. 2017. Reproductive ecology of interior least tern and piping plover in relation to Platte River hydrology and sandbar dynamics: Editorial. Ecology and Evolution.

Altenhofen, John, Northern Water. 2018 personal communication, March 28, 2018

Baasch, D.M, P.D. Farrell, J.M. Farnsworth, and C.B. Smith. 2017a. Nest-site selection by Interior Least Terns and Piping Plovers at managed, off-channel sites along the Central Platte River in Nebraska, USA. Journal of Field Ornithology 88:236–249.

Baasch, D.M., P.D. Farrell, J.M. Farnsworth, and C.B. Smith**.** 2017b. Interior least tern productivity in relation to flow in the central Platte River valley. Great Plains Research 27:35–42.

Baasch, D.M., P.D. Farrell, Aaron T. Pearse, David A. Brandt, Andrew J. Caven, Mary J. Harner, Greg D. Wright, Kris Metzger. 2018. Diurnal Habitat Selection of migrating Whooping Cranes in the Great Plains. Draft Manuscript submitted for publication.

Brown, M.B., J.G. Jorgensen, S.E. Steckler, M.J. Panella, W.R. Silcock and C.M. Thody. 2011. A review of Interior Least Tern and Piping Plover management, conservation, and recovery on the Lower Platte River, Nebraska. Joint report of the Tern and Plover Conservation Partnership and the Nongame Bird Program at the Nebraska Game and Parks Commission, Lincoln, NE.

Butler, et al. 2014. Whooping crane demographic responses to winter drought focus conservation strategies. Biological Conservation 179 (2014) 72–85.

Butler, M.J., K.L. Metzger, G.M. Harris, 2017. Are whooping cranes destined for extinction? Climate change imperils recruitment and population growth. Ecol Evol. 2017; 7:2821‐2834. https://doi.org/10.1002/ece3.2892

Butler, M.J. and Wade Harrel, 2017. Whooping Crane Survey Results: Winter 2016–2017. USFWS Aransas National Wildlife Refuge. https://www.fws.gov/uploadedFiles/Region_2/NWRS/Zone_1/Aransas-Matagorda_Island_Complex/Aransas/Sections/What_We_Do/Science/Whooping_Crane_Updates_2013/WHCR_Update_Winter_2016-2017.pdf

Central Nebraska Public Power and Irrigation District. 2017a. Project N. 1417, Land and Shoreline Management Plan 3-year Endangered Species Reevaluation Article 421.

Central Nebraska Public Power and Irrigation District. 2017b. Project N. 1417, Article 420, Least Tern and Piping Plover Nest Monitoring Final Report 2017.

Colorado Water Conservation Board. 2018. Colorado's Annual Report for 2016, Memorandum for the Executive Director's Office, Platte River Recovery Implementation Program, April 17, 2018.

Compass, 2016. Least Tern and Piping Plover Structured Decision Making Report for the PRRIP. August 2016 Final Report.

Davis, Craig, 2018. Personal Communication Email to Matt Rabbe, March 19, 2018.

Farnsworth, J.M., D.M. Baasch, C.B. Smith, and K.L. Werbylo**.** 2017. Reproductive ecology of interior least tern and piping plover in relation to Platte River hydrology and sandbar dynamics. Ecology and Evolution 10:3579–3589. doi: 10.1002/ece3.2964.

Harrell, Wade, 2016. Whooping Crane Update September 16, 2016. Aransas National Wildlife Refuge Webpage. https://www.fws.gov/nwrs/threecolumn.aspx?id=2147594180

Harrell, Wade, 2017. Email Personal Communication, July 12, 2017.

Jenniges, Jim and Mark Peyton. 2014. Fish Population Studies Report, 2014. Technical Report.

Lewis, J. C., E. Kuyt, K. E. Schwindt, and T. V. Stehn. 1992. Mortality in fledged cranes of the Aransas- Wood Buffalo population. Pages 145-148 *in* D. A. Wood, editor. Proceedings of the 1988 North American crane workshop. Florida Game and Fresh Water Fish Commission Nongame Technical Report No. 12, Tallahassee, Florida, USA.

Lott, C.A. 2006. Distribution and abundance of the interior population of least tern (*Sternula antillarum*) 2005: a review of the first comprehensive range-wide survey in the context of historic and ongoing monitoring efforts. ERDC/EL TR-06-13. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

Lott, C.A., R.L. Wiey, R.A. Fischer, P.D. Hartfield, and J.M. Scott. 2013. Interior Least Tern (*Sternula antillarum*) breeding distribution and ecology: implications for population-level studies and the evaluation of alternative management strategies on large, regulated rivers. Ecology and Evolution 3(9).

Murphy, P. J., T. J. Randle, L. M. Fotherby, and J. A. Dario. 2004. Platte River Channel: History and Restoration. Draft, February 3, 2004. U.S. Bureau of Reclamation, Denver, Colorado. 149 pp.

National Research Council. 2005. Endangered and Threatened Species of the Platte River, Interim Report. Washington, DC: National Academy Press.

Nebraska Department of Natural Resources (NDNR). 2014. 2014 annual evaluation of availability of hydrologically connected water supplies, Nebraska Department of Natural Resources. Lincoln, NE.

Pearse, A.T., Brandt, D.A., Harrell, W.C., Metzger, K.L., Baasch, D.M., and Hefley, T.J., 2015, Whooping crane stopover site use intensity within the Great Plains: U.S. Geological Survey Open-File Report 2015–1166, 12 p., http://dx.doi.org/10.3133/ofr20151166.

