

**Missouri River Recovery Management Plan
and Environmental Impact Statement**

RECORD OF DECISION

November 2018

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Record of Decision

Missouri River Recovery Management Plan and Environmental Impact Statement

This Record of Decision completes the procedural requirements of the National Environmental Policy Act for the Current Immediate Need Action.

Approved:

A handwritten signature in black ink, appearing to read 'D. Peter Helmlinger', with a stylized flourish at the end.

D. Peter Helmlinger, P.E.
Brigadier General, USA
Division Commander

Date: 20 Nov 2018

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Acronyms and Abbreviations

AIRFA	American Indian Religious Freedom Act
BA	Biological Assessment
BiOp	Biological Opinion
BSNP	Missouri River Bank Stabilization and Navigation Project
CEQ	Council on Environmental Quality
CWA	Clean Water Act
ESA	Endangered Species Act
ESH	emergent sandbar habitat
EPA	U.S. Environmental Protection Agency
HC	human considerations
IRC	interception and rearing complex
Master Manual	<i>Missouri River Mainstem Reservoir System Master Water Control Manual</i>
MRRMP-EIS	Missouri River Recovery Management Plan and Environmental Impact Statement
MRRIC	Missouri River Recovery Implementation Committee
MRRP	Missouri River Recovery Program
NAGPRA	Native American Graves Protection and Repatriation Act
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NPS	National Park Service
PA	programmatic agreement
ROD	Record of Decision
SAMP	Science and Adaptive Management Plan
SWH	Shallow Water Habitat
System	Missouri River Mainstem Reservoir System
USACE	U.S. Army Corps of Engineers
USC	U.S. Code
USFWS	U.S. Fish and Wildlife Service
WRDA	Water Resources Development Act

1.0 Introduction

The U.S. Army Corps of Engineers (USACE) has developed the Missouri River Recovery Management Plan and Environmental Impact Statement (MRRMP-EIS) in cooperation with the U.S. Fish and Wildlife Service (USFWS). This document is the USACE Record of Decision (ROD) for the Final MRRMP-EIS dated August, 2018. The MRRMP-EIS is a programmatic assessment of major federal actions necessary to avoid a finding of jeopardy for the pallid sturgeon (*Scaphirhynchus albus*), interior least tern (*Sterna antillarum*), and the Northern Great Plains piping plover (*Charadrius melodus*) caused by operation of the Missouri and Kansas River reservoir systems and operation and maintenance of the Missouri River Bank Stabilization and Navigation Project (BSNP). Cooperating agencies in the MRRMP-EIS included the USFWS, National Park Service (NPS), Western Area Power Administration, Bureau of Reclamation, and States of Wyoming, Nebraska, and South Dakota.

The Missouri River Recovery Program (MRRP) was established by USACE in 2005. It is the umbrella program that coordinates USACE efforts to comply with the Endangered Species Act (ESA) requirements for the operation of the Missouri River Mainstem Reservoir System (System), operation and maintenance of the BSNP, and operation of the Kansas River System. The MRRP also includes acquiring and developing lands to mitigate for lost habitats as authorized in Section 601(a) of the Water Resources Development Act (WRDA) of 1986 and modified by Section 334 (a) of WRDA 1999 (collectively known as the BSNP Fish and Wildlife Mitigation Project). Since the 2000 and 2003 Amended Biological Opinions (BiOps) concerning USACE operations on the Missouri River were published, a substantial amount of research has generated new scientific knowledge regarding the pallid sturgeon, least tern, and piping plover, and effects of USACE actions on those species. The MRRMP-EIS is focused on incorporating this new scientific information into USACE management actions for the listed species on the Missouri River to ensure continued compliance with the ESA.

Beginning in 1987, the USFWS and USACE have engaged in consultation in compliance with Section 7 of the ESA, concerning the impact of System operations on the listed birds. That consultation resulted in a 1990 BiOp with a finding of jeopardy. Consultations continued after the pallid sturgeon was listed in 1990 and the scope was expanded to include proposed System operations under the revised *Missouri River Mainstem Reservoir System Master Water Control Manual* (Master Manual [USACE 2006]) and the operation and maintenance of the BSNP. In a 2000 BiOp, USFWS concluded that operating the System, operating and maintaining the BSNP, and operating the Kansas River System, as proposed at the time, would jeopardize the continued existence of the federally listed pallid sturgeon, interior least tern, and piping plover. USACE reinitiated formal consultation with the USFWS, providing a Biological Assessment (BA) with new proposed actions. After additional consultation in 2003, USFWS amended its 2000 BiOp with the determination that the new proposed actions would avoid jeopardizing the continued existence of the two listed bird species, but would jeopardize the continued existence of the pallid sturgeon in the wild (USFWS 2003). USACE has since re-initiated consultation with the USFWS as part of the MRRMP-EIS process. A Final BA was submitted to USFWS on October 30, 2017, and amended on January 19, 2018, and a new Final BiOp was issued by USFWS on April 13, 2018. The 2018 BiOp determined that implementation of the USACE proposed action in the BA is not likely to jeopardize the pallid sturgeon, interior least tern, or piping plover or destroy or adversely modify piping plover critical habitat. The preferred alternative identified in the MRRMP-EIS (Alternative 3) incorporates the proposed action from the 2017 BA (as amended) and is consistent with the 2018 BiOp.

After consultation with the USFWS, and extensive collaboration, analysis, and independent scientific review, USACE has identified Alternative 3 as the selected alternative in the MRRMP-EIS. Alternative 3 will meet the species objectives and fulfill the purpose and need of the management plan while avoiding and minimizing adverse impacts to stakeholders. Importantly, Alternative 3 would be implemented within an adaptive management framework detailed in the Science and Adaptive Management Plan (SAMP). Description of the alternatives and the rationale and reasoning for the selection of this alternative is below.

2.0 The National Environmental Policy Act Process

The basic purpose of the National Environmental Policy Act (NEPA) process is to ensure that the federal government gives proper consideration to the environment prior to undertaking any major federal action that has potential to significantly affect the environment. The NEPA process is used to inform decision makers and the public of a proposed action and reasonable alternatives considered, to disclose potential environmental impacts, and to consider Tribal, agency, state, stakeholder, and public comments before final decisions are made.

The MRRMP-EIS is a programmatic EIS which enables the USACE to tier future project proposals from the overarching programmatic EIS analysis. The programmatic MRRMP-EIS is USACE's strategic approach to meeting its NEPA responsibilities in implementing the MRRP in compliance with the ESA. Implementation of the management actions articulated in the EIS may require subsequent analysis for site-specific actions that can be tiered from this programmatic EIS. NEPA regulations encourage the use of tiering in order to focus on issues ripe for decision making (40 CFR 1502.20). Using a tiering approach allows more general matters to be addressed in this programmatic EIS, with subsequent tiered EISs or environmental assessments to focus on site-specific actions and associated environmental analyses.

To solicit public input for the MRRMP-EIS process, USACE conducted public scoping webinars on September 11 and 18, 2013, which were broadcast live via internet from the Omaha District Office. Members of the public and federally recognized Tribes (Tribes) within the region were invited to participate online, or attend a broadcast of the webinars in real time at one of several host sites. The dates and times of the public scoping webinars and the host site locations were announced in the Notice of Intent, published in the Federal Register on August 9, 2013, via a press release from the Kansas City District Public Affairs Office on August 28, as well as through social media, and in mass emails. At least one host site location was offered in each of eight states throughout the Basin. Additionally, one of the webinars was recorded, archived, and made available on www.moriverrecovery.org for members of the public who were unable to attend the live broadcast via internet or at a host site. The scoping comment period was open from August 9 to November 4, 2013, during which 70 correspondences were received. In addition, USACE held a series of in-person Tribal scoping meetings for the MRRMP-EIS at six locations across the Basin including: Fort Peck, Montana; Billings, Montana; Bismarck, North Dakota; Vermillion, South Dakota; Pawhuska, Oklahoma; and Lawrence, Kansas. Letters of invitation were distributed to all 29 Tribes in the Basin in mid-July 2013. Members of the Tribes were invited to submit comments in person at the Tribal scoping meetings, by mail, email, or online.

The MRRMP-EIS alternatives development process was substantively informed by the Missouri River effects analysis (effects analysis). The effects analysis began in fall of 2013 and was completed in 2016 with reports documenting the progress of the effects analysis efforts also issued during this timeframe. The effects analysis process and associated products summarize the best scientific information currently available to evaluate the potential effectiveness of

management actions on the ESA listed species. The three essential components of an effects analysis are to collect reliable scientific information, critically assess and synthesize available data and analyses, and analyze the effects of actions on listed species and their habitats. The effects analysis was led and staffed by an independent team of nationally recognized experts and consisted of three interactive efforts:

- Hydrology, Hydraulics, and Geomorphology Team – Dr. Craig Fischenich, USACE Engineer Research and Development Center, lead
- Pallid Sturgeon Team – Dr. Robert Jacobson, U.S. Geological Survey, lead
- Interior Least Terns and Piping Plovers – Dr. Kate Buenau, Pacific Northwest National Laboratories, lead.

USACE and the USFWS used the effects analysis information to ensure that up-to-date science informed the alternatives that were developed and assessed in the EIS. The MRRMP-EIS underwent internal review processes (District Quality Control and Agency Technical Review on the Draft MRRMP-EIS in 2016 and 2017 and on the Final MRRMP-EIS in 2018). It was also reviewed by a panel of external experts (Independent External Peer Review on the Draft MRRMP-EIS and SAMP in 2017).

