

US ARMY CORPS OF ENGINEERS  
NORTHWESTERN DIVISION  
MISSOURI RIVER BASIN  
WATER MANAGEMENT DIVISION

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**FINAL BIOLOGICAL ASSESSMENT ON  
THE OPERATION OF THE MISSOURI  
RIVER MAINSTEM RESERVOIR  
SYSTEM, THE OPERATION AND  
MAINTENANCE OF THE BANK  
STABILIZATION AND NAVIGATION  
PROJECT, AND THE OPERATION OF  
KANSAS RIVER RESERVOIR SYSTEM**

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November 2003



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## Acronyms

AF	acre-feet
AOP	Annual Operating Plan
BA	Biological Assessment
BiOp	Biological Opinion
BSNP	Bank Stabilization and Navigation Project

cfs	cubic feet per second
Corps	U.S. Army Corps of Engineers
CRP	Construction Reference Plane
CWCP	current Water Control Plan
DRM	Daily Routing Model
EA/FONSI	Environmental Assessment/Finding of No Significant Impact
EIS	Environmental Impact Statement
ESA	Endangered Species Act
ESH	emergent sandbar habitat
FTC	Fish Technology Center
ft-msl	feet mean sea level
GPS	Geographic Positioning System
kcfs	thousand cubic feet per second
KDWP	Kansas Department of Wildlife and Parks
MAF	million acre-feet
Master Manual	Missouri River Master Water Control Manual
MDC	Missouri Department of Conservation
mm	millimeters
MRRIC	Missouri River Recovery Implementation Committee
msl	mean sea level
MTFWP	Montana Fish, Wildlife and Parks
NEPA	National Environmental Policy Act
NFH	National Fish Hatchery
NGPC	Nebraska Game and Parks Commission
NRC	National Research Council (National Academy of Sciences)

O&M	Operation and Maintenance
PA	Proposed Action
PIT	Passive Integrated Transponder
PVA	Population Viability Analysis
RM&E	Research, Monitoring, and Evaluation
RPA	Reasonable and Prudent Alternative
RPMA <sub>s</sub>	Recovery Priority Management Areas
SFH	State Fish Hatchery
SWH	shallow water habitat
System	Missouri River Mainstem Reservoir System
TESDMS	Threatened & Endangered Species Data Management System
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WAPA	Western Area Power Administration
WRDA86	Water Resources Development Act of 1986
WRDA99	Water Resources Development Act of 1999
YOY	young of year

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**I. INTRODUCTION**

**A. Federal Action Subject to ESA Section 7 Consultation.** In accordance with the Endangered Species Act (ESA), the U.S. Army Corps of Engineers (Corps) must insure, in consultation with the U.S. Fish and Wildlife Service (USFWS), that any action carried out is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The federal action subject to ESA consultation is the Corps' operation of the Missouri River Mainstem Reservoir System, operation of the Kansas River projects, and the operation and maintenance of the Bank Stabilization and Navigation Project (BSNP) (hereinafter referred to as the Missouri Basin Projects). Congress authorized the Corps to operate the Missouri River Mainstem Reservoir System for flood control, navigation, hydropower, irrigation, water supply, water quality, recreation, and fish and wildlife; the BSNP for navigation and bank stabilization purposes; and the Kansas River projects for flood control, water quality, recreation, fish and wildlife, navigation, irrigation, and water supply purposes.

The Corps entered into formal consultation with the USFWS pursuant to the ESA on the operation of the Missouri Basin Projects culminating in the USFWS Missouri River Biological Opinion issued November 2000 (2000 BiOp). The 2000 BiOp concluded the Corps' proposed action jeopardized the continued existence of the listed pallid sturgeon, piping plover, and the interior least tern, and recommended a Reasonable and Prudent Alternative (RPA). Subsequently, the Corps and the USFWS have continued coordination and entered into both informal and formal consultation over the Corps' operation of the mainstem system and other actions addressed by the 2000 BiOp.

In accordance with the ESA regulations, the Corps is reinitiating consultation based on new information concerning effects of the action on the species not previously considered, and the designation of piping plover critical habitat. Further, the Corps has concluded that certain components of the USFWS RPA contained in the 2000 BiOp do not comport with the regulatory criteria for an RPA. The regulations provide for the USFWS to identify alternative actions that can be implemented in a manner consistent with the intended purpose of the action, that can be implemented consistent with the scope of the agency's legal authority, that is economically and technologically feasible, and the USFWS believes would avoid the likelihood of jeopardizing the continued existence of listed species or result in the destruction or adverse modification of critical habitat. The Corps is therefore proposing alternative actions to avoid jeopardizing the species.

In its operation of the Missouri Basin Projects, the Corps will continue implementing a majority of the actions recommended in the 2000 BiOp. Additionally, the Corps has concluded in this

Biological Assessment (BA), that the proposed action avoids the likelihood of jeopardizing the continued existence of the listed species. This BA will consider the effects of the Corps proposed action, which includes revised mainstem system operations, the acceleration of shallow water habitat creation, implementation of a robust research, monitoring and evaluation program, flow tests, and expanded support for pallid sturgeon propagation efforts.

**B. Corps Conclusions.** This BA addresses several new engineering analyses conducted by the Corps and various other scientific reports completed after the issuance of the 2000 BiOp. Based on a review of the new information and application to the Corps' action, the Corps concludes the following:

1. The RPA "spring rise" and summer flows below minimum service flows out of Gavins Point Dam recommended in the 2000 BiOp do not provide the intended physical attributes and biological effects. The recommended 2000 BiOp RPA flows were intended to restore and maintain sandbar and shallow water habitat, reconnect riverine and floodplain habitat, and provide for pallid sturgeon spawning cues below Gavins Point. Engineering studies show the recommended RPA spring rise flows would not be effective in building and maintaining additional habitat for terns and plovers or reconnecting the flood plain. Currently, there is scientific uncertainty about life cycle requirements, in particular pallid sturgeon spawning cues and the parameters of the sturgeon's spawning requirements (flows, temperatures, turbidity, habitat, etc.). Pallid sturgeon larvae have been sampled from the Missouri River in North Dakota and Missouri, indicating that some stretches of the Missouri River or its tributaries may have recently possess the necessary elements, which resulted in successful pallid sturgeon spawning. The Corps is therefore proposing a comprehensive research program to study these river reaches to determine the physical attributes that provide conditions resulting in successful sturgeon spawning. With respect to the low summer flows, engineering studies show that the recommended RPA summer low flows below minimum service levels would not be an effective means to attain significant amounts of additional shallow water habitat. In conclusion, the RPA flows out of Gavins Point Dam that are recommended in the 2000 BiOp do not provide the anticipated physical attributes and biological effects likely to avoid jeopardy to the species. Further, given the criteria that the alternative must be an action that can be implemented within the agency's authority, and in a manner consistent with the intended purpose of the action, e.g. operation of the Missouri Basin Projects to provide for the authorized project purpose of navigation, the flow components of the 2000 BiOp RPA may not comport with the criteria for an RPA. Based upon these factors, more fully described in this biological assessment, the Corps concludes that the 2000 BiOp RPA flows out of Gavins Point Dam are not reasonable and prudent based on the criteria described in Section I.A.

2. Based on the information obtained since the issuance of the 2000 BiOp, the Corps believes that this proposed action, rather than the flow regime called for in the 2000 BiOp RPA, will avoid jeopardizing the continued existence of all listed species. Alternative actions proposed by the Corps that can be taken in the near term to effectively conserve listed species and likely avoid jeopardy include, but are not limited to, accelerated habitat development, particularly throughout the BSNP; expanded and accelerated support to propagation efforts; a robust research, monitoring, and evaluation program (RM&E) that examines the multiple factors that may be limiting pallid sturgeon spawning and recruitment in all suitable reaches of the Missouri

River; and various flow tests at a number of project sites on the mainstem system. As noted earlier, implementing the variable flow releases associated with the RPA from Gavins Point Dam does not provide the necessary physical attributes, particularly those needed for the pallid sturgeon. As pointed out in the National Academy of Sciences' National Research Council (NRC) 2002 report entitled "The Missouri River, Exploring the Prospects for Recovery," because of the highly controlled and structured nature of the navigational portion of the Missouri River, providing a spring flood pulse in the absence of river-connective habitat is not likely to produce needed ecological benefits for those 734 river miles. Additionally, the existence of constructed habitat in the absence of changes in the hydrologic regime will likewise not render desired ecological benefits. The NRC 2002 report identified two essential shortcomings currently limiting the ability to make substantial progress toward the recovery of pallid sturgeon. First is the absence of sufficient river-connective, shallow water habitat in key reaches of the Missouri River. Second is the absence of necessary scientific information on the lifecycle requirements of the pallid sturgeon, and an understanding of the factors that are limiting spawning and recruitment. Hence, the rationale supporting the Corps' proposed action is straightforward: 1) initiate an aggressive and accelerated shallow water habitat development program on the BSNP, 2) initiate a robust RM&E program to gather as much scientific information as possible regarding the limiting factors to pallid sturgeon spawning and recruitment in the Missouri River, 3) initiate expanded and accelerated efforts to upgrade the capabilities of pallid sturgeon propagation hatcheries in order to augment the population with higher numbers and higher quality fish, 4) conduct a "3 year check-in," as described below, in order to assess scientific findings, progress and successes associated with other actions to make course adjustments, including potential flow adjustments from Gavins Point Dam.

3. An adaptive management approach to address critical scientific uncertainties and build upon current stakeholder efforts to develop a strategy to conserve the species will ultimately lead to greater success in recovery of the species and the ecosystem upon which they depend. This conclusion is derived from the NRC's 2002 report. The report underscores the importance of restoring river form and function and "natural river processes," and highlights adoption of an adaptive management approach, including broad stakeholder participation. The Corps proposes establishment of a Missouri River Recovery Implementation Committee (MRRIC). This approach builds upon the recommendations in the 2000 BiOp.

