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Missouri River Recovery Program
Emergent Sandbar Habitat Complexes in the
Missouri River, Nebraska and South Dakota
Draft Project Implementation Report (PIR)
With Integrated Environmental Assessment
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Cover Sheet

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Missouri River Recovery Program Emergent Sandbar Habitat Complexes in the Missouri River; Nebraska and South Dakota Draft Project Implementation Report (PIR) With Integrated Environmental Assessment

Chapter 1 INTRODUCTION	1
1.1 Introduction	1
1.2 Background	1
1.2.1 Missouri River and Channelization	1
1.2.2 ESA Consultation	2
1.2.3 The 59-Mile Segment of the Missouri National Recreational River	3
1.2.3.1 Reasons for Designation of the Segment	3
1.2.3.2 Outstandingly Remarkable Values / Resources	
1.3 Project Authority	4
1.4 Project Description and Location	
1.5 Scope of Study	
1.6 Site Selection	6
Chapter 2 PROJECT GOALS AND OBJECTIVES	10
2.1 Project Goals and Objectives	10
2.2 Purpose and Need for Action (Problems & Opportunities)	10
2.3 Constraints	11
2.4 Resource Significance	11
2.4.1 Institutional Recognition	11
2.4.2 Public Recognition	12
2.4.3 Technical Recognition	12
2.5 Prior Reports	13
2.6 Agency Coordination	15
2.7. Existing and Future without Project Condition	16
Chapter 3 ALTERNATIVES	17
3.1 Introduction	17
3.2 Preliminary Measures Considered	17
3.2.1 Creation of New Sandbar	17

3.2.2 Vegetation Removal	17
3.2.3 Vegetation Removal with Subsequent Overtopping	17
3.2.4 Vegetation Removal and Building up to 20,000 and 50,000 cfs Elevations	18
3.2.5 No Action	18
3.3 Preliminary Screening	18
3.3.1. River Mile 789.7	18
3.3.2 River Mile 759.4	18
3.3.3. River Mile 756.7	19
3.4 Recommended Alternative	
3.4.1 Description of Recommended Actions	
3.4.1.1 River Mile 789.7	
3.4.1.2 River Mile 759.4	
3.4.1.3 River Mile 756.7	
3.5 Design and Construction Considerations	22
3.5.1 Design Criteria	
3.5.2 Site Access and Staging	23
3.5.3 Construction Period	
3.6 Risk and Uncertainty	25
Chapter 4 AFFECTED ENVIRONMENT	
4.1 Physiography/Topography	26
4.2 Hydrology, Geomorphology, Erosion	
4.2 Biological Resources	28
4.2.1 Fish	28
4.2.2 Wetlands	28
4.2.3 Vegetation	29
4.2.4 Wildlife	29
4.2.4.1 Mammals	29
4.2.4.2 Birds	29
4.2.4.3 Amphibians and Reptiles	30
4.2.4.4 Invertebrates	30
4.2.4.5 Mussels	30
4.2.4.6 Bald Eagle	32

4.3 Federally Threatened and Endangered Species	33
4.3.1 Pallid Sturgeon, Scaphirhynchus albus (Endangered)	33
4.3.2 Interior least tern, Sternula antillarum (Endangered)	34
4.3.3 Piping Plover, Charadrius melodus (Threatened)	36
4.3.4 Piping Plover Critical Habitat	36
4.3.5 Whooping Crane (Endangered)	37
4.3.6 Eskimo Curlew (Endangered)	37
4.3.7 Topeka Shiner (Endangered)	37
4.3.8. Scaleshell Mussel (Endangered) and Higgin's eye pearlymussel (Endangered)	37
4.3.9. Western Prairie Fringed Orchid (Threatened)	37
4.3.10. American Burying Beetle (Threatened)	38
4.4 State Threatened and Endangered Species	38
4.4.1 South Dakota State Listed Species	38
4.4.2 Nebraska State Listed Species	38
4.5 Migratory Birds	
4.7 Prime Farmland	
4.8 Flood Plain	40
4.9 Climate	
4.10 Water Quality	40
4.11 Air Quality	
4.12 Noise	42
4.13 Historic Properties and Cultural Resources	42
4.14 Socioeconomic Resources	43
4.14.1 Land Use	43
4.14.2 Land Ownership	43
4.15 Recreation	43
4.15.1 National Wild and Scenic Rivers System	44
Chapter 5 ENVIRONMENTAL CONSEQUENCES	45
5.1 Summary of Effect	45
5.2 Physiography/Topography	45
5.3 Hydrology, Geomorphology, and Erosion	45
5.3 Biological Resources	46