On December 16, 2016, USACE released the Draft MRRMP-EIS for a 60-day public review and comment period. NEPA implementing regulations require a minimum 45-day public review and comment period for all draft EISs. A Notice of Availability (NOA) of the Draft MRRMP-EIS was published in the Federal Register on December 23, 2016. Members of the public also received notice of the availability of the Draft MRRMP-EIS through a news release published following the publication of the NOA in the Federal Register. Based on requests from Missouri River Recovery Implementation Committee (MRRIC) members, Tribes, and the public, the Draft MRRMP-EIS review and comment period was ultimately extended to a total of 122 days that ended on April 24, 2017. The public comment period was announced on the USACE website (www.moriverrecovery.org), posted at 10 libraries located in towns along the Missouri River, and announced through press releases. The Draft MRRMP-EIS was made available at www.moriverrecovery.org, the NPS Planning, Environment, and Public Comment website at <http://parkplanning.nps.gov/MRRMP>, and on the U.S. Environmental Protection Agency (EPA) EIS database website. During the comment period, six in-person public meetings, which contained a formal hearing portion, were held in February 2017 throughout the region. These meetings provided the public an opportunity to ask questions, make statements (with a court reporter on hand to record comments for the official record), and encourage public involvement and community feedback on the Draft MRRMP-EIS. All six of the public meetings were held during the public comment period as follows:

- February 7, 2017: Fort Peck Interpretive Center, Fort Peck, Montana
- February 8, 2017: Bismarck State College-National Energy Center of Excellence, Bismarck, North Dakota
- February 9, 2017: Ramkota Hotel and Conference Center, Pierre, South Dakota
- February 14, 2017: Thompson Alumni Center-Bootstrapper Hall, Omaha, Nebraska
- February 15, 2017: Hilton-Kansas City Airport, Kansas City, Missouri
- February 16, 2017: Double Tree by Hilton Hotel, Chesterfield, Missouri

The public was encouraged to submit comments on the Draft MRRMP-EIS online or through mail. Commenters also had the option of filling out comment forms distributed at the meetings or entering comments online via a computer station provided by USACE.

USACE considered all comments received in the preparation of the Final MRRMP-EIS. Comments on the Draft MRRMP-EIS varied with some supportive of managed flow pulses, habitat construction, land acquisition, and other management actions for the listed species while some opposed any action whatsoever. The public comment and review process resulted in refinements improving the impacts analysis, but did not result in any significant changes to the alternatives, including the preferred alternative, or the conclusions. The comments received during the review of the Draft MRRMP-EIS in 2016–2017 are included in Appendix K of the Final MRRMP-EIS, along with corresponding responses. Comments are addressed throughout the Final MRRMP-EIS, appendices, and supporting documents.

The Final MRRMP-EIS was made available for final review from August 31 to November 9, 2018. The USACE received a total of 20 separate pieces of correspondence on the Final EIS. The USACE evaluated the comments and determined the substance of the comments were previously addressed in the FEIS, or in response to comments on the DEIS, or were concerning non-substantive issues. Therefore, no additional response is provided to these comments beyond which has already been provided. Copies of correspondence received on the FEIS are provided in Appendix A of this ROD.

3.0 Purpose and Need for the Action

The purpose of the MRRMP-EIS is to develop a suite of actions that meets USACE ESA responsibilities for the pallid sturgeon, piping plover, and interior least tern. Authorities used to meet this purpose may include existing USACE authorities related to System operations, operation and maintenance of the BSNP, and acquisition and development of land needed for creation of habitat provided in Section 601(a) of WRDA 1986, as modified by Section 334(a) of WRDA 1999, and further modified by Section 3176 of WRDA 2007, although alternatives formulation considered actions that would need additional authority prior to implementation.

Alteration of the ecosystem and loss of aquatic and terrestrial habitats due to USACE operation of the Missouri and Kansas River Systems and operation and maintenance of the BSNP have contributed to the ESA listing of the pallid sturgeon, piping plover, and interior least tern. The ESA requires that any actions federal agencies authorize, fund, or carry out do not jeopardize the continued existence of endangered species or result in the destruction or adverse modification of designated critical habitat. This applies to the continued operation of the Missouri and Kansas Reservoir Systems and operation and maintenance of the BSNP. Since the issuance of the 2003 Amended BiOp, new scientific information has become available, as documented in the effects analysis, that has resulted in the need to reevaluate the actions needed to comply with the ESA for operation of the Systems and operation and maintenance of the BSNP. The MRRMP-EIS and associated BA, BiOp, and SAMP were the mechanisms for this re-evaluation. Fundamental uncertainties remain about the limiting factors affecting the pallid sturgeon, piping plover, and interior least tern and the associated potential management actions to address those factors for species needs. Due to those uncertainties, there is a demonstrated need to develop a management plan comprised of actions informed by best available science implemented within an adaptive framework. The full description of the purpose and need for action are described in Chapter 1 of the MRRMP-EIS.

USFWS provided fundamental objectives, sub-objectives, targets, and metrics for each of the three listed species pursuant to their responsibilities for administering the ESA, and special expertise as a cooperating agency on this MRRMP-EIS. These objectives were informed by the effects analysis products. Achieving these objectives would meet the purpose and fulfill the need of the plan.

Pallid Sturgeon Fundamental Objective: Avoid jeopardizing the continued existence of the pallid sturgeon from USACE actions on the Missouri River.

The following sub-objectives must be attained to ultimately achieve the stated “fundamental objective.” The intent of the sub-objectives is to provide direction in the short term, provide objectives meaningful for adaptive management, and focus efforts on the desired short-term outcomes while working toward the fundamental objective.

Pallid Sturgeon Sub-Objective 1: Increase pallid sturgeon recruitment to age 1.

Pallid Sturgeon Sub-Objective 2: Maintain or increase numbers of pallid sturgeon as an interim measure until sufficient and sustained natural recruitment occurs.

Piping Plover Fundamental Objective: Avoid jeopardizing the continued existence of the piping plover due to USACE actions on the Missouri River.

Piping Plover Sub-Objective 1 (Distribution): Maintain a geographic distribution of plovers in the river and reservoirs in which they currently occur in both the Northern and Southern River Regions.

Piping Plover Sub-Objective 2 (Population): Maintain a population of Missouri River piping plovers with a modeled 95 percent probability that at least 50 individuals will persist for at least 50 years in both the Northern and Southern Regions.

Piping Plover Sub-Objective 3 (Population Dynamics): Maintain a stable or increasing long-term trend in population size in both regions.

Piping Plover Sub-Objective 4 (Reproduction): Maintain fledgling production by breeding pairs sufficient to meet the population growth rate objectives within both the Northern and Southern Regions on the Missouri River.

Interior Least Tern Fundamental Objective: Avoid jeopardizing the continued existence of the endangered interior least tern due to USACE actions on the Missouri River. For purposes of this MRRMP-EIS, it is assumed that achieving the stated objectives for the piping plover would also achieve the fundamental objective for the interior least tern.

4.0 Alternatives Considered in Detail in the Final MRRMP-EIS

An interdisciplinary team made up of experts from multiple agencies in collaboration with Basin stakeholders and Tribes participated in alternatives development. Alternatives were developed in accordance with the Council on Environmental Quality (CEQ) NEPA implementing regulations (40 CFR 1500–1508). The goal was to both formulate a range of reasonable alternatives to meet the species objectives and clearly articulate the effects of those alternatives, thus providing necessary information to decision makers, stakeholders, Tribes and the public. The team used an iterative development process to identify and screen management actions and

alternatives. The EIS provided the necessary information for the decision maker to fully evaluate a range of alternatives to best meet the purpose and need of the MRRMP-EIS. It fully addressed the potential impacts of alternatives as required under NEPA, as amended (42 U.S. Code [USC] 4321 et seq.); CEQ regulations (40 CFR 1500–1508); and USACE ER 200-2-2 (33 CFR 230).

Plan Alternatives Carried Forward for Detailed Evaluation

Six plan alternatives (the No Action alternative and five action alternatives) were carried forward for detailed evaluation. The names of each alternative correspond to the concept or feature that distinguishes them from all other alternatives. Some of the alternatives have management actions in common. A full description of the alternatives can be found in Chapter 2 of the MRRMP-EIS.

Actions Common to All Plan Alternatives

The following management actions would be implemented as part of all plan alternatives carried forward for detailed evaluation in the MRRMP-EIS including the No Action alternative.

Mechanical Emergent Sandbar Habitat (ESH) Construction for Piping Plovers and Least Terns: ESH construction includes using various combinations of construction equipment to manipulate sand within the river to create sandbars suitable for least tern and piping plover nesting. All alternatives include mechanical ESH construction as a management action; however, the amounts of ESH that would be constructed mechanically vary by alternative.

Vegetation Management, Predator Management, and Human Restriction Measures to benefit Piping Plovers and Least Terns: The primary and preferred method of vegetation control and removal is application of pre- and/or post- emergent herbicides to selected sandbars. Additional vegetation control and removal methods include controlled burning, cutting, mulching, and mowing. Predator management includes the lethal and non-lethal removal of predators, management actions to dissuade predators, and enclosure cages to protect piping plover nests. Human restriction measures taken to reduce disturbance to the birds include posting signs and placing barricades to restrict access to breeding areas.