4. The Corps proposes to revisit the scientific findings of a robust RM&E program, the progress and success of accelerated habitat development, and other actions within three years of the issuance of a new BiOp is proposed. This is consistent with the adaptive management approach. Such a "3 year check-in" should be set within the context of a broad public forum involving a diverse array of stakeholders and other interested parties to examine scientific findings and determine changes and additional actions, as appropriate, to further enhance the conservation of listed species and the broader ecosystem values of the Missouri River.

5. Reinitiation of formal consultation is also required because of the recent designation of critical habitat for the northern Great Plains population of the piping plover with the USFWS. The USFWS designated critical habitat for the northern Great Plains population of the piping plover (67 FR 57638), including the Missouri River, in September 2002. On rivers, the physical primary constituent elements of the critical habitat include sparsely vegetated channel sandbars,

sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river. On reservoirs, the physical primary constituent elements include sparsely vegetated shoreline beaches; peninsulas; islands composed of sand, gravel, or shale; and their interface with the water bodies. The Corps believes critical habitat for piping plovers may be affected by several components of the actions listed in the 2000 BiOp as well as the proposed action in this BA. These actions include operation of the mainstem system, creation/maintenance of the emergent sandbar habitat, development of shallow water habitat, and various components of proposed RM&E efforts.

## II. ADAPTIVE MANAGEMENT FRAMEWORK

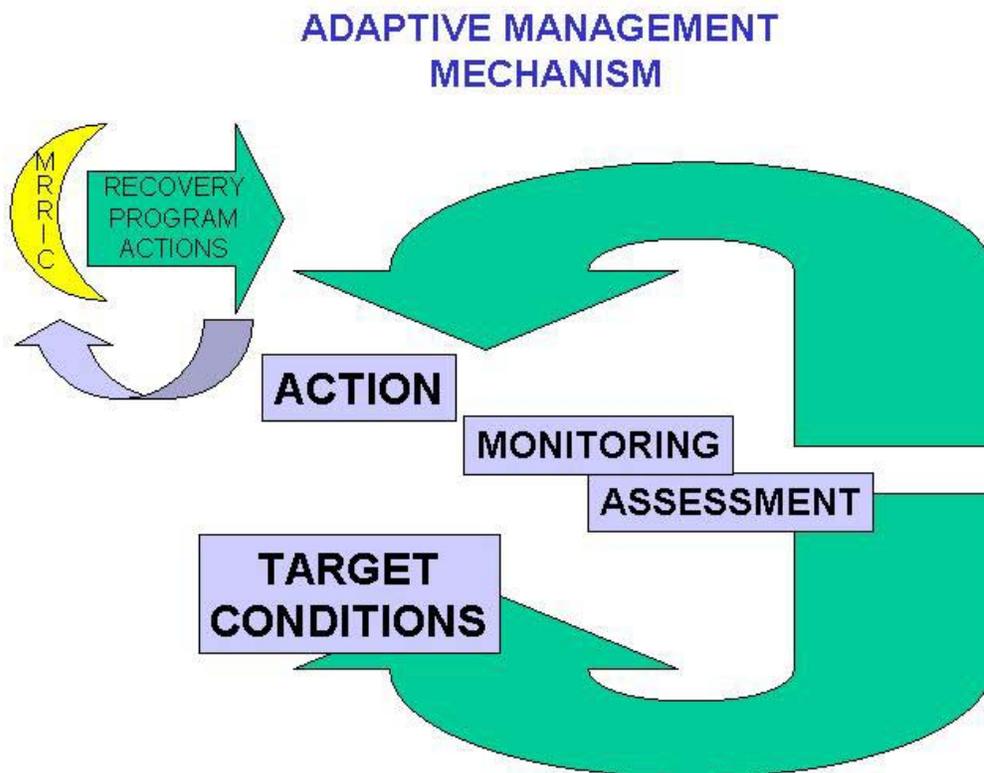
**A. Adaptive Management.** The 2000 BiOp recommended that the Corps adopt an adaptive management approach to implementing the various BiOp measures. The USFWS stated that the *“adaptive management framework is a particularly effective way to address multiple species, ecosystem variability, and biological unknowns about the lifecycles, behaviors, and habitat requirements of the listed species.”* The National Research Council in its January 2002 report also recommended that adaptive management be adopted as an “ecosystem management paradigm” for the Missouri River. Key components of the NRC 2002 report include broad stakeholder involvement, an independent scientific peer review process, and a collaborative process to “learn about successes, failures, and potential management actions that could be usefully implemented in the Missouri River ecosystem.” Further discussion of the NRC report and recommendations can be found in Appendix A, page 1.

The Corps embraces the concept of adaptive management. Adaptive management is not a new concept; but rather, a dynamic construct that is now commonly used throughout the world to help shape resource management decisions, policies, and approaches. There is an up-front recognition that all is not known about the complete life cycles and behaviors of species or their requisite habitat needs throughout their life cycles. Adaptive management is an overall strategy for addressing scientific uncertainty and modifying actions in response to new information. It promotes an environment for testing hypotheses and pursuing promising changes, based on sound scientific data and analyses.

Generally speaking, the adaptive management program envisioned by the Corps for the Missouri Basin Projects would: 1) aggressively implement on-the-ground actions to attain those physical and biological attributes that will result in beneficial effects for the listed species; 2) conduct a rigorous research effort to reduce the uncertainty surrounding essential attributes needed to insure the survival and recovery of listed species; and 3) adapt to the findings of an intensive and comprehensive monitoring and evaluation program. In carrying out the adaptive management approach to decision-making, some future actions may pose significant effects to the natural and/or human environment. In some cases, this may require that the Corps undertake an assessment of the effects in accordance with the National Environmental Policy Act (NEPA) prior to making any decisions to implement an action. The ultimate success of the adaptive management framework for the Missouri River Basin must also take into account that humans are integrated into the ecosystem and that natural ecosystems are not constrained within administrative boundaries and property lines.

**B. Missouri River Recovery Implementation Committee.** To effectively use the adaptive management approach, the Corps proposes the establishment of a recovery team, the Missouri River Recovery Implementation Committee (MRRIC), which will include broad and diverse stakeholder representation to ensure that public values are incorporated into recovery implementation. MRRIC will provide recommendations to the Federal agencies regarding recovery implementation and will be developed cooperatively with entities having an interest in recovery of listed species and the ecosystem on which they depend. Representation on MRRIC will include the full spectrum of basin interests. Committee membership will be comprised of representatives of Tribal and State governments and of non-governmental organizations that have an interest in the management of the river and recovery of the species and Missouri River ecosystem values.

The adaptive management framework and the establishment of the MRRIC are consistent with all applicable federal and state laws, American Indian trust responsibilities, and interstate compacts and decrees. The Corps recognizes that the USFWS and the Corps each have statutory responsibilities that cannot be delegated, and the establishment of MRRIC is not intended to abrogate any of the statutory responsibilities of the agencies. The Corps advocates that the MRRIC be a partner in recommending applicable future actions to be taken to benefit the listed species in the Missouri River. Consistent with this adaptive management framework, the Corps will adjust actions based on scientific findings and, when applicable, recommendations of the MRRIC. It is anticipated that basin establishment of the MRRIC will require a considerable amount of time. The structure of MRRIC itself will be the subject of adaptive management. A conceptual diagram of an adaptive management strategy to include the MRRIC follows.



The above discussion is a broad overview of an encompassing and dynamic adaptive management strategy. In reality, adaptive management would occur at several levels ranging from broader ecosystem management activities to day-to-day operations. For example, the ecosystem and species recovery actions will be the focus of the MRRIC. Whereas in the day-to-day operation of the mainstem system, the Corps communicates in real-time with the USFWS, other Federal, State, and local entities, basin Tribes, and numerous stakeholder organizations and individuals. Most of the real-time adjustments to system operations are not expected to be subject to consideration by the MRRIC. These day-to-day interactions will continue and are essential to effective real time operation of the mainstem system.

### III. FLOW MODIFICATIONS

A. **Description of the 2000 BiOp RPA.** The 2000 BiOp states:

*Flow modifications at Gavins Point are needed to provide an ecologically improved hydrograph in the lower Missouri River (Galat 1999, Hesse, 1999). Such flows would restore and maintain sandbars and shallow water areas that serve as nesting and foraging habitat for least terns and piping plover, as well as nursery habitat for pallid sturgeon and other native fishes; trigger spawning activity in pallid sturgeon and other native fishes; and reconnect potential riverine and floodplain habitats inundating side channels, backwaters, and other off-channel areas needed as spawning and nursery areas for pallid sturgeon and forage fishes, as well as providing additional foraging areas for terns and plovers.*

In this section of the BA, information is presented from Corps engineering studies and analyses demonstrating that the flow modifications at Gavins Point Dam set forth in the 2000 BiOp RPA do not provide the intended physical attributes and biological effects originally thought, and therefore do not insure the Corps' action is avoiding the likelihood of jeopardizing the continued existence of the species. The Corps recognizes the importance of river hydrology on ecosystem health, however we do not propose to adopt the flow recommendations in the 2000 BiOp RPA without: 1) development of scientific information demonstrating flow measures that will provide the conditions the USFWS believes are necessary to provide sturgeon spawning cues, create new habitat, and reconnect the floodplain; and 2) an adequate monitoring program in place to measure biological responses (e.g. spawning and recruitment). Rather than implementing the flow measures called for in the 2000 BiOp from Gavins Point Dam, the Corps proposes actions to attain the habitat related objectives and attributes intended by the RPA by other measures and to continue gathering additional scientific information to make future decisions on Gavins Point flows.