5.3.1 Fish	46
5.3.2 Wetlands	46
5.3.3 Vegetation	47
5.3.4 Wildlife	48
5.3.4.1 Mammals	48
5.3.4.2 Birds	48
5.3.4.3 Amphibians and Reptiles	49
5.3.4.4 Invertebrates	49
5.3.4.5 Mussels	50
5.3.4.6 Bald Eagle	50
5.4 Threatened and Endangered Species	
5.4.1 Pallid Sturgeon	51
5.4.2 Interior Least Tern	
5.4.3 Piping Plover	54
5.4.4 Piping Plover Critical Habitat	
5.4.5 Whooping Crane (Endangered)	56
5.4.6 Eskimo Curlew (Endangered)	
5.4.7 Topeka Shiner (Endangered)	56
5.4.8 Scaleshell Mussel (Endangered) and Higgin's eye pearlymussel (Endangered)	56
5.4.9 Western Prairie Fringed Orchid (Threatened)	
5.4.10 American Burying Beetle (Threatened)	
5.5 State Listed Species	
5.6 Migratory Bird Treat Act	
5.7 Prime Farmland	
5.8 FloodPlain	
5.9 Climate	
5.10 Water Quality	
5.12 Air Quality	60
5.13 Noise	
5.14 Historic Properties and Cultural Resources	
5.15 Socioeconomic Resources and Human use	
5.15.1 Land Use	

5.450.110	~ 4
5.15.2 Land Ownership	
5.16 Recreation	
5.16.1 National Wild and Scenic Rivers System	
Chapter 6 COMPLIANCE WITH ENVIRONMENTAL STATUTES	
6.1 Introduction	
6.2 Air Quality	.65
6.3 Water Resources	.65
6.4 Biological Resources	
6.4.1 Fish and Wildlife	.66
6.5 Environmental Policy	
6.6 Cultural Resources	
6.7 Prime Farmland	
6.8 Short Term Versus Long Term Productivity	.66
6.9 Irreversible and Irretrievable Commitment of Resources	.67
Chapter 7 OTHER CONSIDERATIONS	.68
7.1 Introduction	.68
7.2 Monitoring and Adaptive Management	.68
7.2.1 Objectives	.68
7.2.2 Monitoring	.69
7.2.3 Assessment	.69
7.2.4 Adaptive Management	.69
7.2.5 Implementation	.70
7.3 Vegetation Modification Study	.70
7.4 Predation Management	.70
7.5 Maintenance of Created Emergent Sandbar Habitat	.71
7.6 Draft Programmatic Environmental Impact Statement (PEIS)	
7.7 Missouri River Ecosystem Restoration Plan and Environmental Impact	
Statement	
7.8 Implementation Responsibilities	
7.9 Cost Estimate	
7.10Schedule	
7.11 Conclusions and Recommendations	
Chapter 8 REFERENCES	.75

APPENDICES

A. Correspondence

- B.
- Project Plans (pending) Environmental Protection Specifications C.

LIST OF FIGURES

Figure 1-2.	General Project Location Described by River Mile Example of Sensitive Resources Mapping to Determine Construction ESH in the Gavins Point River Segment	on
Figure 3-1:	Design for RM 789.7	20
	Design for RM 759.4	
	Design for RM 756.7	22
Figure 4-1:	Adult Census of Least Terns & Piping Plovers on the Missouri River	35
Figure 4-2:	Fledge Ratios of Least Terns & Piping Plovers on the Missouri River	36
Figure 5-1:	Conceptual Decline in Estimated ESH Acreage Trends	52
Figure 5-2:	Tern Fledge Ratios on the Gavins Point Segment (Goal = 0.94)	53
Figure 5-3:	Plover Fledge Ratios on the Gavins Point Segment (Goal = 1.22)	55
	LIST OF TABLES	
Table 1-1	Activities at Proposed Site Locations in the 59-Mile Segment of the MNRR	
Tahla 3-1.	ESH Construction Windows	
	Thalweg Locations	
	Vegetation on Existing Bars at Proposed Project Locations	
	Mussel Species of the 59-Mile Missouri National Recreational	
	River	31
Table 4-4:	Bald Eagle Nests	
	Compliance of Preferred Alternative with Environmental Protection	
	Statutes and Other Environmental Requirements	64
Table 7-1:	Potential Adaptive Management actions	70
	PEIS Acreage Alternatives	
	Estimated Cost of each Proposed ESH Site	
Table 7-4	Estimated Schedule	74