Flow Management to Reduce Take of Piping Plovers and Least Terns: This action involves the adjustment of reservoir releases when hydrologic conditions allow during the nesting season to reduce take of nests, eggs, and/or chicks located on sandbars in riverine reaches. It is referred to as Steady Release-Flow to Target.

Piping Plover and Least Tern Monitoring and Research: USACE conducts annual productivity monitoring of least tern and piping plover populations on the reservoir and river reaches of the Missouri River Mainstem. The monitoring focuses on an adult census, measurement of fledge ratios, and documentation of incidental take. USACE also performs habitat monitoring. Monitoring results are used to determine the effectiveness of management actions for least terns and piping plovers. In addition, USACE funds focused research projects on various aspects of least tern and piping plover demographics and habitat use.

Pallid Sturgeon Propagation and Augmentation: The authority and responsibility for hatchery management lie with the USFWS for those facilities operated by the USFWS; states are responsible for the operation of their hatcheries. USACE support of pallid sturgeon propagation and augmentation efforts would continue to support these actions at funding levels similar to what is currently provided for each of the plan alternatives.

Monitoring and Evaluation of Pallid Sturgeon Recruitment: Under all alternatives, the Pallid Sturgeon Population Assessment Project would continue to provide data for long-term assessment of pallid sturgeon metrics in both the upper and lower Missouri River. USACE will also continue its role in conjunction with the Bureau of Reclamation at Intake on the Yellowstone River. The Bureau of Reclamation is responsible for monitoring the success of fish passage following implementation of fish passage measures. USACE is responsible for ensuring that MRRP monitoring and assessment can determine whether successful fish passage is contributing to the upper river pallid sturgeon population.

Lower River Pallid Sturgeon Early Life Stage Habitat Construction: All alternatives include channel reconfiguration for the creation of early life stage pallid sturgeon habitat; however, the amounts and types of habitat that would be created vary by alternative and those differences are described in the respective section for each alternative. This action includes the physical manipulation of the river bed or bank (including top-width) to create or improve areas for provision of specific pallid sturgeon habitats thought to be limiting.

Habitat Development and Land Management on MRRP Lands: All alternatives include habitat development and land management on MRRP lands; however, the amount of land acquisition varies by alternative as would the magnitude of habitat development. The land requirements for implementation of habitat creation can occur (1) on existing public lands if the state or federal agency owning the property is willing to cooperate with USACE on the project; or (2) on land acquired in fee title from willing sellers.

Alternative 1 – No Action (Current System Operation and Current MRRP Implementation)

Under the No Action alternative, the MRRP would continue to be implemented under the 2003 Amended BiOp as it is currently. The 2003 Amended BiOp does not reflect updated scientific knowledge gained since its release. In addition to the description of actions common to all plan alternatives the USACE would implement the following under Alternative 1:

Mechanical ESH Construction for Piping Plovers and Least Terns: USACE would mechanically construct ESH annually at an average rate of 164 acres per year across the Garrison and Gavins Point reaches as identified in Section 3.4 of the EIS.

Early Life Stage Habitat Construction for Pallid Sturgeon: Under the No Action alternative, construction of habitat to support early life stage requirements of pallid sturgeon would occur as part of the shallow water habitat (SWH) program. The SWH restoration goal as outlined in the 2003 Amended BiOp (USFWS 2003) is to achieve an average of 20–30 acres of SWH per river mile. Under the No Action alternative, the USACE would achieve the low end of this acreage target (i.e., 20 acres per river mile) between Ponca, Nebraska, and the mouth of the Missouri River. SWH projects would consist of a combination of mechanical top-width widening, chute construction, and backwater construction and would be focused on achieving the 2003 Amended BiOp acreage targets.

Spawning Cue Release for Pallid Sturgeon: For purposes of the No Action alternative, USACE assumed implementation of the plenary spring pulse as described in the Master Manual (USACE 2006) would occur. This action would include a March and May Spring Pulse from Gavins Point Dam when hydrologic conditions and specific criteria were met. The specific magnitude, duration, and criteria for all flow releases described in this ROD are provided in Chapter 2 of the MRRMP-EIS.

Monitoring, Research and Adaptive Management: In addition to the Pallid Sturgeon Population Assessment Project described under actions common to all plan alternatives, it was assumed that other current USACE monitoring and research programs for pallid sturgeon would continue. This includes the Habitat Assessment and Monitoring Program and focused pallid sturgeon research. USACE would also continue to implement the adaptive management approach that has been in place since 2009.

Alternative 2 – USFWS 2003 Biological Opinion Projected Actions

Alternative 2 represents the USFWS interpretation of the management actions that would be implemented as part of the 2003 Amended BiOp Reasonable and Prudent Alternative (USFWS 2003). Whereas the No Action alternative only includes the continuation of management actions the USACE has implemented to date for BiOp compliance, Alternative 2 includes additional iterative actions and expected actions that USFWS anticipates would ultimately be implemented through adaptive management as impediments to implementation were removed. Similar to Alternative 1, Alternative 2 is based on the 2003 Amended BiOp which does not reflect updated scientific knowledge gained since its release. In addition to the description of actions common to all plan alternatives the USACE would implement the following under Alternative 2:

Mechanical ESH Construction for Piping Plovers and Least Terns: USACE would mechanically construct an average of 1,331 acres of ESH annually across the Garrison, Fort Randall, Gavins Point, and Lewis and Clark Lake reaches.

Spring Habitat-Forming Flow Release for Pallid Sturgeon: A spring reservoir release for the purposes of creating ESH is not included in Alternative 2; however, the pallid sturgeon spring flow release from Gavins Point Dam was expected to provide ancillary ESH creating benefits. These benefits were accounted for in the habitat modeling.

Lowered Nesting Season Flows: The low summer flow described for pallid sturgeon would also serve as a lowered nesting season flow for the benefit of nesting least terns and piping plovers under Alternative 2. In general, lower flows expose more habitat and reduce the chance of nest inundation.

Early Life Stage Habitat Construction for Pallid Sturgeon: Under Alternative 2 the USACE would achieve the high end of the 2003 Amended BiOp acreage target (i.e., 30 acres per river mile between Ponca, Nebraska, and the mouth of the Missouri River). Similar to Alternative 1, SWH construction would be focused on achieving the 2003 Amended BiOp acreage targets through a combination of mechanical top-width widening, chute construction, and backwater construction.

Spring Pallid Sturgeon Flow Release: USFWS determined in the 2003 Amended BiOp that restoration of a normalized river hydrograph below Gavins Point Dam was necessary to avoid jeopardizing the continued existence of the pallid sturgeon. Several biologically relevant features were identified for a flow action below Gavins Point Dam including (1)

flows to cue spawning that are sufficiently high for an adequate duration; and (2) flows that provide for connection of low-lying lands adjacent to the channel. The spring pallid sturgeon flow release from Gavins Point Dam would be bimodal (i.e., consisting of two separate flow pulses) and would be implemented in every year if conditions are met. This release would include both higher peaks and longer durations than the spring pallid sturgeon flow release described under Alternative 1.

Low Summer Flow to benefit Pallid Sturgeon: The USFWS 2003 Amended BiOp also called for modification of System operations to allow for flows that are sufficiently low to provide for SWH as rearing, refugia, and foraging areas for larval, juvenile, and adult pallid sturgeon. Alternative 2 includes a low summer flow that would be implemented to meet those purposes.

Floodplain Connectivity to benefit Pallid Sturgeon: The USACE coordinated with the USFWS during alternatives development to identify criteria for clarification of the floodplain connectivity management action stated in the USFWS 2003 Amended BiOp as no specific action has been identified or implemented to date. The criteria submitted to the USACE from the USFWS for Alternative 2 stated that this management action should maximize floodplain habitat by ensuring that 77,410 acres of connected floodplain are inundated at a 20 percent annual chance exceedance.

Reservoir Unbalancing to benefit Least Terns and Piping Plovers: Alternative 2 modeling incorporated storage unbalancing for the upper three reservoirs: Fort Peck, Garrison, and Oahe, during March – April. Unbalancing of the upper three reservoirs would rotate on a 3-year cycle with one reservoir ending the runoff year (March – February) higher than the balanced storage amount, one reservoir ending the runoff year lower than the balanced storage amount, and the remaining reservoir floating throughout the year. Reservoir unbalancing is intended to benefit interior least terns and piping plovers by making shoreline habitat available through draw down.

Monitoring, Research and Adaptive Management: Monitoring and research efforts under Alternative 2 would be the same as described for Alternative 1. The adaptive management approach for Alternative 2 would be the same as for Alternative 1, but would be modified to address specific alterations in proposed management actions as described by the USFWS in a November 5, 2015, Planning Aid Letter to the USACE.

Alternative 3 – Mechanical Construction Only

Under Alternative 3, current System operations as described in the Master Manual (USACE 2006) would continue except criteria for a spring plenary bi-modal pulse and reservoir unbalancing would be removed from the Master Manual and would not be implemented. In addition to the description of actions common to all plan alternatives the USACE would implement the following under Alternative 3:

Early Life Stage Habitat Construction for Pallid Sturgeon: Under Alternative 3, construction of habitat to support early life stage requirements of pallid sturgeon would occur following the interception and rearing complex (IRC) concept. During the first 6–7 years of implementation, 12 site pairs (experimental IRC site and control site) would be implemented in an experimental design to evaluate whether young fish are intercepted and retained. In addition to the IRC concept, existing SWH sites would be evaluated to determine if they are

presently functioning as IRC habitat. Those that can be most efficiently modified to provide IRC habitat would be refurbished.