**B. Explanation as to Why the Corps Does Not Consider 2000 BiOp RPA Flow Measures to be Reasonable and Prudent.**

1. **Habitat Creation.** The habitat related objectives of the RPA for Gavins Point flows were to: 1) restore, maintain, and create sandbar habitat for terns and plovers; 2) reconnect riverine and floodplain habitats; and, 3) increase the amount of shallow water habitat for pallid sturgeon. As discussed below, the Corps' technical analyses of the RPA flows show that these flows will not achieve the intended outcomes.

a. **Restore, Maintain, and Create Sandbar Habitat for Terns and Plovers.** Since the issuance of the 2000 BiOp, the Corps evaluated the RPA flows to determine their effectiveness in restoring, maintaining, or creating sandbar habitat for terns and plovers. The Corps' engineering analysis of the alluvial geomorphic process of the reach below Gavins Point Dam concludes the RPA flows would likely accelerate erosion of sandbars beyond that of the Current Water Control Plan (CWCP), and would not provide for a complimentary scouring/sandbar building event. It is important to realize that a change in the present alluvial processes will require a change in the dominant discharge class. The dominant discharge is that discharge (or discharge class) that transports the majority of the bed material sediment load. Determining the dominant discharge class requires flow-duration data and an adequate relationship between river discharge and sediment transport. Considering the sediment discharge rating curve for the Sioux City area and the flow-duration curve under the RPA, the slight shift in the discharge class caused by the spring rise would be insufficient to scour and maintain high elevation barren sandbars. The Corps' studies also show that the long-term net result of the RPA flows would be less available habitat. Further discussion of the engineering analysis can be found in Appendix A, page 3.

b. **Connectivity to Low-Lying Lands.** As stated in the 2000 BiOp:

*Floodplain connectivity refers to the seasonal flooding of areas adjacent to the river. The spring flood pulse often provides connectivity between the floodplain and the river. For native river fish like the pallid sturgeon, this floodplain connectivity, especially during May/June, provided spawning areas for forage species, increased phytoplankton production, and redistributed carbon to the river.*

This carbon, in the form of detritus scoured off of the floodplain, settled out in the shallow water areas along the river where the microscopic biota grew. As the pallid sturgeon hatched, the larval fish would float down the river until they were able to float into the shallow water areas, where they would reside during their fragile first months of life.

To better understand how much floodplain connectivity may be occurring along the lower river from Sioux City to the mouth, the Corps estimated the acreage and elevation of the low-lying lands (areas adjacent to oxbow lakes and chutes) that could be inundated by higher river flows. This information was then correlated with modeled flows under the CWCP and the 2000 BiOp RPA flows. The months of May and June were chosen because this is when a spring rise would normally occur. Duration plots of acres inundated versus percent of time were then generated. In

conclusion, the gains in connectivity in the low-lying areas with spring rise flow increases are relatively minor. In fact, there is effectively no increase in value downstream of the Omaha reach. By adding a spring rise of 20 kcfs, the gain in connectivity for the Missouri River from Sioux City to the St. Louis, a distance of 734 river miles, is estimated at 164 acres. Without additional habitat creation in the lower river, the spring rise will have minimal effectiveness in reconnecting the floodplain. This conclusion is supported by the NRC's commentary that hydrologic connections between river channel, floodplain, and backwater areas have been greatly disrupted. Further discussion of the floodplain connectivity analysis can be found in Appendix A, page 8.

**c. Shallow Water Habitat Along the Lower River and Summer Flows.** In its BiOp, the USFWS states that shallow water habitat has value to all life stages of native big river fish and other river organisms. Shallow water habitat is likely important during the first few months of the life of the larval pallid sturgeon. The Corps and USFWS agreed during the formal consultation for, and the review of, the 2000 BiOp, that 20 to 30 acres of shallow water habitat per mile may provide the habitat necessary for recovery of pallid sturgeon.

An analysis of existing shallow water habitat under the 2000 BiOp RPA flows and CWCP was conducted using data obtained from the physical habitat model developed by the Corps. As part of the development of that model, cross-sections were taken at a representative sub-reach of seven reaches of the lower river and hydraulically modeled. These data provided a basis for determining the amount of habitat fitting into a variety of depth and velocity classes for each of the seven reaches (habitat per mile times reach length). Shallow water habitat for the purpose of this analysis is habitat that is up to 5 feet deep with a velocity no greater than 2.5 feet per second. The amount of habitat in each depth and velocity class could be determined based on the amount of flow in each river reach. Using these relationships, the Corps developed a model that would provide duration plots of the acres of habitat per mile in each reach for any time frame of interest. The conclusion was that the 2000 BiOp RPA summer low flow releases from Gavins Point Dam would increase the shallow water habitat in Missouri River from Sioux City to the confluence with the Osage River, an approximate distance of 600 river miles, an estimated 1,200 acres (from an estimated 3,700 acres to 4,900 acres). This additional 1,200 acres of shallow water habitat does not meet the identified goal of approximately 12,000 acres (based on 20 acres per mile for that portion of the Missouri River). Further discussion of the shallow water habitat analysis for the lower river can be found in Appendix A, page 11.

**2. Spawning Cue in the Lower River.** The 2000 BiOp RPA recommends a spring rise in flows from Gavins Point Dam to provide important physical attributes and biological conditions including a spawning cue for native river fish, especially the endangered pallid sturgeon. The 2000 BiOp RPA specifies a modified release pattern that has a spring rise of 15 to 20 kcfs above the full navigation service level on average of once every three years. The duration of this release is 2 weeks at its peak and a total duration of 4 weeks including the period over which the releases are gradually increased and decreased.

USFWS and Corps staff acknowledge that the parameters of the pallid sturgeon spawning requirements (flows, temperatures, turbidity, habitat, etc.) are currently not known. Pallid sturgeon larvae have been sampled from the Missouri River in North Dakota and Missouri

indicating that some stretches of the Missouri River or tributaries may have recently possess the necessary habitat and flows resulting in successful pallid sturgeon spawning. For instance, monitoring of the Missouri River downstream of Fort Peck Dam and the confluence with the Yellowstone River in 2002 found two larval pallid sturgeon. A comparable population assessment program is just beginning for the lower Missouri River below Gavins Point Dam to determine whether or not a spring rise component would result in successful spawning of pallid sturgeon. Additionally, an analysis of modeled flows at different locations on the lower Missouri River indicates that a spring rise of various magnitudes and durations is occurring. In the proposed research, monitoring and evaluation program, these areas would be studied to determine if spawning is occurring. Further discussion of this analysis can be found in Appendix A, page 17. The Corps believes it is essential to address the scientific uncertainties associated with the relationship between flow releases and spawning cues to insure the action avoids the likelihood of jeopardizing the continued existence of the species.

**C. Description of the Corps' Alternative to the Gavins Point RPA (Proposed Action).** It is important to recognize that the USFWS and the Corps are in agreement on the habitat attributes necessary to conserve listed species on the Missouri River as described in the 2000 BiOp. However, as previously described, the flow measures prescribed for Gavins Point Dam in the 2000 BiOp will not achieve these desired attributes. Consequently, the Corps is proposing a series of alternative near term and long term actions it believes will benefit and conserve listed species and avoid jeopardizing their continued existence. Such actions include modified Missouri River Mainstem Reservoir System (System) operations; a robust research, monitoring, and evaluation (RM&E) program to examine the multiple factors that may be limiting pallid sturgeon spawning and recruitment in all suitable reaches of the Missouri River; various flow tests at certain projects on the mainstem system; accelerated shallow water habitat development; and expanded support for propagation efforts. The Corps is also proposing, consistent with the proposed adaptive management approach, that the scientific findings associated with the RM&E program, the progress and success of accelerated habitat development, and other actions be revisited within three years of the issuance of a new BiOp to examine scientific findings and determine changes and additional actions, as appropriate, to further enhance the conservation of listed species and the broader ecosystem values of the Missouri River.

**1. Proposed System Operations.** The operation of the System is designed to serve Congressionally authorized project purposes, including flood control, hydropower, water supply, water quality, irrigation, navigation, recreation, and fish and wildlife. During periods of drought, service to all authorized purposes is maintained, though at reduced levels.

This proposed action measure has two basic flow features that are changed from the CWCP. First, more stringent drought conservation or retention of water in the upper three reservoirs is included. Second, a set pattern of intrasystem unbalancing is included. Also described in this section are proposed options for summer operations.

**a. Drought Conservation Measures.** During extended drought periods, or those lasting more than 1 year, navigation service would be reduced earlier under the proposed action than it is under the CWCP. This would allow more water to be stored in the upper three reservoirs. During the more severe droughts, such as the 1930 to 1941 drought, releases for

navigation would be curtailed at a higher total System storage level than under the CWCP. This proposed action measure was not specified in the USFWS 2000 BiOp RPA; however, all modeling conducted for the USFWS as it prepared the BiOp included more stringent drought conservation measures.

The drought conservation criteria included in the proposed action consists of “guide curves” for the determination of flow support for navigation and other downstream purposes and navigation season length. Under the proposed action, the navigation service level and season length would be reduced at higher system storage levels than they are currently under the CWCP. The March 15 System storage level at which navigation would not be served for that year was raised from 23.5 million acre-feet (MAF) under the CWCP to 31 MAF under the new drought conservation measures for this proposed action measure. Figures 1 through 3 compare the drought storage levels and the corresponding navigation service levels and season lengths of the CWCP and proposed action.

Comparison of Drought Conservation Measures  
15 March Storage Check (MAF) – Flow Support

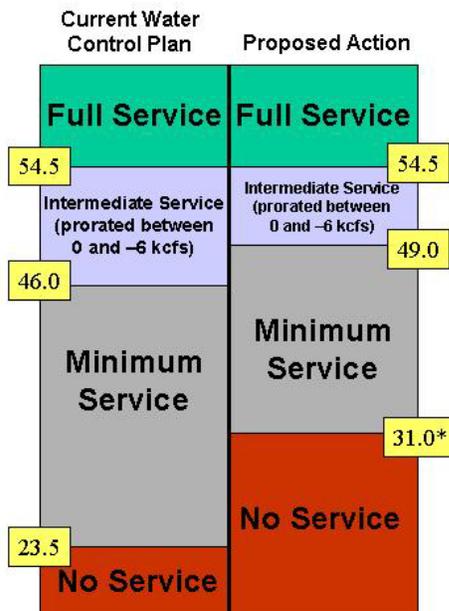


Figure 1. Comparison of drought conservation measures between the CWCP and the System operations under the proposed action based on the March 15 System storage check for Service Level.