Acronyms and Abbreviations

ACHP Advisory Council on Historic Properties

ACT Agency Coordination Team
AMSL Above Mean Sea Level
APE Area of Potential Effect

ASM Archaeological Society of Missouri BEA Bureau of Economic Analysis

BSNP Bank Stabilization and Navigation Project

C Celsius

CA Conservation Area

Corps U.S. Army Corps of Engineers CRP Construction Reference Plane

CWA Clean Water Act

EA Environmental Assessment

EPA Environmental Protection Agency

ESA Endangered Species Act

FONSI Finding of No Significant Impact
GIS Geographic Information Systems

GMP General Management Plan

IDNR Iowa Department of Natural Resources

M&E Monitoring and Evaluation

mg/l Milligrams per liter

NAAQS National Ambient Air Quality Standards
NASS National Agricultural Statistics Service
NEPA National Environmental Policy Act
NGPC Nebraska Game and Parks Commission

NHPA National Historic Preservation Act
NLCD National Land Cover Data Set

NPDES National Pollutant Discharge Elimination System

NRCS Natural Resources Conservation Service
NRHP National Register of Historic Places
NSHS Nebraska State Historical Society

NWI National Wetland Inventory

NWP Nationwide Permit
NWR National Wildlife Refuge
O&M Operation & Maintenance

ORV Outstandingly Remarkable Values

PDT Project Delivery Team
PgMP Program Management Plan
PH Potential of Hydrogen

PIR Project Implementation Report

PL Public Law RM River Mile

ROD Record of Decision
RPM Root Pruning Method

SEIS Supplemental Environmental Impact Statement

SHPO State Historic Preservation Office

SRA State Recreation Area

SWPPP	Storm Water Pollution Prevention Plan
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

WMA Wildlife Management Area

WRDA86 Water Resources Development Act of 1986 WRDA99 Water Resources Development Act of 1999



Chapter 1 INTRODUCTION

1.1 INTRODUCTION

The Missouri River Recovery Program (MRRP) was developed to address actions included in the U.S. Fish & Wildlife Service (USFWS) 2000 and 2003 Amended Biological Opinions (BiOp) on the Operation of the Missouri River System and the Missouri River Bank Stabilization and Navigation Fish and Wildlife Mitigation Project (Mitigation Project) authorized by the Water Resources Development Acts of 1986 and 1999 (WRDA86 and WRDA99). The BiOp and Mitigation Project provide authority and direction to complete projects for fish and wildlife habitat along Missouri River. These actions are being undertaken to address endangered species needs and mitigate for the loss of habitat that resulted from construction, operation, and maintenance of the Missouri River Bank Stabilization and Navigation Project (BSNP).

The 2003 BiOp Amendment found that Corps operations on the Missouri River were not likely to jeopardize interior least tern and piping plover populations if the Reasonable and Prudent Alternative (RPA) set forth in the BiOp was implemented. RPA IV.B.3 includes recommendations for the mechanical creation and maintenance of Emergent Sandbar Habitat (ESH) as nesting habitat for these two species. ESH refers to exposed, inter-channel sandbars. In contrast to islands, ESH complexes are temporary formations and comparatively dynamic in nature. The proposed action involves the restoration of three ESH complexes in the 59-mile segment of the Missouri National Recreational River (MNRR) below Gavins Point dam (River Miles 811-753). This segment forms part of the border between the states of South Dakota and Nebraska.

This Project Implementation Report (PIR) will focus on potential ESH projects located at River Miles (RM) 789.7, 759.4 and 756.7. This PIR includes an Environmental Assessment (EA) consistent with the National Environmental Policy Act (NEPA), the Council on Environmental Quality's (CEQ) regulations for implementing NEPA (40 CFR 1500-1508), the Corps' regulations for implementing NEPA (33 CFR 325), and other appropriate environmental laws and regulations, including the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA), and Section 404 of the Clean Water Act (CWA).

1.2 BACKGROUND

1.2.1 Missouri River and Channelization

Prior to channelization, the Missouri was a wide, braided river with numerous sandbars. These characteristics made the river ideal as a habitat for the piping

plovers and least terns, which typically nest and fledge their young on emergent sandbars. Channelization, irrigation, construction of reservoirs and pools, and managed river flows have contributed to the elimination of much of the available sandbar nesting habitat for least terns and piping plovers. Under the Missouri River BSNP, the Missouri River was engineered into a single, narrow navigation channel, eliminating most sandbars between Sioux City, Iowa and St. Louis, Missouri. Reservoir storage and irrigation depletions of flows responsible for scouring sandbars have resulted in encroachment of vegetation onto sandbars, further reducing least tern nesting habitat. In addition, river main stem reservoirs now trap much of the sediment load resulting in less aggradation and more degradation of the river bed, reducing formation of suitable sandbar habitat during nesting season of terns and plovers (USFWS, 2000a).