Spawning Habitat Construction for Pallid Sturgeon: Under Alternative 3, USACE would construct up to three pallid sturgeon spawning habitat sites and monitor the effectiveness of this action in terms of the relative use of these sites compared to other control areas, and the relative spawning success, as determined by hatch rate, catch per unit effort of free embryos, and other indicators.

Mechanical ESH Construction for Least Terns and Piping Plovers: Under Alternative 3, the USACE would create ESH habitat through mechanical means at an average rate of 332 acres per year, in years where construction is needed, across the Garrison, Fort Randall, and Gavins Point reaches. This amount represents the acreage necessary to meet the bird habitat targets after accounting for available ESH, as provided by the USFWS in a November 13, 2015, Planning Aid Letter to the USACE.

Adaptive Management: Under Alternative 3, the USACE would follow the SAMP that was developed based on the results of the effects analysis. The SAMP is a companion document to the MRRMP-EIS. The SAMP identifies the process and criteria to implement the initial management actions, assess hypotheses, introduce new science, and provide a process for adjusting management actions should it become necessary.

Level 1 and 2 Studies: As part of the SAMP, USACE would implement Level 1 and 2 studies for better understanding of limiting factors associated with pallid sturgeon. Level 1 studies are research focused and do not change river conditions (laboratory studies or field studies under ambient conditions). Level 2 studies would focus on in-river testing of actions at a level sufficient to expect a measurable biological, behavioral, or physiological response in pallid sturgeon, surrogate species, or related habitat response. Under Alternative 3, Level 2 studies would include a one-time spawning cue test release for pallid sturgeon from Gavins Point Dam if Level 1 studies during the first 9–10 years support the need for a managed pulse from Gavins Point Dam.

Alternative 4 – Spring ESH Creating Release

Alternative 4 includes those actions identified as common to all alternatives and also includes the adaptive management approach described for Alternative 3, Level 1 and 2 studies, spawning habitat construction, and early life stage pallid sturgeon habitat as specified under Alternative 3. The spring ESH-creating flow release is the management action unique to Alternative 4.

Spring ESH Creating Release: Alternative 4 would include a high spring water release from Garrison Dam and Gavins Point Dam designed to create ESH for piping plovers and least terns. In any year, the implementation of this release would occur if System storage is at 42 million acre-feet or greater on April 1, natural flows creating 250 acres of ESH have not occurred in the previous 4 years, and downstream specialized flow limits used for modeling are not anticipated to be exceeded.

Mechanical ESH Construction: The average amount of ESH that would need to be mechanically constructed under Alternative 4 is less than Alternative 3 because of ESH created by the spring release. Alternative 4 would include the construction of an average of 195 acres per year across the Garrison, Fort Randall, and Gavins Point reaches.

Alternative 5 – Fall ESH Creating Release

Alternative 5 includes those actions identified as common to all alternatives and also includes the adaptive management approach described for Alternative 3, Level 1 and 2 studies, spawning habitat construction, and early life stage pallid sturgeon habitat as specified under Alternative 3. The fall ESH-creating flow release is the management action unique to Alternative 5. Scheduling the release in the fall rather than spring is intended to avoid the spring season when natural flows are generally higher.

Fall ESH Creating Release: Alternative 5 would include a high fall water release from Garrison Dam and Gavins Point Dam designed to create ESH for piping plovers and least terns. In any year, the implementation of this release would occur on October 17 if System storage is at 54.5 million acre-feet or greater, natural flows creating 250 acres of ESH have not occurred in the previous 4 years, and downstream specialized flow limits used for modeling are not anticipated to be exceeded.

Mechanical ESH Construction: The average amount of ESH that would need to be mechanically constructed under Alternative 5 is less than Alternative 3 because of ESH created by the fall release. Alternative 5 would include the mechanical construction of an average of 253 acres per year in the Garrison, Fort Randall, and Gavins Point reaches.

Alternative 6 – Pallid Sturgeon Spawning Cue

Alternative 6 includes those actions identified as common to all alternatives and also includes the adaptive management approach described for Alternative 3, Level 1 and 2 studies, spawning habitat construction, and early life stage pallid sturgeon habitat as specified under Alternative 3. The re-occurring spring pallid sturgeon spawning cue flow release is the management action unique to Alternative 6.

Spring Pallid Sturgeon Spawning Cue Flow Release: Alternative 6 would attempt a spawning cue release every 3 years consisting of a bimodal pulse in March and May. These spawning cue releases would not be started or would be terminated whenever downstream specialized flow limits used for modeling are anticipated to be reached.

Mechanical ESH Construction: The average amount of ESH that would need to be mechanically constructed under Alternative 6 is less than Alternative 3 because of incidental ESH created by the spring spawning cue release. Alternative 6 would include the mechanical construction of an average of 246 acres per year across the Garrison, Fort Randall, and Gavins Point.

5.0 Summary of Impacts

The environmental consequences section of the MRRMP-EIS (Chapter 3) includes a detailed analysis of environmental impacts from the alternatives including impacts to the authorized purposes and the many other benefits and functions afforded by the System and BSNP. USACE and USFWS have worked closely with MRRIC since January 2013 to identify the underlying stakeholder interests referred to as “human considerations”. The human considerations (HCs) are rooted in the economic, social, environmental, and cultural values associated with the natural resources of the Missouri River.

The management actions in the MRRMP-EIS that could potentially affect the environment are activities to create habitat or changes in reservoir System releases. In addition to understanding the temporary or short-term impacts that could result from these actions, it is prudent to consider long-term impacts that could occur in conjunction with the substantial hydrologic variability that exists in the Basin. Therefore, the discussion of potential impacts for many resources includes an analysis based on the results of modeling the alternatives over an 82-year (1931–2012) hydrologic period of record for the Basin. Impacts of the alternatives were evaluated for each of the following resources in the MRRMP-EIS:

- River Infrastructure and Hydrologic Processes
- Pallid Sturgeon
- Piping Plover and Least Tern
- Fish and Wildlife Habitat
- Other Special-Status Species
- Water Quality
- Air Quality
- Cultural Resources
- Land Ownership
- Commercial Sand and Gravel Dredging
- Flood Risk Management and Interior Drainage
- Hydropower
- Irrigation
- Navigation
- Recreation
- Thermal Power
- Water Supply
- Wastewater Facilities
- Tribal Interests (Other)
- Human Health and Safety
- Environmental Justice
- Ecosystem Services
- Mississippi River

A full description of the impacts analysis, results, and comparison of alternatives is provided in Chapters 2 and 3 of the MRRMP-EIS. What follows is a summary of results of the impacts analysis. The discussion is framed in the context of acceptability, completeness, effectiveness, and efficiency which are standard water resources planning criteria provided in the Economic and Environmental Principles and Guidelines for Water and Related Land Resources

Implementation Studies (U.S. Water Resources Council 1983). The criteria are defined as follows:

- Acceptability is the workability and viability of the alternative plan with respect to acceptance by state and local entities and the public and compatibility with existing laws, regulations, and public policies.
- Completeness is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects.
- Effectiveness is the extent to which an alternative alleviates the specific problems and achieves the specified opportunities (e.g., the purpose, need, and objectives).
- Efficiency is the extent to which an alternative plan is the most cost-effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nation's environment.

5.1 Alternative 1 – No Action (Current System Operation and Current MRRP Implementation)

Alternative 1 Summary of Impacts: Alternative 1 is a continuation of the current operation of the System and also management actions being implemented to comply with the 2003 Amended BiOp (USFWS 2003). Although referred to as “No Action” because it is the default reference case under NEPA, the No Action alternative could be referred to as no change in direction from existing operation and implementation of the MRRP. No benefits to pallid sturgeon are thought to be attributable to the spawning cue release as defined by the technical criteria in the Master Manual (USACE 2006) and described under Alternative 1. Although there are potentially long-term benefits from SWH construction for pallid sturgeon, SWH would not address hypotheses developed through the effects analysis. Additionally, Alternative 1 does not meet the species objective of providing a 95 percent chance of persistence for the piping plover over the 50-year modeled period. The adaptive management approach under Alternative 1 would remain focused on evaluation of habitat actions from the 2003 Amended BiOp such as ESH and SWH. Alternative 1 is insufficient in meeting the piping plover population persistence targets and therefore is not a complete or effective plan because it would not meet all of the species objectives. The effectiveness of Alternative 1 is also questionable because it is based on the 2003 Amended BiOp which does not represent the best available science related to the listed species. In addition, Alternative 1 is not an efficient plan because other alternatives that meet all of the species objectives would be less costly than Alternative 1. The acceptability of Alternative 1 would likely be varied based on Draft MRRMP-EIS comments and experience with implementation of past management actions included in Alternative 1. Some stakeholders are supportive of managed flow pulses, habitat construction, land acquisition, and other proposed management actions for the listed species while some are opposed to any action whatsoever.