Comparison of Drought Conservation Measures  
1 July Storage Check (MAF) – Flow Support

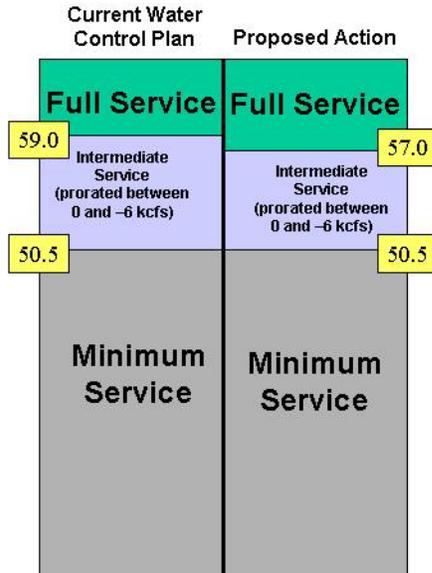


Figure 2. Comparison of drought conservation measures between the CWCP and the System operations under the proposed action based on the July 1 System storage check for Service Level.

Comparison of Drought Conservation Measures  
1 July Storage Check (MAF) – Season Length

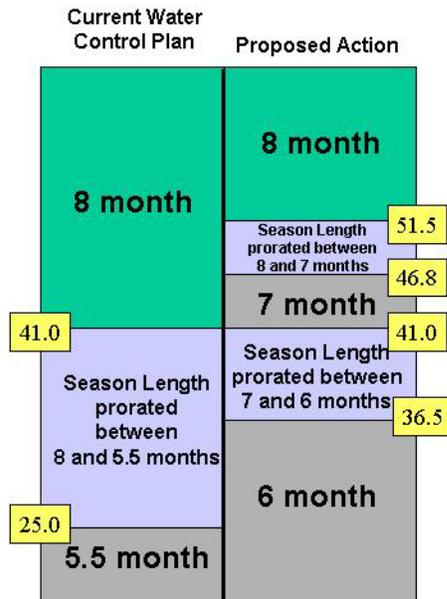


Figure 3. Comparison of drought conservation measures between the CWCP and the System operations under the proposed action based on the July 1 System storage check for Season Length.

The proposed water control plan presented in this BA calls for suspension of navigation service if System water-in-storage (storage) is at or below 31 MAF on 15 March of any year. It should be noted that the occurrence of System storage at or below 31 MAF would most likely coincide with a national drought emergency. If any of the reservoir regulation studies performed for the development of the Annual Operating Plan (AOP) indicate that System storage will be at or below 31 MAF by the upcoming 15 March, the Corps will notify the Secretary of the Army. Approval from the Secretary of the Army will be required prior to implementation of back-to-back non-navigation years. The Corps will ensure that basin stakeholders are promptly informed of the notification to the Secretary of the Army and of the Secretary's decision regarding suspension of navigation.

Table 1 compares the lowest elevations that would have occurred under the CWCP and this proposed action measure for each of the upper three lakes during the 1987 to 1993 drought. The figure also contains the minimum storage for the CWCP if the current drought conservation measures had been strictly followed. Inclusion of these measures would increase total system storage from 40.2 to 42.1 MAF for this proposed action measure during a similar drought.

Table 1. Lowest lake levels for the 1987 to 1993 drought (ft msl).

Lake	CWCP	Proposed Action
Fort Peck Lake	2,206	2,208
Lake Sakakawea	1,813	1,817
Lake Oahe	1,585	1,587

**b. Unbalancing of the Upper Three Lakes.** The Corps has the authority under the existing Master Manual and currently implements intrasystem unbalancing. Unbalancing of the lakes was also included as a feature of the 2000 BiOp RPA. Unbalancing under this proposed action consists of a set pattern of purposefully lowering one of the upper three lakes approximately 3 feet to allow vegetation to grow around the rim, and then refilling the lake to inundate the vegetation. The unbalancing would rotate among the three lakes on a 3-year cycle. Movement of water among the lakes as they are lowered and refilled provides benefits to fish and birds in both the intervening river reaches and the lakes. Higher spring releases will fill the downstream reservoir and provide a rising lake level for game and forage fish spawning. The subsequent 2 years of lower flows would expose sandbar habitat for use by the protected birds. Unbalancing would also provide more bare sandbar habitat around the perimeter of the lakes for the birds. In subsequent years, the inundated vegetation around the perimeter would be used by adult fish for spawning and by young lake fish hiding from predators.

Intrasystem unbalancing would be implemented in those years when there is not an excessive amount of flood control storage utilized or significant drawdown of the lakes due to severe drought conditions. To the extent possible, based on hydrologic conditions, a 3-year cycle would be followed for lowering the water level about 3 feet below normal the first year, followed by a refill of the lake to about 3 feet above normal the second year and declining lake levels (a “float” year) the third year. This 3-year cycle would be rotated among the upper three lakes on an

annual basis so that each year one lake is high, one is low and the third is floating. Table 2 describes the 3-year cycle of lake unbalancing.

**Table 2. Unbalancing Schedule for Upper Three Lakes**

	Fort Peck		Garrison		Oahe	
	March 1	Rest of Year	March 1	Rest of Year	March 1	Rest of Year
<b>Year 1</b>	High	Float	Low	Hold Peak	Raise and hold during spawn	Float
<b>Year 2</b>	Raise and hold during spawn	Float	High	Float	Low	Hold Peak
<b>Year 3</b>	Low	Hold Peak	Raise and hold during spawn	Float	High	Float

During the low year at a lake, the goal of the Corps would be to begin the runoff season on March 1 with a low lake elevation with respect to the other two upper lakes. Ideally, the lake would rise during the lake fish spawn and then hold the peak lake level for the remainder of the year. The following year, the high year, the lake would begin the runoff season high with respect to the other lakes, rise during the fish spawn, and then float downward during the remainder of the year. The float year, or third year, the lake would rise during the fish spawn and then drift downward for the remainder of the year so that it is in position to be at a low elevation the following year as the cycle repeats.

**c. Gavins Point Dam Summer Releases.** Summer releases under the proposed action will be adjusted when the Corps determines that birds have begun nesting. Flow support for navigation and other downstream purposes would be provided by adjusting releases as needed throughout the summer as tributary inflow varies to meet targets (flow-to-target); by providing a steady, flat release during the tern and plover nesting season at the flow level estimated to provide the desired navigation service support in August when tributary inflows have declined (steady-release); or by some combination of the two methods, as was implemented during the 2003 nesting season (steady-release – flow-to-target). The modeling done for the Missouri River Master Manual Review and Update process used a flat 28.5 kcfs as an estimate of the release needed to provide minimum service support, and 34.5 kcfs for full service support; however, the actual release would vary based on the hydrologic conditions at the time.

Adaptive management will be used to make decisions about the method to use during any given year and will be based on runoff, habitat availability, fledge ratios, and population conditions at that time. For example, if a moderately high runoff year is anticipated and sufficient habitat exists, a flat release may be used because, in general, it would evacuate more water during the summer months than would be released by following targets. If, on the other hand, the upper basin is experiencing a moderate to severe drought and the upper three large lakes are low, a flow-to-target or steady- release – flow-to-target operation may be followed through the summer season to conserve water in the system.

The evacuation of floodwaters would be delayed until mid-September whenever possible to minimize the impacts to the young-of-year native river fish. This delay may be done independently in any year flood water evacuation is needed after the nesting season, or in conjunction with one of the flow tests proposed as part of the proposed action. Additional

measures to minimize losses of the two listed bird species are taken by the Corps. Further details regarding these measures can be found in Appendix B, page 6.

**2. Research, Monitoring, and Evaluation.** As indicated above, the Corps proposes to operate the System using adaptive management including a robust research, monitoring and evaluation (RM&E) program and a re-evaluation of the science on flow modifications and other potential actions in three years.

**a. Comprehensive Pallid Sturgeon Research Project.** Research to determine the critical ecological factors that contribute to successful pallid and shovelnose sturgeon reproduction and survival in the Missouri River will include laboratory and field research. This research will provide new information on the physiology of reproduction and growth, survival across the life stages, status of populations, and taxonomy for sturgeon in the Missouri River, including quantitative assessment of how biology, hydrology, and water quality combine to provide suitable habitat and resources over a considerable spatial and temporal scale.

While a variety of factors have been suggested as contributing to the viability of pallid and shovelnose sturgeon, the significance and interaction of flow-related factors (such as hydrologic cues, temperature, turbidity, depth, and velocity) with in-channel habitat features and other factors (such as nutrition, competition, predation, productivity, water quality and contamination) is uncertain. An objective assessment of how multiple life stages and essential activities of the two sturgeon species respond to a range of potential stressors will provide rigorous and credible information for use in resolving the many issues surrounding pallid sturgeon recovery actions. This research is intended to provide the best understanding of sturgeon responses as functions of management variables, thereby providing stakeholders with an improved understanding of tradeoffs among management alternatives. Further details regarding the comprehensive research activities can be found in Appendix B, page 19.

**b. Regional Population Assessments**

**1) Interior Least Tern and Piping Plover.** In addition to the population assessment and monitoring efforts on the Missouri River being conducted in response to the 2000 BiOp, the Corps will develop and support a regional coordination process for the Missouri River piping plovers and least tern subpopulations. It has become apparent that if successful management actions are to occur for these species on the Missouri River the dynamics of their larger population structure must be understood. Greater understanding of regional population interactions such as immigration/emigration, source/sink populations, and seasonal presence/absence would provide greater sensitivity in assessing the long-term prospects for species persistence and allow more informed management decisions. Further information regarding this proposed action can be found in Appendix B, page 23.

**2) Pallid Sturgeon.** The pallid sturgeon in the Missouri River is part of a larger population that may extend to the middle and lower Mississippi River. If successful management actions are to be successful on the Missouri River, the dynamics of the larger population structure must be understood. Population parameters such as recruitment, survival and mortality must be understood and the role each river system and segment plays in the overall

success of the species must be determined. The Corps is currently involved in determining these parameters for Mississippi River pallid sturgeon populations and will coordinate population assessment studies done on the Missouri River to insure a broader regional assessment can be conducted.

c. **Flow Tests.** Due to the extent of required habitat, considerable new habitat will need to be created. Three tests would be conducted to determine the extent to which additional habitat can be constructed with flows into Lewis and Clark Lake, in the river reach downstream from Gavins Point Dam, and to determine if constructed sandbars can be conditioned to provide better habitat for the least terns and piping plovers.