Pearse, Aaron T., Matt Rabbe, Mark Bidwell, Lara Juliusson, Lea Craig-Moore, David A. Brandt, Wade Harrel. 2018. Delineating and identifying long-term changes in the whooping crane (*Grus americana*) migration corridor. PLoS ONE13(2):e0192737. https://doi.org/10.1371/journal.pone.0192737

Platte River Recovery Implementation Program. 2006. Program Document, including attachments.

Platte River Recovery Implementation Program. 2017. Whooping Crane Habitat Synthesis Chapters. Prepared for the Governance Committee of the Platte River Recovery Implementation Program.

Platte River Recovery Implementation Program. 2017. Water Action Projects Update. Memorandum to the Executive Director (Internal), August 8, 2017

Platte River Recovery Implementation Program. 2018. 2016 State of the Platte Report, Prepared by the Executive Director's Office, February 28, 2018.

Platte River Recovery Implementation Program. 2018. Program Water Update, Presentation to Governance Committee, March 14, 2018

Rabbe, Matt, 2017. Whooping Crane Migration Update Email, April 20, 2017.

Sherfy, M.H., Anteau, M.J., Shaffer, T.L., Sovada, M.A., and Stucker, J.H., 2012, Foraging ecology of least terns and piping plovers nesting on Central Platte River sandpits and sandbars: U.S. Geological Survey Open-File Report 2012–1059, 50 p.

Sidle, J.G., D.E. Carlson, E.M. Kirsch, and J.J. Dinan. 1992. Flooding: mortality and habitat renewal for least terns and piping plovers. Colonial Waterbirds 15: 132-136.

Stehn, Thomas V. and C.L Haralson-Strobel, 2014. An Update on Mortality of Fledged Whooping Cranes in The Aransas/Wood Buffalo Population. Proceedings of the North American Crane Workshop 12:43-50.

Stucker, J. H. 2012. Sandbars managed for least terns within the Missouri River: evaluating the influence of fish, spatial scale, and environment on habitat use. Dissertation, University of Minnesota. Reproduced from the USFWS Interior least tern 5-year review.

Szell, C.C. and Woodrey, M.S. 2003. Reproductive ecology of the least tern along the Lower Mississippi River. Waterbirds vol. 26 (1): 35-43. Reproduced from the USFWS Interior least tern 5-year review.

Tetra Tech, 2017. Channel Geomorphology and In-Channel Vegetation 2016 Final Data Analysis Report. Platte River Recovery Implemenation Program.

Thompson, B. C., J. A. Jackson, J. Burger, L. A. Hill, E. M. Kirsch, and J. L. Atwood. 1997. Least tern (*Sternula antillarum*). In *The Birds of North America*, No. 290 (A. Poole and F. Gill, editors). The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, DC.

Urbanek, Richard P. and James C. Lewis. 2015. Whooping Crane (*Grus americana*), version 2.0. In The Birds of North America (P. G. Rodewald, editor). Cornell Lab of Ornithology, Ithaca, New York, USA.

USFWS. 1989. Determination of threatened status for eastern and western prairie fringed orchids Federal Register 54 (187): 39857-39862. https://ecos.fws.gov/docs/federal_register/fr1602.pdf

USFWS. 1990. Recovery plan for the interior population of the Least Tern (*Sternula antillarum*). 90 pp.

USFWS. 1996. *Platanthera praeclara* (Western Prairie Fringed Orchid) recovery plan. U.S. Fish and Wildlife Service, Fort Snelling, Minnesota. https://ecos.fws.gov/docs/recovery_plan/960930a.pdf

USFWS, 1997. FERC Kingsley Dam Project No. 1417 Biological Opinion, dated July 25, 1997.

USFWS. 2003. Amendment to the biological opinion on the operation of the Missouri River main stem reservoir system, operation and maintenance of the Missouri river bank stabilization and navigation project, and operation of the Kansas River Reservoir system. U.S. Fish and Wildlife Service, Region 6, Denver, CO.

USFWS, 2006. Platte River Recovery Implementation Program Biological Opinion.

USFWS, 2007. CNPPID Hydrocyling Biological Opinion on the Platte River, dated January 23, 2007.

USFWS. 2009. *Platanthera praeclara* (Western Prairie Fringed Orchid) Five Year Review: Summary and Evaluation. U.S. Fish and Wildlife Service, Bloomington, Minnesota. https://ecos.fws.gov/docs/five_year_review/doc2412.pdf

USFWS. 2014. Interior Least Tern, 5-Year Review: Summary and Evaluation, Southeast Region, Mississippi Field Office.

USFWS. 2015. Summary Contained on Website: "Quivira National Wildlife Refuge: Whooping Crane, Grus americana". Retrieved 12 July 2017.

USFWS. 2016. Draft Revised Recovery Plan for the Northern Great Plains Piping Plover (*Charadrius melodus*). U.S. Fish and Wildlife Service, Denver, Colorado. 322 pp. + appendices.

USFWS. 2016. Programmatic Biological Opinion of Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions. USFWS Midwest Regional Office, January 5, 2016.

USFWS. 2017. Whooping Crane Survey Results: Winter 2016-2017. Aransas National Wildlife Refuge Annual Update.

USFWS, 2018a. Whooping Crane Tracking Project, Database Updated Annually. Nebraska Ecological Services Field Office.

USFWS. 2018b. U.S. Fish and Wildlife Service Reporting on 2017 Tier Platte River Biological Opinions, Memorandum for the Executive Director's Office, Platte River Recovery Implementation Program, February 26, 2018.

USFWS, 2015. Quivira National Wildlife Refuge, Current Whooping Crane Population. https://www.fws.gov/refuge/Quivira/wildlife_and_habitat/whooping_crane.html