5.2 Alternative 2 USFWS 2003 Biological Opinion Projected Actions

Alternative 2 Summary of Impacts: The net benefits of Alternative 2 compared to Alternative 1 mainly relate to increases in piping plover persistence probability, improvements in flood risk benefits from a National Economic Development (NED) perspective (as averaged across all areas and all years and over the 82-year period of record) and benefits to recreation from a NED perspective. There would also be benefits to fish and wildlife and ecosystem services

through land acquisition and habitat restoration, and regional income and job creation provided by program expenditures associated with habitat construction.

The adverse effects of Alternative 2 relative to Alternative 1 include higher program costs, a higher amount of temporary construction related impacts, and impacts to cultural resources, thermal power, navigation, hydropower, irrigation, and land ownership. Alternative 2 would require a large increase in federal funding for program expenditures, driven primarily by increased ESH and SWH construction and land acquisition requirements under this alternative. Alternative 2 would result in an increase in total cultural site days at risk in the reservoirs as compared to Alternative 1, and riverine reaches would have an increase in severity of impacts. Despite benefits in flood risk management from a NED perspective, there would be instances of adverse localized impacts in some areas associated with the March and May spring pulse release, such as in areas with limited channel capacity like the Fort Randall Reach. As modeled, Alternative 2 would cause an approximated increase of 427 additional days of channel capacity exceedance over the 82-year period of record in the Fort Randall reach relative to Alternative 1.

Similar to Alternative 1, there are concerns about the acceptability of this alternative based on comments received during the public review period of the Draft MRRMP-EIS. Given the scale of actions required under Alternative 2, and the potential impacts as compared to Alternative 1, it is likely this alternative would not be acceptable to many stakeholders, Tribes, agencies, and the public. The high level of mechanical ESH construction in the Garrison reach for example would be a concern to Tribes due to potential impacts to cultural resources and the State of North Dakota due to recreation impacts during construction and concerns related to changed river geomorphology. Alternative 2 is not an efficient alternative as it would be the most expensive alternative and would result in adverse impacts across a broad range of HCs. Additionally, the effectiveness of this alternative is less certain in comparison to Alternatives 3–6 because Alternative 2 is based on the 2003 Amended BiOp which does not represent the best available science related to the listed species.

5.3 Alternative 3 – Mechanical Construction Only

Alternative 3 Summary of Impacts: Alternative 3 has a wide range of benefits relative to Alternative 1, including benefits to endangered species, reduced program expenditures, and reduced adverse impacts for most HCs. The reduction in the scale of early life stage pallid sturgeon habitat construction under the IRC concept as compared to SWH, and greater use of structure modifications, rather than top-width widening and/or chute construction, relative to Alternative 1 would reduce overall program expenditures and reduce the likelihood of adverse impacts from construction. This would reduce the need to purchase as much private land and would result in less of a decrease in local tax revenue to local governments at the end of the implementation period. Alternative 3 is anticipated to meet all of the species objectives described in Chapter 2 of the MRRMP-EIS.

Alternative 3 removes the existing pallid sturgeon spawning cue release in Alternative 1 resulting in benefits to a range of HCs. Comparatively small average annual net increases relative to Alternative 1 may be expected for hydropower, recreation (reservoir and river), navigation, thermal power, flood risk management, irrigation, water supply, and land ownership and management. Most of these have national, regional, and other social beneficial effects. A small increase in ecological services, fish and wildlife, and other special-status species are indicated but these impacts are not considered significant. The main adverse effect of Alternative 3 is related to a reduction in habitat construction related jobs which would result in a relative reduction in regional income. Some Tribes have expressed that the projected potential

level of mechanical ESH construction in the Garrison reach is not acceptable and extensive coordination on site-specific construction activities to avoid sensitive areas in this reach would be an essential component of this alternative. Alternative 3 does not include a reoccurring flow action for the listed species; therefore, the channel capacity exceedances in the Garrison and Fort Randall reaches that are a concern under Alternatives 2, 4, 5, and 6 are not associated with Alternative 3. Alternative 3 is not expected to result in any significant adverse impacts.

Alternative 3 is an acceptable plan due to its relative lack of adverse impacts compared to the other alternatives; however, several comments received during the public comment period indicate there are some who oppose Alternative 3 due to perceived impacts from management actions on their interests or because they believe Alternative 3 does not include enough habitat restoration or land acquisition. The ongoing engagement with MRRIC, Tribes, other agencies, and the public as site-specific management actions are implemented will help USACE identify remaining concerns and attempt to avoid and/or minimize impacts where possible.

Alternative 3 is an effective and complete plan in that it is anticipated to meet the species objectives including USFWS's probability of persistence targets for piping plover and least terns. Alternative 3 would continue ongoing pallid sturgeon propagation activities, build spawning habitat as in-river test projects to learn if this action is effective, and build IRC habitat through structure modification and channel widening. It would also be implemented under an active adaptive management framework as outlined in the SAMP. For pallid sturgeon, long-term beneficial impacts may be expected from the creation of spawning sites and from IRC development although there is still high uncertainty regarding what is limiting pallid sturgeon recruitment. Although Alternative 3 would not be the most efficient alternative from an overall NED standpoint, it is the second most efficient alternative from a NED perspective and its lack of adverse impacts compared to Alternative 1 is a good balance between overall efficiency and level of impacts to resources. There are uncertainties associated with Alternative 3 (in common with each alternative); however, Alternative 3 implemented within the framework of the SAMP clearly demonstrates it would be the least impactful means of meeting species objectives across the full range of interests.

USACE has completed ESA Section 7 consultation with USFWS on this alternative and received a no jeopardy finding in the 2018 BiOp (USFWS 2018) for least tern, piping plover, and pallid sturgeon. Alternative 3 would meet the species objectives and fulfill the purpose and need of the plan while causing the least adverse impacts to stakeholders of any of the alternatives.

5.4 Alternative 4 – Spring ESH Creating Release

Alternative 4 Summary of Impacts: The benefits of Alternative 4 relative to Alternative 1 include the listed species, regional land ownership, flood risk management benefits from a NED perspective (averaged across all areas and all years over the 82-year period of record) and reduced program expenditures from a national perspective. Modeling indicates that updated piping plover and least tern population persistence targets would be met under this alternative. For pallid sturgeon, long-term beneficial impacts may be expected from the creation of spawning sites and from IRC development although there is still high uncertainty regarding what is limiting pallid sturgeon recruitment. No negative impacts to pallid sturgeon are anticipated from the spring ESH-creating release. Alternative 4 is anticipated to meet all of the species objectives described in Chapter 2 of the MRRMP-EIS.

The majority of the net impacts of Alternative 4 would be negative. Hydropower revenues would fall as the result of lower flow years during System refill phases, reductions in some years

following releases would be in the tens of millions of dollars which is considered significant. Recreation as a sector would decrease from a national perspective and yearly labor income would fall regionally relative to Alternative 1. Most of these impacts would be from the upper three reservoirs (where summer elevations would more frequently be at lower than preferred levels), although lower river recreation may experience benefits from more preferable flow conditions and recreational opportunities offered by habitat creation. Compared to Alternative 1, irrigation and thermal power would be negatively affected on average from a NED impacts perspective. Navigation losses would occur from a NED and regional perspective.

Increased flood risk management issues would be associated with spring releases for ESH creation in some locations in years when releases occur. Similar to Alternative 2, despite overall benefits in flood risk management there would be instances of adverse impacts in some areas associated with the spring ESH release such as in areas with limited channel capacity like the Fort Randall Reach and Garrison Reach. Although there may be some opportunities to reduce flood risk under real-time operation (refer to Chapter 5 in the SAMP), there would be additional risk associated with increasing river flows for ESH creation during the spring period when tributary inflows are somewhat less predictable and available response time can be reduced. As modeled over the period of record, Alternative 4 would cause an increase of over 416 additional days of channel capacity exceedances in the Garrison Reach and 374 additional days in the Fort Randall reach relative to Alternative 1. Alternative 4 could result in significant impacts to flood risk management in some areas and hydropower in years where releases occur.

The acceptability of Alternative 4 appears to be varied, with comments on the Draft MRRMP-EIS ranging from concerns related to elevated flood risk to concerns about reduced habitat construction and land acquisition as compared to Alternative 1. Given the increased flood risk during release years and impacts to hydropower under Alternative 4, and the resulting potential impacts as compared to Alternative 1, it is likely this alternative would not be acceptable to many stakeholders, Tribes, agencies, and the public.

Similar to Alternative 3, Alternative 4 is considered an effective and complete plan in that it would meet USFWS probability of persistence targets for piping plover and least terns and would continue ongoing pallid sturgeon propagation activities, build spawning habitat as in-river test projects to learn if this action is effective, and build IRC habitat through structure modification and channel widening. It would also be implemented under an active adaptive management framework for both the birds and pallid sturgeon. Alternative 4 has benefits compared to Alternative 1 from a combined NED standpoint but its net average annual NED value is less than Alternatives 3, 5, and 6.

5.5 Alternative 5 – Fall ESH Creating Release

Alternative 5 Summary of Impacts: Relative to Alternative 1, Alternative 5 has a range of benefits for listed species, flood risk management from a NED perspective (averaged across all areas and all years over the 82-year period of record), program expenditures, and regional land ownership. Piping plover and least tern population persistence targets would be met under this alternative. Long-term beneficial impacts for pallid sturgeon could occur from the creation of spawning sites and IRC development although there is still much uncertainty regarding what is limiting pallid sturgeon recruitment. No negative impacts to pallid sturgeon are anticipated from the fall ESH-creating release. Alternative 5 is anticipated to meet the species objectives for pallid sturgeon, and least terns and piping plovers as described in Chapter 2 of the MRRMP-EIS.