1) **Gavins Point Reach Fall Test.** In the fall a flow test will be run in the river reach downstream from Gavins Point Dam after refill of the system following the current drought, and would be conducted when evacuation of the system is necessary. The test will consist of a release of approximately 60 kcfs for a period of approximately 60 days. The exact magnitude and duration of the test will be determined through pre-test investigations and public input. The test would be monitored for physical changes in sandbar distribution and characteristics in the reach of the river from Gavins Point Dam to Ponca State Park. Representative island/bars will be monitored to determine the factors that limit the initiation of scour, and tests would be performed on techniques that may aid the scouring process, e.g., vegetation removal prior to the test discharges, physical conditioning (i.e., disking) prior to the test, etc. This would increase the total amount of bare sandbar habitat in this reach and would allow for a redistribution of the habitat. This test would also provide a greater understanding of the benefits/impacts associated with any alternative release scenario from Gavins Point Dam. Further discussion of this flow test can be found in Appendix B, page 10.

2) **Fort Randall Reach Fall Rise.** A second flow test that includes a fall rise out of Fort Randall Dam will also be conducted. This action would consist of producing a controlled rise in releases from Fort Randall Dam, preceded by a lowering of the pool in Lewis and Clark Lake. This test would be conducted after Labor Day. The purpose of the rise is to further define sediment-flushing parameters and to modify the sediment deposits in the delta area. This would increase the amount of least tern and piping plover habitat in the reach below Fort Randall Dam and will further the understanding of the sediment flushing requirements. The releases from Fort Randall Dam could be as high as 60 kcfs, and the pool at Lewis and Clark Lake could be as low as 1180 feet mean sea level (ft-msl). The length of the test would depend on the rate that the Lewis and Clark Lake pool is refilled, which depends on the release rate from Gavins Point Dam. The test could be conducted at the same time as the fall rise test downstream from Gavins Point Dam, or it could be conducted independently. If it were run with the Gavins Point Dam fall rise, the duration could be up to 60 days. If it were run by itself, the estimated test length is 5 days. The exact magnitude and duration of the test will be determined through pre-test investigations and public input. Further discussion of this flow test can be found in Appendix B, page 11.

3) **Gavins Point Spring Sandbar Habitat Conditioning.** A third flow test, conditioning of constructed sandbar habitat, will be conducted downstream from Gavins Point Dam. Before running this test, new sandbar habitat would be constructed following the fledging of the least terns and piping plovers. As releases from Gavins Point Dam are increased the

following spring to meet the navigation service requirements, there will be additional releases in excess of those planned to serve navigation such that the new sandbar habitat would be inundated for a day or two. This is intended to consolidate the substrate and potentially mix organic material in the surface layer. The objective of this test is to determine if there is a difference in least tern and piping plover productivity between the conditioned habitat and the habitat that is constructed and not inundated. Further discussion of this flow test can be found in Appendix B, page 12.

4) **Fort Peck Tests.** The 2000 BiOp included release changes from Fort Peck Dam as a component of the RPA. Prior to full implementation of this release change, the RPA included two tests, the “mini test” and the “full test.” The Corps’ proposed action includes conducting these two tests. Preliminary biological data collection is essential to determine the responses and effects of the “mini” and “full tests” on pallid sturgeon and the target species that have been selected for this effort, and will provide science critical to recovering fish populations throughout the Missouri River Basin. After assessment of the results of these tests, and through the adaptive management framework, the Corps may implement a Fort Peck Dam release change as a component of System operations. However, this would require revision of the Water Control Plan. Additional information on the planned Fort Peck tests can be found in Appendix C, page 1.

### 3. Accelerated Actions to Benefit the Species.

a. **Shallow Water Habitat.** The Corps proposes to accelerate the construction of shallow water habitat surpassing the short-term goals recommended in the 2000 BiOp. This action will be taken in the lower river from Ponca State Park to the mouth. Additional information on existing and planned habitat development can be found in Appendix B, page 18.

b. **Propagation Support Improvements.** Pallid sturgeon propagation efforts had limited success when the 2000 BiOp was written. An understanding of rearing densities specific to pallid sturgeon had not been developed, and the design of existing facilities was similar to West Coast hatcheries propagating white sturgeon for commercial markets. Through experience, fish culturists now know the pallid sturgeon must be reared at very low densities to achieve normal growth and minimize the potential for disease outbreaks. The 2000 BiOp did not address specific needs related to infrastructure and facility improvements that may limit the population augmentation component of recovery. Additionally, since the completion of the 2000 BiOp, stocking plans have been revised utilizing more liberal stocking rates to supplement the year classes that are absent as a result of a lack of natural reproduction/recruitment and severely depressed wild populations. The USFWS and the Corps have prioritized a list of facility improvements with an emphasis on increasing production capabilities while improving water quality and water reliability to propagate pallid sturgeon of the highest quality possible. To achieve the increased production levels and improve the overall health of the progeny produced from the population augmentation program, the Corps proposes a series of expansions and/or modifications to hatchery facilities on an accelerated schedule.

In addition the Corps proposes an accelerated brood stock collection program to facilitate direct, intensive collection efforts by state and federal agencies to capture the genetic stocks that inhabit

the lower river. Specific efforts directed toward brood stock collection are essential to capture and represent the genetic variability and diversity of pallid sturgeon in the lower river. Successful collection, spawning, rearing, and stocking will partially offset the lack of natural reproduction and would help ensure these genetic stocks are perpetuated in the wild while solutions to habitat loss are addressed through the various means of habitat restoration (i.e., shallow water habitat projects). Further information on planned activities can be found in Appendix B, page 12.

4. **Three-Year Re-evaluation.** Consistent with the adaptive management approach, the Corps proposes that the status of the species, the scientific findings of the proposed robust RM&E program, the progress and success of other implemented measures to date, and other relevant new information be re-evaluated within 3 years following the issuance of a new BiOp. This re-evaluation will inform decisions concerning implementation of additional measures or modification of existing measures and strategies, including potential flow releases out of Gavins Point Dam. The “3 year check-in” would include input from The Missouri River Recovery Implementation Committee (MRRIC) to promote conservation of listed species and the broader ecosystem values of the Missouri River.

**D. Discussion of Effects.** This section of the BA provides the Corps’ assessment of the effects of the proposed action on the five listed species on the Missouri River. These include the pallid sturgeon, least tern, piping plover, bald eagle, and Indiana bat. Specifically, the effects of the proposed System operation changes, the RM&E Program, and the accelerated actions to benefit species are assessed.

#### 1. Pallid Sturgeon.

a. **System Operation Changes:** The proposed action includes two basic flow features that are changed from the CWCP: more stringent drought conservation measures and the establishment of an intrasystem unbalancing pattern. Also described in the proposed action are proposed options for summer operations.

1) **Drought Conservation Measures.** The drought conservation measures, aimed at conserving water during critical drought periods, will generally result in reduced flows below Gavins Point Dam earlier in the drought cycle. These lower flows will typically occur during the summer and fall months. The effects of this action on pallid sturgeon are not completely understood, however, with reduced flows there may be additional shallow water habitat in some reaches. The impact on shallow water habitat will vary year to year depending on the uncontrolled runoff from tributaries.

2) **Unbalancing of the Upper Three Lakes.** The effects of unbalancing the upper three reservoirs will have no effect on pallid sturgeon below Gavins Point. For the Fort Peck reach, the effects would vary year to year. In years when the project is refilling, releases from Fort Peck would be reduced and in other years, releases would be increased. Over time, it is expected that this operation would not adversely affect pallid sturgeon in the Fort Peck reach.

3) **Gavins Point Summer Releases.** Releases from Gavins Point Dam have been steady-release, flow-to-target or a combination of the two. The potential effect on approximately 800 miles of the Missouri River downstream of Gavins Point Dam from a flow-to-target would vary from year to year. Depending on channel configuration and tributary inflow, the amount of shallow water habitat available for use by young-of-the-year fish as refugia and nursery will be reduced in some parts of the river while other parts will increase.

b. **Research, Monitoring, and Evaluation:** Even though the knowledge base regarding the pallid sturgeon has been rapidly improving during the past decade, much of the basic life history is still unknown for the species. Although field sampling efforts have detected limited spawning success, much of the current understanding is inferred from studies and observations of other sturgeon species or other native big river fish species. The Middle Basin Pallid Sturgeon Recovery Work Group recently identified the top five recovery needs as follows:

- Locate, quantify, and characterize pallid sturgeon spawning area, frequency, and behavior
- Locate, define, and characterize/quantify juvenile and rearing habitat
- Determine habitat use by larval pallid sturgeon
- Evaluate habitat restoration projects and efforts
- Locate, define, and characterize adult pallid sturgeon habitat

Documented information concerning the functioning of the Missouri River ecosystem and the habitat requirements needed for survival of pallid sturgeon is extremely limited. The proposed action will provide for a significant pallid sturgeon RM&E program seeking to acquire information and an understanding of the pallid sturgeon biological requirements, filling data gaps, and providing much needed information to guide research, management, and future recovery of the pallid sturgeon.

This RM&E Program will include studies to: 1) identify the causes for lack of reproduction, lack of recruitment, and hybridization; 2) identify and map the location of gravel/cobble/rock substrates that may provide potential spawning habitat for sturgeon within the prioritized river segments; 3) and investigate modifications to river channel structures to maintain and improve aquatic habitat diversity. This RM&E will include investigating areas with existing spring rises and significant amounts of shallow water habitat to locate pallid sturgeon spawning areas and quantify spawning requirements for the species. Data collected by this RM&E program is critical for the survival of the pallid sturgeon. This new information will be used in the adaptive management strategy to inform the recovery decision-making process. As part of the RM&E for all listed species, four flow tests are proposed.