1.2.2 ESA Consultation

In 1987, the Corps prepared a Biological Assessment (BA) in conjunction with proposed revisions to the Missouri River Mainstem Reservoir System Master Water Control Manual (Master Manual). In 1989, the Corps and USFWS entered into official Section 7 consultation under the ESA. The Corps' 1987 BA was then sent to USFWS, who issued the original BiOp for the Missouri River Mainstem (MRMS) in 1990. This 1990 BiOp concluded that Corps' operations on the Missouri were likely to jeopardize the Interior Least Tern and the piping plover, but not the Bald Eagle. At this time, the Pallid Sturgeon was not a federally listed species. In 1993, the Corps completed an EA for the Implementation of ESH improvements along the Missouri River, as directed by the 1990 BiOp.

In 1998, the Corps reinitiated the formal Section 7 consultation process with USFWS. Later the same year, the Corps provided USFWS with a new BA for MRMS Reservoir System Operations. Then, in 1999, the Corps provided USFWS with a BA for BSNP Operations. Both these projects, along with the Kansas River Reservoir System, were taken into consideration for the 2000 BiOp, which was issued by USFWS on November 30, 2000.

In response to the Corps' request for the re-initiation of consultation (due to new information, which included updated environmental baseline conditions, the current status of terns and plovers, the effects of the Corps' new proposed RPA elements, cumulative effects information, and a hydrologic assessment of flow alternatives proposed in the 2000 BiOp) the USFWS issued the 2003 BiOp Amendment. The Corps presented an engineering analysis in their 2003 BA which determined that the flows recommended in the 2000 RPA would not accomplish the intended habitat objectives specified, and that the RPA flows would likely accelerate erosion of sandbars beyond the effects of the current water control plan. Therefore, in the Corps BA it was proposed to meet the habitat goals specified in the 2000 BiOp through alternate means (e.g. mechanical creation of sandbars and restoration of existing sandbars through vegetation removal). The USFWS accepted the Corps' results regarding the efficacy of the RPA flow modifications to create habitat. Based on this, the USFWS eliminated the altered flow element of the 2000 BiOp and issued a nonjeopardy opinion for terns and plovers, on the condition that the 2003 BiOp

Amendment RPA IV.B.3 was implemented. With regard to terns and plovers, this RPA included establishment of a monitoring plan, investigation of flow enhancement through adaptive management, unbalanced intrasystem regulation, and habitat restoration. The 2003 BiOp Amendment kept the ESH goals from the 2000 BiOp (see Section 11) and prioritized reaches for ESH restoration (high, moderate and low). The 59-Mile Segment of the MNRR is listed as "high" priority for terns and plovers.

Since the receipt of the 2003 BiOp Amendment, the Corps has been working with the USFWS on plans for near-term ESH restoration sufficient to meet the intent of the 2003 BiOp Amendment. Additionally, USFWS and the National Park Service (NPS) are working with the Corps on the development of the Programmatic Environmental Impact Statement (PEIS) for the ESH program and an associated Adaptive Management plan. The PEIS will analyze the impacts of implementation of the acreage goals listed in the BiOp along with other alternative mechanical creation strategies that may promote species recovery.

1.2.3 The 59-Mile Segment of the Missouri National Recreational River

The 59-mile segment of the MNRR was designated as a Recreational River under the Wild and Scenic Rivers Act (WSRA) in 1978 (Public Law 95-625) and extends from below Gavins Point Dam to the downstream end of Ponca State Park. Although NPS is the overall administrating agency for the reach, the Corps has legal jurisdiction on the river and operates the MNRR cooperatively with the NPS (NPS, 1999). The lead agency (NPS or Corps) for specific tasks is identified in the 1980 Cooperative Agreement between the Department of Army and the Department of Interior.

WSRA, Public Law 90-542, was passed by Congress in October 1968. The Act established a method for providing federal protection for the Nation's remaining free-flowing rivers, and preserving them and their immediate environments for the use and enjoyment of present and future generations. Section 7 of the Act affords substantial protection to rivers included in the National Wild and Scenic Rivers System and to congressionally authorized study rivers. A Section 7(a) evaluation is used to analyze impacts of a proposed project and determine whether those impacts would constitute a direct and adverse effect on the river or its resources. The process for making a Section 7(a) determination involves evaluating first whether the project is a water resources project as defined by the Act and, if so, evaluating the effect of the proposed water resources project on the outstandingly remarkable values for which the river was included in the system. The Secretary of Interior, acting through the NPS for rivers assigned to that agency for administration, makes determinations of effect for federal or federally assisted water resources projects pursuant to Section 7(a) of the Act.