Relative to Alternative 1, Alternative 5 would have net adverse impacts to hydropower, recreation, irrigation, thermal power, navigation, and regional income from program expenditures. The reduced scale of habitat construction relative to Alternative 1 would result in a reduction in habitat construction related jobs. The adverse average annual hydropower impacts resulting from Alternative 5 would be a fraction of 1 percent of the overall value of electricity generated although reductions in some years following releases would be in the tens of millions of dollars. The average annual benefit to thermal power would be approximately \$1 million less than Alternative 1. Alternative 5 would have little net change for recreation, although impacts to upper reservoir recreation would be offset somewhat by gains to lower river recreation. There would be relatively small regional negative impacts associated with flood risk management and navigation in the average year relative to Alternative 1.

Impacts of the ESH releases on flood risk management are a concern, particularly in the Garrison and Fort Randall Reaches, and net average annual benefits often mask more acute adverse impacts in release years or during System recharge periods. Likewise, although adverse impacts to hydropower on an average annual basis are a fraction of the total value of electricity generated, relatively severe adverse impacts occur in some years. In addition, over the period of record used for modeling, Alternative 5 would cause an increase of 265 additional days of channel capacity exceedances in the Garrison Reach and 233 days in the Fort Randall reach relative to Alternative 1.

The acceptability of Alternative 5 appears to be varied, with comments on the Draft MRRMP-EIS ranging from concerns related to elevated flood risk to concerns related to reduced habitat construction and land acquisition. Given the increased flood risk in release years under Alternative 5, and the resulting potential impacts as compared to Alternative 1, it is likely this alternative would not be acceptable to many stakeholders, Tribes, agencies, and the public.

Similar to Alternative 3, Alternative 5 is considered an effective and complete plan in that it would meet USFWS's probability of persistence targets for piping plover and least terns and would continue ongoing pallid sturgeon propagation activities, build spawning habitat as in-river test projects to learn if this action is effective, and build IRC habitat through structure modification and channel widening. It would also be implemented under an active adaptive management framework for both the birds and pallid sturgeon (in common with Alternatives 3, 4, and 6). Alternative 5 would be the most efficient alternative from a combined NED standpoint and would have an average annual NED value of \$789,000 greater than Alternative 3. However, it would also have a larger negative regional impact compared to Alternative 3 of a roughly similar amount.

5.6 Alternative 6 – Pallid Sturgeon Spawning Cue

Alternative 6 Summary of Impacts: Modeling indicates that updated population persistence targets for piping plover and least tern would be met under Alternative 6. Long-term beneficial impacts for pallid sturgeon could occur from the creation of spawning sites and IRC development although there is still high uncertainty regarding what is limiting pallid sturgeon recruitment. There would be possible beneficial impacts from the spawning cue release, although evidence is currently lacking to confirm or quantify any level of benefit. Alternative 6 is anticipated to meet the species objectives for pallid sturgeon, least tern, and piping plover described in Chapter 2 of the MRRMP-EIS.

The majority of the impacts of Alternative 6 would be negative. Recreation as a whole would decrease per year from the national and regional perspective. Most of these impacts would be

from the upper three reservoirs (where summer elevations are more frequently at lower than ideal levels), although lower river recreation may experience benefits from more preferable flow conditions and recreational opportunities offered by habitat creation. Irrigation and navigation would be negatively affected on average from a national and regional perspective. Alternative 6 would adversely impact cultural resources by increasing sites affected in the reservoirs compared to Alternative 1. The adverse average annual hydropower impacts resulting from Alternative 6 would be a fraction of 1 percent of the overall value of electricity generated, although reductions in some years following releases would be in the tens of millions of dollars which is considered significant. Impacts to flood risk management would increase under Alternative 6. Modeling suggests an average annual increased flood damage of \$283,000 nationally and a decrease in average annual labor income of \$65,000 regionally.

Alternative 6 results in negative impacts to a wide range of interests in the Basin. Increased flood risk management issues are associated with releasing water in the spring for the recurring bi-modal spawning cue. Although there may be some opportunities to reduce flood risk under real-time operation (refer to Chapter 5 in the SAMP), there would be additional risk associated with increasing river flows during the spring period when tributary inflows are less predictable and available response time can be reduced. As modeled over the period of record, Alternative 6 caused an increase of 541 additional channel capacity exceedances in the Fort Randall reach relative to Alternative 1.

The acceptability of Alternative 6 appears to be varied, with comments on the Draft MRRMP-EIS ranging from concerns related to elevated flood risk to concerns related to reduced habitat construction and land acquisition. Given the increased flood risk under Alternative 6, and the resulting potential impacts as compared to Alternative 1, it is likely this alternative would not be acceptable to many stakeholders, Tribes, agencies, and the public.

Similar to Alternative 3, Alternative 6 is considered an effective and complete plan because it would meet USFWS's probability of persistence targets for piping plover and least terns and would continue ongoing pallid sturgeon propagation activities, build spawning habitat as in-river test projects to learn if this action is effective, and build IRC habitat through channel modifications. It would also be implemented under an active adaptive management framework for both the birds and pallid sturgeon.

Alternative 6 is a fairly efficient alternative from a combined NED standpoint but has a net average annual value less than Alternatives 3 and 5. The relative benefits to NED associated with this alternative do not appear to be worth the broad range of often severe negative impacts to Basin interests. Alternative 6 incorporates a recurring bi-modal spawning cue flow for pallid sturgeon; however, there is currently no scientific evidence that pallid sturgeon would benefit from such a flow and therefore Alternative 6 is not considered more effective in meeting the species objectives than Alternative 3.

6.0 Environmentally Preferable Alternative

CEQ NEPA regulations require federal agencies to identify the alternative or alternatives they consider to be environmentally preferable in the ROD. The environmentally preferable alternative is considered the alternative that will promote the national environmental policy as expressed in NEPA, Section 101. This generally includes the consideration of the alternative that can achieve the least damage to the biological and physical environment, and protects, preserves, and enhances historic, cultural, and natural resources (42 USC 4331).

The USACE considered both construction and long-term operation and maintenance impacts disclosed in the MRRMP-EIS of each of the alternatives in determining the environmentally preferable alternative. When impacts to all historic, cultural, and natural resources, and other river uses are balanced against each other as defined by Congress, the NEPA regulations, and the CEQ's Forty Most Asked Questions Concerning NEPA Regulations, Alternative 2 is environmentally preferable because it has the greatest amount of overall habitat creation and restoration (via land acquisition, habitat construction, and flow management); however, this alternative is projected to have a range of adverse impacts if implemented including potentially significant impacts to cultural resources, thermal power, hydropower, and flood risk management in some locations in years where releases occur. Alternative 2 was also not selected in part because the management actions under this alternative are based on the 2003 Amended BiOp, which does not represent the best available science related to the listed species. If implemented, the benefits to the three listed species from this alternative are uncertain, despite the overall greater amount of habitat that would be established. Additionally, the selected alternative, Alternative 3, is projected to better meet the purpose, need, and objectives of the plan while avoiding and/or minimizing the impacts that are of concern under Alternative 2.

7.0 Evaluation of Alternatives

Alternative 3 is selected for implementation. Alternative 3, the selected alternative, meets the species objectives and the purpose and need for the plan while causing the least amount of adverse impacts to Basin stakeholders. The USACE and USFWS have worked with Basin stakeholders for more than 5 years to identify an alternative that avoids jeopardy to the pallid sturgeon, least tern, and piping plover and that also minimizes impacts to stakeholders. A thorough analysis of the beneficial and adverse impacts of the alternatives has demonstrated that Alternative 3 would achieve the purpose and need for the plan, including the species objectives, and would be the least impactful means of meeting species objectives across the full range of interests. The existing spring pulse and reservoir unbalancing actions will be removed from the Master Manual (USACE 2006) and will not be implemented under the selected alternative. The existing spring pulse is not based on the best available science, and reservoir unbalancing was determined to be ineffective in helping to achieve least tern and piping plover objectives. Modeling indicates that a contribution in bird populations on one reservoir from lowered water levels causes a corresponding negative effect on bird populations on other reservoirs due to higher water levels. Alternative 3 will be implemented in accordance with the SAMP which has received a high level of independent scientific review and was developed in collaboration with MRRIC. Additionally, USACE has completed ESA Section 7 consultation with USFWS on this alternative and received a no jeopardy finding in the 2018 BiOp (USFWS 2018) for least tern, piping plover, and pallid sturgeon. Alternative 3, implemented in accordance with the SAMP, would meet the species objectives and fulfill the purpose and need of the plan.

Alternative 1 was not selected for implementation in part because the management actions in this alternative are based on the 2003 Amended BiOp, which does not represent the best available science related to the listed species. Additionally, it would not meet piping plover probability of persistence criteria, and therefore would not fully meet the species objectives or the purpose and need for the plan.