1) **Gavins Point Fall Test.** The proposed action includes a pulsing 60,000 cfs test for 60 days to assess the effects on the physical structure of the island sandbar habitat from Gavins Point to Ponca for the benefit the listed terns and plovers. The effects of the flow test may be detrimental to larval and young of the year sturgeon. During the fall, the juveniles are at a critical stage in development and increasing flows at this time could affect their ability to hold station and may affect food availability. Also, these changes to the environment have the

potential of negatively impacting the sturgeon populations. Monitoring of the effects to pallid sturgeon will be part of the test.

2) **Fort Randall Fall Release.** This test would release water in the fall to inundate island and sandbar habitat. The proposed action is to pulse up to 60,000 cfs for 5 to 60 days. The purpose of the test would be to redistribute sandbar complexes below Fort Randall to benefit listed terns and plovers. The potential effects on the pallid sturgeon could be both positive and negative. Additional shallow water habitat will be created, which would be beneficial to pallid sturgeon, while increased flows may adversely affect any juvenile fish present during the operation because of the same considerations set forth for the Fort Gavins Point Fall Test.

3) **Gavins Point Spring Habitat Conditioning.** The proposed 1-2 day spring pulse will have positive effects on the pallid sturgeon as it will bring nutrients into the aquatic environment. Depending on the magnitude of the pulse, the ecological benefits range from insignificant to significant.

4) **Fort Peck Tests.** These tests are designed to provide positive effects to the sturgeon. The “mini test” is designed to test the efficacy of conducting longer-term pulse flows. The “full test” is designed to provide hydrograph attributes (turbidity, temperature, and volume) to determine biological responses from the sturgeon and other native fishes. This proposed action has positive effects on the pallid sturgeon and will provide valuable information for the adaptive management process.

#### c. **Accelerated Actions to Benefit Species**

1) **Hatchery Facility Improvements:** In addition to continuing the pallid sturgeon propagation and augmentation program, this measure will include improvements to existing pallid sturgeon hatchery facilities. It is anticipated that these hatchery improvements will increase pallid sturgeon production capabilities to fully meet all stocking requirements for the Missouri River basin. This will provide a beneficial effect to the pallid sturgeon by increasing the number of pallid sturgeon in all Recovery Priority Management Areas as identified in the Pallid Sturgeon Recovery Plan and the 2000 BiOp. This measure will also accelerate the collection of pallid sturgeon broodstock. This will enable the state and federal agencies to direct intensive collection efforts to capture the genetic stocks that inhabit the lower basin. Broodstock collection is essential to preserve the remaining genetic variability of pallid sturgeon in the Lower River. Successful collection, spawning, rearing, and stocking will ensure that these genetic stocks are not lost and prevent extirpation of existing pallid sturgeon populations in the Missouri River.

2) **Accelerated Shallow Water Habitat Construction:** In its 2000 BiOp, the USFWS states that shallow water habitat is valuable to all life stages of native big river fish and other river organisms. Shallow water habitat is thought to be especially important during the first few months of the life of the larval pallid sturgeon. The BiOp concluded 20 to 30 acres of shallow water habitat per mile is necessary to preclude jeopardy to the pallid sturgeon with an

interim goal of approximately 2,460 new acres by 2010, and a long-term goal of 8,180 new acres by 2020 (based on acquiring 20 acres per mile from Sioux City to the Grand River).

The Corps proposed action accelerates the creation of shallow water habitat resulting in a total of 5,870 acres of new shallow water habitat in the lower river by the year 2010. This accelerated habitat development will exceed the 2000 BiOp habitat goal for 2010 by nearly 3,300 acres. This will result in meeting the long-term shallow water habitat goal of 20 acres per mile from the Osage River to the mouth and nearly reaching the goal from Kansas City to the Osage River. Substantial gains will be made in the river reaches upstream from Kansas City. The Gavins Point reach already has 63 acres/mile, which is sufficient shallow water habitat.

Shallow water habitat is an indicator of the diversity of in-channel habitat conditions. A wide range of depth and velocity distributions and macro-habitat characteristics, such as emergent sandbars, side channels, sandbar pools, etc., were characteristic of the pre-channelized Missouri River. A dynamic alluvial process created and maintained these habitat types. The development of a more dynamic alluvial channel through this measure will provide greater diversity of depth and velocities over a wider range of flows. Further, the increased alluvial process will provide for an erosion/deposition pattern that will reflect the seasonal/annual variation of run-off and stage. The increase in shallow water habitat and the resulting alluvial process resulting from this measure may provide important habitat for early life stages of pallid sturgeon and other native riverine fish.

**d. Conclusion on the Effects to the Pallid Sturgeon:** The Corps believes that this proposed action will avoid jeopardizing the continued existence of pallid sturgeon. The actions that can be taken in the near term to effectively conserve listed species and would avoid the likelihood of jeopardizing the listed pallid sturgeon, include, but are not limited to, accelerated habitat development, particularly throughout the BSNP; expanded and accelerated support to propagation efforts; a robust research, monitoring, and evaluation program (RM&E) that examines the multiple factors that may be limiting pallid sturgeon spawning and recruitment in all suitable reaches of the Missouri River; and various flow tests at a number of projects on the System.

The proposed action by the Corps will: 1) create additional habitat likely to benefit pallid sturgeon and other native fishes; 2) significantly advance the scientific information and understanding of the life history and ecological requirements for survival of the endangered pallid sturgeon; 3) improve the pallid sturgeon propagation and augmentation program to upgrade the capabilities of pallid sturgeon propagation hatcheries in order to augment the population with higher numbers and higher quality fish; 4) and establish a “3 year check-in” to assess scientific findings, progress and successes associated with actions to make course adjustments, including potential flow adjustments from Gavins Point Dam. Based on the current scientific information on the pallid sturgeon, it is possible that the proposed action may have some unknown adverse affects to the species. However, the many known beneficial effects of the proposed action will significantly aid efforts to recover the pallid sturgeon. The proposed action as described in this BA, therefore, meets the objectives of the 2000 BiOp RPA concerning the pallid sturgeon and will likely avoid jeopardizing the continued existence of the pallid sturgeon.

**2. Interior Least Terns and Piping Plovers.** The following sections describe effects to the interior least tern and piping plover anticipated from the proposed action as described in this BA. Many life cycle requirements of the least tern and piping plover are similar, including habitat used for nesting and brood rearing. Therefore where appropriate, effects to these species will be considered together when evaluating effects of this action.

**a. System Operation Changes:**

**1) Drought Conservation Measures.** Drought conservation measures effects will be beneficial to both least terns and piping plovers in the short term with adverse effects over the long term if the drought conditions persist. In the short term, reduced releases would have the following benefits to the two species: barren sandbar habitat will increase, greater sandbar size will reduce predation losses, and more shallow water areas will increase the size of forage areas. However, if drought conditions continue for a long time, it is expected that barren sandbar habitat would decrease through natural erosion processes and vegetation encroachment.

**2) Unbalancing of the Upper Three Lakes.** The effects of unbalancing the upper three reservoirs will be positive for both least terns and piping plovers by replenishing beach habitat. Vegetation that grows up along the beaches during the low cycle will be inundated during the consequent refilling of the reservoirs during the high cycle. However, based on historic trends, the degree of benefit of the unbalancing will be different for the two species. Historically during low pool levels, Fort Peck Lake has been little used by either species, Lake Sakakawea has been used extensively by piping plovers, and Lake Oahe has been used extensively by both species. Therefore the beach habitat created once every three years by the unbalancing will provide the most benefit on Lake Sakakawea and Lake Oahe.

Least terns and piping plovers nesting below Fort Peck and Garrison Dams will also benefit from the unbalancing of the three reservoirs. The decrease in releases for a reservoir going into the high cycle will increase the amount of sandbar habitat, increase foraging habitat and reduce predation losses due to greater sandbar size. There will be a long-term benefit to both species when releases are increased when a reservoir goes into a low cycle. During the high releases vegetation will be scoured off of the inundated sandbars, thus regenerating habitat that will be exposed during lower releases. The benefits will vary. Most benefit will be below Garrison Dam, which historically has been the second most productive riverine reach for least terns and piping plovers. There will be less benefit on the reach below Fort Peck Dam because historically, piping plovers seldom use this reach.

**3) Gavins Point Summer Releases.** Releases from Gavins Point Dam have been steady-release, flow-to-target or a combination of the two. Steady-release flows have the advantage of minimizing take by preventing the two species from nesting on low sandbars that would be subject to inundation to meet flow targets in the navigation channel later in the nesting season. This regime has an adverse effect in that it decreases the amount of habitat available to the birds. By contrast, the flow-to-target regime provides additional habitat for both species during the early part of the nesting season. This regime however requires that tributary runoff later in the nesting season remain high enough to meet flow targets in the navigation channel.

b. **Research, Monitoring, and Evaluation:** This research monitoring and evaluation effort will provide scientific information and fill data gaps concerning biological cues of these species and their associated ecological processes. This information is critical to establishing appropriate management strategies and to their future success.

1. **Gavins Point Reach Fall Test.** It is expected that a test discharge of 60,000 cfs for 60 days from Gavins Point Dam would have a beneficial effect for least terns and piping plovers. This conclusion is based on productivity since the 1997 fall releases out of Gavins Point, in which releases were 70,000 cfs from September through mid-December. Both species have shown remarkable productivity in the six years following the event. The least tern fledge ratio is 1.38 fledglings per adult pair for 1998 through 2003, while the piping plover fledge ratio is 1.99 fledglings per adult pair for the same time period. As a comparison, the least tern fledge ratio for 1986 through 1997 was 0.50 and the piping plover fledge ratio for the same time period was 0.49. Though the 70,000 cfs releases in 1997 were of a greater magnitude and a longer duration (more than three months), it is predicted the results could be similar.

2. **Fort Randall Reach Fall Rise.** Depending on the magnitude and duration of a fall rise out of Fort Randall Dam, it is expected that there will be a beneficial effect for least terns and piping plovers. This conclusion is based on productivity since the 1997 fall releases out of Fort Randall. In 1997, releases were 65,000 cfs from September through mid-December. Since that high release regime both species have shown significant productivity in the six years following the event. The least tern fledge ratio is 0.88 fledglings per adult pair for 1998 through 2003 while the piping plover fledge ratio is 1.04 fledglings per adult pair for the same time period. As a comparison, the least tern fledge ratio for 1986 through 1997 was 0.22 and the piping plover fledge ratio for the same time period was 0.31. If the Fort Randall test is done in conjunction with the Gavins Point test with similar releases and duration, it is predicted the results could be similar to those from the 1997 releases. In addition to replenishing habitat on the Fort Randall reach, it would be expected that the test's flushing of sediment in the upper part of Lewis & Clark Lake would likewise have a beneficial effect on least terns and piping plovers by creating habitat.

3. **Sandbar Habitat Conditioning.** It is expected that a test flow to condition constructed sandbars would have an effect on least terns and piping plovers. It is hypothesized that this flow would benefit both species by consolidating substrate and mixing organic material in the surface layer, and this in turn would lead to greater productivity compared to sandbars that were constructed and not inundated. However, the test could show that there is no effect or even a detrimental effect on the two species. Conducting this test and analyzing the results will address this uncertainty.

4. **Fort Peck Dam Tests.** The Fort Peck Dam test releases will primarily benefit least terns since historically piping plovers seldom use this reach. Restoration of habitat by the removal of vegetation from the higher releases benefits both species. The release of warmer water through the Fort Peck Dam spillway may provide a benefit to the Missouri River ecosystem. This in turn may benefit the two bird species through an increase in forage species due to the warmer water.

c. **Accelerated Actions to Benefit Species:** The Corps concludes that the accelerated construction of shallow water habitat and propagation efforts for pallid sturgeon will have no effect on the least tern or piping plover.

d. **Conclusion on the Effects to the Interior Least Tern and Piping Plover.** While the proposed action as described in this BA will not completely ameliorate all of the adverse effects of the operation of the System on terns and plovers, the Corps has determined that the proposed action, in concert with the 2000 BiOp actions that are underway, will have many beneficial effects. The proposed action in conjunction with the on-going 2000 BiOp actions will: 1) meet the physical emergent sandbar habitat goals for nesting, brooding and foraging habitat; 2) provide critically significant gains in information and understanding of these species and their associated biological interactions within the ecosystem; 3) afford the opportunity to develop future courses of action through establishment of a recovery strategy to include broad stakeholder involvement in the management of the river and actions designed to benefit the listed species and critical habitat; 4) and meet the three year running average fledge ratio goals for the least tern (0.70 chicks/pair) and piping plover (1.13 chicks/pair), as described in the 2000 BiOp.

3. **Bald Eagle.** The Corps has concluded that the proposed action has no effect on the bald eagle.

4. **Indiana Bat.** The Corps has concluded that the proposed action has no effect on the Indiana bat.

#### **IV. CRITICAL HABITAT FOR THE PIPING PLOVER**

A. **Critical Habitat.** Critical habitat is the area designated necessary for the species to survive. It includes the primary biological and physical processes of the habitat necessary to create and maintain itself. The objective is to protect habitat that is considered essential to restoring the listed population. In determining areas essential to conserve the northern Great Plains breeding population of piping plovers, the USFWS used the best scientific and commercial data available.

The USFWS designated critical habitat for the northern Great Plains population of the piping plover (67 FR 57638), including the Missouri River, in September 2002. In Montana, critical habitat was designated on Fort Peck Lake (77,370 acres (31,310.6 ha.), and 125.4 miles (201.8 km) of the Missouri River below Fort Peck Dam (RM 1712.0 to RM 1586.6). In North Dakota, critical habitat includes 18.6 miles below Fort Peck Dam (RM 1586.6 to RM 1540.0), 179 miles of river on Lake Sakakawea above Garrison Dam (RM 154.0-RM 1389.0), 87 miles of river below Garrison Dam (RM 1389.0-RM 1302.0), and 70 miles of river on Lake Oahe (RM 1302-RM 1232.0). In South Dakota, critical habitat includes 159.7 miles on Lake Oahe (RM1232.0-RM 1072.3); 36 miles (57.9 km) below Fort Randall Dam (RM 880.0- RM 844.0), 32.9 miles (52.9 km) on Lewis and Clark Lake (RM 844.0-RM811.1); and 58.9 miles (94.8 km) below Gavins Point Dam (RM 811.1-752.2). The Kansas River was not designated as critical habitat.

## **B. Primary Constituent Elements of Critical Habitat.**

In accordance with the Endangered Species Act in determining which areas to propose as critical habitat, the Service is required to base critical habitat determinations on the best scientific and commercial data available and to consider physical and biological features (primary constituent elements) that are essential to conservation of the species, and that may require special management considerations and protection. These include, but are not limited to: (1) Space for individual and population growth, and for normal behavior; (2) food, water, air, light, minerals, or other nutritional or physiological requirements; (3) cover or shelter; (4) sites for breeding, reproduction, rearing (or development) of offspring; and (5) habitats protected from disturbance or that are representative of the historic geographical and ecological distributions of a species. Primary constituent elements for the northern Great Plains population of piping plovers are those habitat components (physical and biological) essential for the biological needs of courtship, nesting, sheltering, brood rearing, foraging, roosting, intraspecific communication, and migration. Federal Register Vol. 67, No. 176 Sept. 2002.

The one overriding primary biological constituent element that must be present at all sites are the dynamic ecological processes that create and maintain piping plover habitat. Without these ecological processes the physical components of the primary constituent elements would not develop. These processes (biological and physical) develop a mosaic of habitats on the landscape that provide the essential combination of prey, forage, nesting, brooding and chick-rearing areas. The availability of the habitat patches is dependent on local weather, hydrological conditions and cycles, and geological processes. For a more in-depth discussion of critical habitat and primary constituent elements, please refer to the Federal Register (vol. 67, No. 176, September 2002).

In summary, primary constituent elements of the northern Great Plains population of the piping plover are those habitat processes (biological) and components (physical) essential for the biological needs of courtship, nesting, sheltering, brood rearing, foraging, roosting, intraspecific communication, and migration. The overriding primary constituent element (biological) necessary on all sites is the dynamic ecological processes that create and maintain the physical components of piping plover habitat. On rivers, the physical primary constituent elements include sparsely vegetated channel sandbars, sand and gravel beaches on islands, temporary pools on sandbars and islands, and the interface with the river. On reservoirs, the physical primary constituent elements include sparsely vegetated shoreline beaches; peninsulas; islands composed of sand, gravel, or shale; and their interface with the water bodies.

## **C. Anticipated Effects of Proposed Action and On-going Actions on Critical Habitat.**

The biological effects on the piping plover designated critical habitat considered here, will include both the proposed action and those actions that are being implemented in response to the 2000 BiOp.

1. **Adaptive Management.** The implementation of adaptive management through MRRIC will likely have no direct adverse effect on the designated critical habitat. As the

adaptive management strategy is based on process and development of information, critical habitat will likely benefit through improved communication and coordination of all activities with the USFWS and other stakeholders.

2. **System Operation Changes.** System operation changes will produce flow changes in a planned, adaptive management process. Implementation of drought conservation measures may lower flows on the river below Gavins Point Dam and expose reservoir shore habitat during drought periods. Unbalanced intrasystem operations will periodically inundate and expose reservoir shoreline habitats. Gavins Point summer releases may vary year to year depending upon hydrologic conditions.

a. **Drought Conservation Measures.** The drought conservation measures, aimed at conserving water in the upper three reservoirs during drought periods, will generally reduce flows below Gavins Point Dam earlier in the drought cycle. The resulting lower flows will typically occur during the summer and fall months. The effects of this operation are complex and will have short and long term impacts to the critical habitat for the plover. In the short-term, lower flows will expose more sandbar and island habitat in the riverine environment below the dams. On the reservoirs, shoreline habitat will potentially continue to be exposed as storage is depleted. During the nesting and brooding season these actions would have a beneficial effect to the plovers by increasing available critical habitat. If the drought conditions persist, these short-term benefits may translate into long-term habitat loss if dynamic ecological processes required to create and maintain critical habitat are not implemented. (See discussion on page 57643 of FR Vol. 67, No. 176, September 2002)

b. **Intrasystem Unbalancing.** The unbalancing of the upper three lakes component of the proposed action would have no effect on riverine habitats. However, the water management strategy of fluctuating the reservoir levels on a three-year cycle introduces variability into the reservoir system. The reservoir biological primary constituent element (sparsely vegetated shoreline beaches, peninsulas, etc.) would be created and maintained by the introduced dynamic process of cyclic rising and falling. This action would allow the habitat to be maintained over time. This would be a positive effect to the critical habitat of the reservoirs.

c. **Gavins Point Summer Releases.** Releases from Gavins Point Dam have been steady-release, flow-to-target or a combination of the two. Steady-release flows have an adverse effect on piping plover critical habitat by inundating habitat early in the nesting season and making this habitat unavailable to the birds throughout the nesting season. By contrast, the flow-to-target regime provides additional piping plover critical habitat during the early part of the nesting season. This regime however requires that tributary runoff later in the nesting season remain high enough to meet flow targets.

3. **Hatchery Facility Improvements.** Hatchery facility improvements will have no effect on piping plover critical habitat.

4. **Accelerated Shallow Water Habitat Construction.** Accelerated shallow water habitat construction will have no effect on piping plover critical habitat as it does not occur within the bounds of the critical habitat designated by the USFWS.

5. **Artificially or Mechanically Created Habitat.** This action includes measures to create and maintain the physical elements of critical habitat through artificial methods. These methods may provide physical habitat elements without dynamic ecological creation processes. However, currently no data exist that demonstrate the ability of many of these methods (spraying, mowing, bulldozing piles of sand) to provide properly functioning biological habitat elements (food, shelter, habitat in the proper arrangement...) or address the effects of these methods on the physical primary constituents elements over large geographic and temporal scales. The production of physically suitable but ecologically non-functioning habitat that result in “ecological traps” is of particular concern. An intensive, experimentally based monitoring approach will be used to assess the value of these methods in providing the biological and physical elements of piping plover habitat. One action to address this issue is the proposed sandbar conditioning test. As this information is obtained and analyzed, the measures will be refined through the adaptive management process. The effects of several measures that are aimed at creating piping plover critical habitat are currently unknown, but are designed to increase knowledge and understanding of habitat creation and functionality processes. Addressing these uncertainties is a beneficial effect.