Alternative 2 was not selected for implementation in part because it would be the most expensive alternative and would result in adverse impacts across a broad range of resources including potentially significant adverse impacts to cultural resources, thermal power,

hydropower, and flood risk management in some locations in years where releases occur. Compared to Alternative 1, over the 82-year period of record, Alternative 2 would increase the site-days at risk for cultural resources sites on the reservoirs by 1,614 days, cause a decrease in average annual thermal power benefits of approximately \$60 million, cause a hydropower average annual benefit decrease of approximately \$3.1 million with large decreases in some years when flow releases occur especially at Oahe, Big Bend, and Fort Peck. In 15 percent of the years in the period of record, Alternative 2 would have large, negative impacts to flood risk management relative to Alternative 1 associated with full and partial spring pallid sturgeon flow releases. Alternative 2 was also not selected in part because the management actions under this alternative are based on the 2003 Amended BiOp, which does not represent the best available science related to the listed species.

Alternative 4 was not selected for implementation because the relative benefits of this alternative are outweighed by a range of impacts including risk of significant impacts to hydropower and flood risk management in release years. Hydropower revenues would fall by an average annual average of \$3.7 million per year as the result of low flow years during System refill phases, a small percentage decrease of the overall value of hydropower. However, there would be year to year variations, and reductions in some years following releases would be in the tens of millions of dollars. Under Alternative 4, overall flood damages were estimated to be \$688,000 less per year, but some years would experience negative impacts in the tens of millions of dollars in comparison to Alternative 1. Alternative 3, the selected alternative, meets the species objectives and the purpose and need for the plan while avoiding these adverse impacts.

Alternative 5 was not selected for implementation because the relative benefits of this alternative are outweighed by a range of impacts to HCs including risk of significant impacts to hydropower and flood risk management in years with a fall release. The average annual hydropower impacts resulting from Alternative 5 would be a fraction of 1 percent of the overall value of electricity generated although reductions in some years following releases would be in the tens of millions. Similar to Alternative 4, Alternative 5 results in net average NED annual benefits to flood risk management; however, the impacts of the ESH releases on flood risk management are a concern, particularly in the Garrison and Fort Randall reaches, and net average annual benefits can mask more acute adverse impacts in release years or during system recharge periods. Alternative 3, the selected alternative, meets the species objectives and the purpose and need for the plan while avoiding these adverse impacts.

Alternative 6 was not selected for implementation because the relative benefits of this alternative are outweighed by a range of impacts including risk of significant impacts to hydropower and flood risk management in years when the spawning cue flow release is implemented. The average annual hydropower impacts resulting from Alternative 6 would be a fraction of 1 percent of the overall value of electricity generated. However, there would be year-to-year variations and reductions in some years would be in the tens of millions of dollars. The impacts analysis indicates average annual increased flood damages of \$283,000 in addition to increases in channel capacity exceedance in the Fort Randall reach. Alternative 3, the selected alternative, meets the species objectives and the purpose and need for the plan while avoiding these adverse impacts.

8.0 Compliance with Federal Regulations

The USACE will continue to operate the Missouri and Kanas Reservoir Systems and maintain and operate the BSNP for all the authorized purposes and follow all required laws, regulations and approvals in implementing the selected alternative including, but not limited to the following:

- **Endangered Species Act:** Any site-specific action carried out under the selected plan that has the potential to adversely impact threatened or endangered species or associated habitat would not be implemented without site-specific surveys and assessments to ensure that no threatened or endangered species would be adversely impacted by USACE actions. All construction timing constraints related to specific listed species within the project area will be observed in order to avoid impacts to federally listed species.
- **National Environmental Policy Act:** The MRRMP-EIS will enable USACE to tier future project proposals from the overarching programmatic EIS analysis, helping to streamline future environmental reviews. NEPA regulations encourage the use of tiering in order to focus on issues ripe for decision making (40 CFR 1502.20.) Using a “tiering” approach allows more general matters to be addressed in the MRRMP-EIS, with subsequent tiered EISs or environmental assessments to focus site-specific actions and associated environmental analyses. Implementation of the management actions in the selected alternative may require subsequent analysis for site-specific actions that can be tiered from the MRRMP-EIS. The tiered EIS or environmental assessment would reference the general discussion from the MRRMP-EIS while focusing on the project-specific impacts important to USACE decision-makers.
- **Fish and Wildlife Coordination Act:** The Fish and Wildlife Coordination Act (16 USC 661 et seq.) requires federal agencies to coordinate with USFWS or the National Marine Fisheries Service and appropriate state wildlife agencies to avoid or minimize adverse impacts of federal actions that propose to modify any stream or water body. Modification of a stream or water body includes impoundment, diversion, and deepening of channels. While USACE is not proposing such modifications as part of this effort, USACE has coordinated with USFWS and various state wildlife agencies throughout the development of the MRRMP-EIS and has received and incorporated planning aid letters (Appendix B of the MRRMP-EIS) into its development. A final Fish and Wildlife Coordination Act report is included in Appendix B of the MRRMP-EIS. Coordination will also continue to occur during implementation of the selected plan.
- **Migratory Bird Treaty Act:** The Migratory Bird Treaty Act (16 USC 703–712), originally implemented in 1918, prohibits the take, possession, or sale of migratory birds. No significant impacts to migratory birds are anticipated under any of the MRRMP-EIS alternatives. Migratory birds are addressed in Section 3.5, Fish and Wildlife Habitat, and Section 3.6, Other Special-Status Species. USACE coordinates with USFWS and appropriate state agencies prior to construction occurring at site-specific projects. Clearing of vegetation normally is scheduled to occur outside of the primary nesting season further reducing the risk to migratory birds.
- **Bald and Golden Eagle Protection Act:** The Bald and Golden Eagle Protection Act (16 USC 668–668d) prohibits the take, possession, or sale of bald and golden eagles, with limited exceptions for the scientific or exhibition purposes, for religious purposes of Indian Tribes, or for the protection of wildlife and agriculture or for preservation of the species. In 2009, USFWS created a permit program for non-purposeful take of eagles

and their nests. The MRRMP-EIS has analyzed the potential impacts of the considered alternatives and has determined that the alternatives are not likely to result in the take of bald or golden eagles. As part of each site-specific project, USACE would coordinate with USFWS and the appropriate state agencies to avoid incidental take of bald or golden eagles during the implementation of any management action. If a bald or golden eagle were to be found near or on a project site, the appropriate USFWS office would be contacted and USFWS National Bald Eagle Management Guidelines would be implemented in coordination with USFWS.

- **Clean Water Act:** The objective of the Clean Water Act (CWA) (33 USC 1251 et seq.), as amended, is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. USACE regulates discharges of dredge or fill material into waters of the United States pursuant to Section 404 of the CWA. The selection of disposal sites for dredged or fill material is done in accordance with the Section 404(b)(1) guidelines, which were developed by the EPA (40 CFR 230). Section 401 of the CWA allows certain states or the EPA to grant or deny water quality certification for any activity that results in a discharge into waters of the United States and requires a federal permit or license. Certification requires a finding by the affected states or the EPA that the activities permitted would comply with all water quality standards individually or cumulatively over the term of a permit. Section 401 water quality certifications would be obtained for site-specific management actions, as required, prior to construction. Section 402 of the CWA also established the National Pollutant Discharge Elimination System for permitting point-source discharges to waters of the United States. A tiered NEPA process will be associated with each site-specific project under the selected alternative. Each process will include compliance with Sections 401, 402, and 404 of the CWA through site-specific analysis and coordination.
- **Floodplains:** Executive Order 11988 requires federal agencies to evaluate the potential effects of their actions on floodplains and to consider alternatives to avoid or minimize impacts. This requirement applies to the following actions: (1) acquiring, managing, and disposing of federal lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. Implementation of the selected alternative will avoid, to the extent possible, long- and short-term adverse impacts to the floodplain. It will also avoid direct and indirect support of development or growth (construction of structure/or facilities, habitable or otherwise) in the base floodplain. Site-specific designs will be developed to ensure that the project complies with Executive Order 11988 through technical analysis and coordination with local floodplain management authorities. Potential impacts to the Missouri River floodplain are described in Section 3.2 of the MRRMP-EIS, River Infrastructure and Hydrologic Processes.
- **National Historic Preservation Act:** Section 106 of the National Historic Preservation Act (NHPA) (54 USC 306108) requires federal agencies to evaluate the effects of federal undertakings on historical, archeological, and cultural resources. To do this, USACE must identify any district, site, building, structure, or object that is located in or near the project area, and is included in or eligible for inclusion in the National Register of Historic Places. The USACE Omaha District implements a programmatic agreement (PA) developed in consultation with Tribes, Tribal Historic Preservation Officers, Advisory Council on Historic Preservation, State Historic Preservation Officers, agencies, and interested parties to address cultural and historic resource impacts involved with the ongoing operation and maintenance of the Missouri River Mainstem Reservoir System.

A separate PA has been developed by Kansas City District, in collaboration with Tribes, Tribal Historic Preservation Officers, Advisory Council on Historic Preservation, and State Historic Preservation Officers for MRRP actions in the lower river such as IRC construction. The lower river PA was pending signature at the time of printing of the final MRRMP-EIS and is not appended to the EIS; however, the document will be made available on the MRRP website (www.moriverrecovery.org) concurrent with the signed ROD. Consultation requirements under Section 106 of the NHPA will be met for all projects and the PAs will be utilized as appropriate. The NHPA System operations PA is included in Appendix J of the MRRMP-EIS. More information regarding cultural resources identification and potential impacts to cultural resources are described in Section 3.9 of the MRRMP-EIS, Cultural Resources.