6. **Research, Monitoring, and Evaluation (RM&E).** There are on-going and proposed RM&E efforts associated with least terns and piping plovers. These include riverine and reservoir habitat monitoring and evaluation, the forage ecology study, and the regional population assessments. These actions will provide for an improved regional understanding of the bird population dynamics, improved coordination and data storage, and will expand current efforts to include actions focused on the wintering grounds. This new information will be used in the adaptive management strategy to inform the recovery decision-making process. Gathering information aimed at improving management of the species will have no adverse effect on critical habitat.

The Corps’ proposed action also includes a series of flow tests to gain essential information, the effects of which are described below.

a. **Gavins Point Reach Fall Test.** As described, 60,000 cfs for 60 days, will have beneficial effects on piping plover critical habitat by introducing some of the natural attributes of high flows to create and maintain sandbar habitat. Because of the fall timing of the release, there will not be a conflict with nesting piping plovers.

b. **Fort Randall Reach Fall Rise.** A pulse flow aimed at creating and maintaining habitat below Fort Randall Dam would have beneficial effects on piping plover critical habitat. The degree of the benefit will depend on the magnitude and duration of the flow. Because of the fall timing of the release, there will not be a conflict with nesting piping plovers.

c. **Gavins Point Spring Sandbar Habitat Conditioning.** This measure will inundate habitat for a short period of time in the spring. This action would potentially provide the primary constituent elements of piping plover critical habitat by consolidating substrate and mixing organic material in the surface layer and this in turn would lead to greater productivity compared to sandbars that were constructed and not inundated.

d. **Fort Peck Tests.** Benefits from this action will likely be improved habitat due to the scouring of vegetation through high flows. Another beneficial effect of the action will be the release of warmer water into the riverine environment below the dam. This could result in improved forage for piping plovers and increase production overall in the local ecosystem.

## V. CORPS ACTIONS TO BENEFIT THE SPECIES

A. **Maintain/Create Habitat.** Considerable progress has been made toward reaching certain goals of the 2000 BiOp in the areas of shallow water habitat, flood plain reconnection, and emergent sandbar habitat. These actions are already being implemented by the Corps in response to the 2000 BiOp and are summarized below.

1. **Shallow Water Habitat.** Shallow water habitat may be achieved through flow management, river widening, (notching/dike modifications), restoration of side channels, or combinations thereof. The Corps has taken many steps toward achieving the 20 – 30 acres per mile of shallow water habitat goals prescribed in the 2000 BiOp. The most immediate goal is the development of 2,000 new shallow water habitat acres between 2000 and 2005. The second milestone is the creation of 5,870 acres of new shallow water habitat by 2010. During the period Fiscal Year (FY) 2001 through FY 2003, the Corps made modifications to the BSNP that resulted in the creation of 1,365 acres of shallow water habitat. Approximately 400 acres of those acres were created below the Grand River where the Corps estimates the shallow water habitat is close to the 20 acres per mile goal. Plans are in-place and the necessary real estate interests have been obtained for continuation of the shallow water habitat program to achieve the 2005 goal. Actions initiated to date to meet the goal of 2,000 additional acres of shallow water habitat by 2005, funded under the O&M program and the Missouri River Fish and Wildlife Mitigation Project, include: excavation of over 400 notches; construction of reverse dikes/notches at Marion and Plowboy Bends; side channel construction at Overton Bottoms, Tobacco Island, and California Bend (NE); buried dike excavation and notching at Overton; chevron construction and dike lowering near Nebraska City; and modification of dike maintenance at selected locations from Sioux City to the mouth to encourage aquatic habitat development. Construction activities planned for FY 2004 and FY 2005 include continuation of the river control structure modification and notching programs, where possible, and construction of chutes at Glovers Point (RM 712), Hole-in-the-Rock (RM 706), Lower Decatur Bend (RM 686), Lower Hamburg Bend (RM 552), and Kansas and Nishnabotna Bends (RM 543).

2. **Floodplain Reconnection.** Through the existing Mitigation Project, the Corps has obtained real estate interests in over 36,000 acres of land from Sioux City to the mouth. Floodplain reconnection has taken place on many of these areas through breaching or moving existing levees. Additionally, the Corps has restored numerous acres of agricultural lands to riparian forest, wetlands, and prairies.

Floodplain reconnection is already underway below Sioux City. Approximately 8,000 acres have been reconnected since the 2000 BiOp was published. An example of this effort is on the Overton North mitigation site where an existing agricultural levee was breached and 3,500 acres have been opened up to the river. This area has received floodwaters the past three springs for

periods of 2 to 8 weeks. Combined with the native vegetative plantings and natural re-growth of the area, this floodplain reconnection has greatly improved the floodplain habitat for a large variety of listed and non-listed species.

The existing Mitigation Project authorization allows the Corps to acquire and develop habitat on 166,750 acres. The Corps proposes to continue this project to enhance habitat opportunities for native fish during spring time flood flows by moving back or breaching existing levees wherever possible. The Corps will also continue native vegetative plantings to increase the amount of riparian forest habitat for the Bald Eagle.

3. **Emergent Sandbar Habitat.** The 2000 BiOp RPA specifies varying amounts of emergent sandbar habitat for the four reaches of the Missouri River currently used by least terns and piping plovers for nesting. By 2005, the recommended minimum habitat during the nesting season (to be measured in late July) is to be 40 acres per mile downstream from Gavins Point Dam, 40 acres per mile in Lewis and Clark Lake, 10 acres per mile downstream from Fort Randall Dam, and 25 acres per mile downstream from Garrison Dam. According to the 2000 BiOp, this habitat should be comprised of a minimum of 60 percent dry sand.

Based on these habitat goals, there would be a total of 6,255 acres of emergent sandbar habitat by 2005. The Corps is currently assessing the existing emergent sandbar habitat to determine how much additional acreage will need to be created. Until those data are available, the Corps' best estimate is that half of the 6,225 acres of emergent sandbar habitat already exists. Of the remaining 3,127 acres to be created, half would be created by vegetation removal procedures on existing sandbars and islands and the other half would need to be physically created.

All available habitat creation, enhancement, maintenance, and reconstruction methods will be used to provide suitable emergent sandbar habitat in the critical reaches, and new methods will be investigated. Further information on these actions can be found in Appendix C, page 9.

**B. Propagation.** Each year the Corps works with Federal and state fisheries agencies to prioritize propagation needs to facilitate achievement of the "Average Annual Shortfall" (Corps' responsibility) as identified in the 2000 BiOp. A prioritization list is generated and is used to determine where the Corps directs assistance for the population/augmentation program each year. The program has been structured to exceed propagation efforts related to the average annual shortfall. Further discussion of this program can be found in Appendix C, page 12.

**C. Research Efforts and Other Studies.** The Corps is continuing to conduct a variety of studies and focused research efforts on pallid sturgeon, least terns and piping plover. These include the following:

- Pallid Sturgeon Population Assessment Program.
- Least Tern and Piping Plover Population Assessment, Monitoring and Captive Rearing
- Least Tern and Piping Plover Focused Research
- Forage ecology study
- Bald Eagle/Cottonwood Population Assessment

Further details of these efforts can be found in Appendix C, page 11.

## VI. CONCLUSIONS

The Corps and the USFWS are in agreement regarding the habitat attributes necessary to conserve listed species on the Missouri River. However, as described in this BA, engineering studies conducted by the Corps since the issuance of the 2000 BiOp indicate that not all of the needed and intended physical attributes and biological effects can be achieved through implementation of the component of the 2000 BiOp RPA associated with the flow release schedule for Gavins Point Dam. This marks the only key variation from the component elements of the 2000 BiOp RPA. Consequently, the Corps is proposing an alternative approach to conserving the listed species in lieu of providing “spring rise” flows and summer flows below minimum service levels out of Gavins Point Dam. The Corps is fully aware of the body of existing large river science that has documented the ecological importance of restoring some degree of natural river-based processes, including appropriate flow regimes. However, as pointed out in the National Research Council’s 2002 report, providing a spring flood pulse in the absence of river-connective habitat is not likely to produce needed ecological benefits. The reverse is also true. The existence of constructed habitat in the absence of changes in the hydrologic regime will not produce needed ecological benefits. Because the flow releases prescribed in the 2000 BiOp will not achieve the intended physical attributes and biological effects, the Corps does not believe it is practicable to implement this component element of the BiOp RPA at this time.

Two important factors were strong influences in the development of the Corps alternative approach to the conservation of listed species on the Missouri River. First was the recognition that there is a relative scarcity of river-connective, shallow water habitat along key reaches of the Missouri River. Hence, the modified flow regime out of Gavins Point Dam prescribed in the 2000 BiOp would not render needed ecological benefits. The second factor is the absence of necessary scientific information on the life cycle requirements of the pallid sturgeon and an understanding of the factors that are limiting spawning and recruitment. Therefore, the rationale supporting the Corps’ proposed action is clear: 1) initiate an aggressive and accelerated program to develop shallow water habitat along the navigation portion of the Missouri River; 2) initiate a robust RM&E effort to gather scientific information regarding the limiting factors to pallid sturgeon spawning and recruitment; 3) and initiate expanded and accelerated efforts to upgrade the capabilities of pallid sturgeon propagation facilities in order to augment the population with higher numbers and higher quality fish. The Corps also proposes that a “3 year check-in” be conducted within the context of a broad public forum involving a diverse array of stakeholders and other interests to examine the scientific findings and determine changes and additional actions that may need to be taken, including potential flow adjustments out of Gavins Point Dam. This effort would be consistent with the adaptive management approach advocated by the Corps in this BA, by the USFWS in its 2000 BiOp, and by the National Research Council in its 2002 report.

The Corps believes that its proposed action as described in this BA, is a reasonable and rational near-term approach to the conservation of listed species avoids the likelihood of jeopardizing the continued existence of the interior least tern, the piping plover, and pallid sturgeon, and does not result in an adverse modification of piping plover critical habitat.