- **Archeological Resources Protection Act:** The Archeological Resources Protection Act (16 USC 470aa–470mm) provides for the protection of archeological sites located on public and Tribal lands; establishes permit requirements for the excavation or removal of cultural properties from public or Tribal lands; and establishes civil and criminal penalties for the unauthorized appropriation, alteration, exchange, or other handling of cultural properties. USACE is authorized to issue permits for archeological surveys and exploration and would ensure that all permit requirements are met if excavation of archaeological sites was required. Potential impacts to archaeological resources are described in Section 3.9 of the MRRMP-EIS, Cultural Resources.
- **Native American Graves Protection and Repatriation Act:** The Native American Graves Protection and Repatriation Act (NAGPRA) (25 USC 3001 et seq.) addresses the discovery, identification, treatment, and repatriation of Native American human remains and cultural items located on federal lands. This Act also establishes penalties for the sale, use, and transport thereof. In recognition of the sensitivity and cultural importance of human remains, funerary objects, sacred objects, or objects of cultural patrimony, each USACE District has developed a standard operating procedure to provide guidance to assure respectful and responsive treatment of human skeletal remains inadvertently discovered on federal lands managed by the district. USACE does not have NAGPRA jurisdiction over human remains or other NAGPRA related collections recovered from private and non-Tribal lands. This is also true if remains are recovered during a federal undertaking on private lands. Under those circumstances, specific state unmarked burial laws would take precedence. Management actions described in the MRRMP-EIS would make the appropriate efforts to avoid adverse impacts to Tribal sites as described in Section 3.9 of the MRRMP-EIS, Cultural Resources.
- **American Indian Religious Freedom Act:** The American Indian Religious Freedom Act (AIRFA) of 1978 (42 USC 1996) provides for the protection and preservation of American Indian rights of freedom of belief, expression, and exercise of traditional religions. Courts have interpreted AIRFA to mean that federal agencies must consider American Indian interests before undertaking actions that might cause unnecessary interference with those traditional practices. USACE recognizes its responsibilities with respect to AIRFA and will coordinate with Tribes in carrying out the requirements of the AIRFA for any actions described in the MRRMP-EIS.
- **Sacred Sites:** Executive Order 13007 requires federal agencies to accommodate access to, and ceremonial use of, American Indian sacred sites by Tribal religious practitioners. The order requires federal agencies to avoid adverse impacts to Tribal sacred sites and maintain the confidentiality of information pertaining to Tribal sacred sites. Tiered environmental analyses will be prepared for site-specific management

actions and USACE will coordinate with appropriate Tribes to ensure that all actions comply with Executive Order 13007.

- **Water Rights:** Modifying the operation of the Missouri River Mainstem Reservoir System for purposes other than endangered species compliance is outside the scope of this analysis. The alternatives that do propose such changes in the MRRMP-EIS do not establish, regulate, determine, quantify, or impact consumptive water rights for any State, Tribe, or individual. USACE operates the Mainstem System in accordance with federal legislation that Congress has enacted. In accordance with Congressional intent, USACE endeavors to operate its projects for their authorized purposes in a manner that does not interfere with lawful uses pursuant to State and Tribal water right authorities. USACE develops water control plans and manuals through a public process, affording all interested parties the opportunity to present information regarding uses that may be affected by USACE operations for authorized purposes of its projects. USACE would consider modifications to System operation, in accordance with pertinent legal requirements, as State or Tribal water rights are exercised in accordance with applicable law. The Winters Doctrine, developed by the Supreme Court in *Winters v. United States*, 207 U.S. 564 (1908), maintains that sufficient water was reserved by implication to fulfill the purposes of the Tribal Reservation at the time the Reservation was established. Case law supports the premise that American Indian reserved water rights cannot be lost, whether or not those rights are exercised.
- **Environmental Justice:** Executive Order 12898 issued requires federal agencies to make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations in the United States. Executive Order 12898 calls for federal agencies to provide opportunities for stakeholders to obtain information and provide comment on federal actions. One additional way USACE is complying with this executive order is by engaging with MRRIC and providing regular and accessible means for stakeholders in the Missouri River Basin to obtain information and provide comments to USACE related the MRRMP-EIS and its potential effects to their resource or use of concern. A more detailed description of the level of engagement USACE has had with MRRIC is included in Section 5.1 of the MRRMP-EIS, Missouri River Recovery Implementation Committee. In addition to regularly engaging with MRRIC, and seeking input from the general public, USACE has conducted additional meetings throughout the Missouri River Basin in an effort to specifically provide information and seek input from minority and low-income populations. Impacts to environmental justice populations are addressed in Section 3.22 of the MRRMP-EIS, Environmental Justice. The EIS concluded that there were no disproportionate adverse impacts to these populations. Additionally, site specific analysis and coordination will ensure that management actions described in the MRRMP-EIS would not disproportionately adversely impact minority or low-income communities during implementation.
- **Farmland:** The Farmland Protection Policy Act (7 USC 4201, et seq.) requires federal agencies to coordinate with the USDA to develop criteria for identifying the effects of federal programs on the conversion of farmland to non-agricultural uses. USACE will coordinate with USDA before implementation of site-specific projects where selected alternative actions have the potential to convert farmland to non-agricultural uses. More information regarding the potential impacts from conversion of farmland are described in Section 3.10 of the MRRMP-EIS, Land Ownership.

- **Clean Air Act:** The Clean Air Act (42 USC 7401 et seq.), amended in 1977 and 1990, was established “to protect and enhance the quality of the Nation’s air resources so as to promote public health and welfare and the productive capacity of its population.” The Clean Air Act authorizes EPA to establish National Ambient Air Quality Standards to protect public health and the environment. The Clean Air Act establishes emission standards for stationary sources, volatile organic compound emissions, hazardous air pollutants, and vehicles and other mobile sources. USACE does not anticipate impacts to air quality from implementation of actions under the selected alternative. If a site-specific project presents potential for impacts to air quality to occur from a USACE action, it will comply with EPA standards and operations. Potential impacts to air quality from the alternatives are described in Section 3.8 of the MRRMP-EIS, Air Quality.
- **Rivers and Harbors:** Section 10 of the Rivers and Harbors Act of 1899 (33 USC 403) prohibits obstruction or alteration of any navigable water of the United States. The purpose of the act was to preserve the public right of navigation and prevent interference with interstate and foreign commerce unless authorized by Congress and approved by the Chief of Engineers and Secretary of the Army. The Missouri River is designated a navigable water under the Rivers and Harbor Act. Actions implemented as part of the selected alternative are focused on habitat projects which are designed, constructed, implemented, and monitored to avoid and minimize negative impacts to the System’s authorized purposes including navigation. Prior to any site-specific construction project, a NEPA analysis will be completed and monitoring will be conducted to detect any issues such as shoaling in the navigation channel. If issues are detected then adjustments will be made to restore the authorized 9-foot-deep by 300-foot-wide navigation channel. All site-specific projects will comply with requirements of Section 10 of the Rivers and Harbors Act. Potential impacts to navigation are addressed in Section 3.15 of the MRRMP-EIS, Navigation.
- **Recreation:** The Federal Water Project Recreation Act (16 USC 4612 et seq.) requires federal agencies to give full consideration to outdoor recreation and fish and wildlife enhancement in the investigating and planning of any federal navigation, flood control, reclamation, hydroelectric, or multipurpose water resource project, whenever any such project can reasonably serve either or both purposes consistently. Projects must be constructed, maintained, and operated to provide recreational opportunities, consistent with the purposes of the project. Potential impacts to recreation are addressed in Section 3.16 of the MRRMP-EIS, Recreation.
- **Wild and Scenic Rivers Act:** Some of the proposed actions in the preferred alternative would take place within the Missouri River National Recreational River, river reaches designated under the Wild and Scenic Rivers Act (16 USC 1271 et seq.) and managed as a unit of the National Park System. The Missouri River National Recreational River is managed by the NPS. Under the Wild and Scenic Rivers Act, a federal agency may not carry out actions that would have a direct and adverse effect on the free-flowing, scenic, and natural values of a federally designated wild or scenic river.

Pursuant to its responsibilities under the ESA and authority under the Wild and Scenic Rivers Act and NPS Organic Act the NPS has evaluated the selected alternative management actions that would occur in the Missouri River National Recreational River. The NPS found that ESH construction would not be compatible with Outstandingly Remarkable Values protection goals in some specifically identified river reaches, because according to the NPS assessment, they may have a direct and adverse effect on river values. As the adaptive management component of the selected alternative is implemented, the NPS will assess and review construction projects within the Missouri

River National Recreational River on a case by case basis outside of these areas and may issue individual Section 7(a) determinations for each action when specific project details are made available.

9.0 Implementation

Following this ROD, the USACE will begin to implement the selected alternative within the framework of the SAMP in accordance with all applicable laws and regulations including America's Water Infrastructure Act of 2018 Section 1226. The existing spring pulse and reservoir unbalancing actions will be removed from the Master Manual (USACE 2006) and will not be implemented. All practicable means to avoid or minimize environmental harm from the selected alternative are adopted as described in Chapter 5 of the SAMP which is the implementation and monitoring plan for the selected alternative. Implementation of the selected alternative will be accomplished in cooperation and collaboration with MRRIC, Tribes, states, the USFWS, other agency partners, and stakeholders as described in the SAMP.

10.0 References

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