1.2.3.1 Reasons for Designation of the Segment

The General Management Plan (GMP) for the 59-mile MNRR notes the following reasons for designation:

- To preserve the free-flowing condition and protect it for the enjoyment of present and future generations.
- To provide stream bank protection compatible with the river's significant natural and cultural resources.
- To preserve the significant recreational, fish and wildlife, and historic and cultural resources of the Missouri River corridor.
- To provide for a level of recreation and recreational access that does not adversely impact the river's significant natural and cultural resources.

1.2.3.2 Outstandingly Remarkable Values / Resources

By virtue of their inclusion in the Wild and Scenic Rivers System, the Missouri National Recreational River Segments are designated to preserve its free-flowing condition and its Outstandingly Remarkable Values (ORVs). The legislation adding the 59-mile MNRR to the System specifically references the Corps' Umbrella Study that describes, in detail, the outstandingly remarkable values that made this segment eligible for inclusion in the System. These outstandingly remarkable values for this segment are recreational, fish and wildlife, historic and cultural. The Umbrella Study also pointed out specific river features that were recognized as having outstandingly remarkable natural value. These features include the river setting at Goat Island, including the entrance of the James River and Missouri chutes paralleling Goat Island; the general high bank shoreline forest dominated by cottonwood trees; clusters of sandbars; and the Nebraska wooded bluffs, particularly at river miles 763, 776, and 787 (USACE, 1977).

1.3 PROJECT AUTHORITY

This project is proposed under the Corps' MRRP, established by the Corps in 2003 essentially combining two related efforts including the responsibilities of compliance with the 2003 amended BiOp and acquiring and developing lands to produce habitat as directed by the Missouri River BSNP Fish and Wildlife Mitigation Project.

The proposed project is intended to help meet the emergent sandbar habitat acreage goal of the USFWS BiOp for the Missouri River (USFWS 2000a, 2003) and thus provide habitat for the endangered interior population of the least tern (Sternula antillarum) and the threatened northern Great Plains piping plover (Charadrius melodus). The BiOp set forth the Reasonable and Prudent Alternative (RPA) requirements for the mechanical creation and maintenance of emergent sandbar habitat (USFWS, 2003).

The Missouri River Bank Stabilization and Navigation Project (BSNP) Fish and Wildlife Mitigation Project of Missouri, Kansas, Iowa, and Nebraska was authorized by Section 601 (a) of the Water Resources Development Act (WRDA) of 1986 [Public Law (PL) 99-662], as amended by Section 334(a) of WRDA99 (PL 106-53). Section 3176(a) of WRDA 2007 further amended the Mitigation

Project authorization allowing funds made available for recovery or mitigation activities in the lower basin of the Missouri River to be used for recovery or mitigation activities in the upper basin of the Missouri River, including the states of Montana, Nebraska, North Dakota, and South Dakota.

Any real estate or easements acquired as part of this project would be completed under the Missouri National Recreational River Program's authority (Public Law 95-625) and utilize the vehicles available under that program's Real Estate Design Memorandum (USACE 2004).

1.4 PROJECT DESCRIPTION AND LOCATION

In accordance with the recommendations of the USFWS found in the RPA of the 2003 BiOp Amendment, the Corps is proposing to restore three ESH complexes through a combination of dredging, bulldozing, scraping, and contouring. The proposed projects are within the 59-Mile Segment of the MNRR. The locations were selected and projects collaboratively designed by staff from the Corps, USFWS, NPS, South Dakota Game, Fish and Parks (SDGFP), and Nebraska Game and Parks Commission (NGPC) (Section 1.6). Figure 1-1 shows the proposed project locations. For detailed project information by site, see Section 3.4.



Figure 1-1: General Project Location Described by River Mile

The complexes located at river miles (RM) 756.7, 759.4 and 789.7 have completed designs and construction may be initiated as soon as July 15, 2010. If funding is an issue, the projects will be ranked in priority order by the interagency ESH Project Delivery Team (PDT). The Corps is coordinating with property owners in the vicinity of these sites to obtain access to the river and staging areas, and, on a willing-seller basis, would continue to coordinate easements and/or fee purchase of land. This is intended to help limit declines in productivity and usage due to human disturbance at these sties. In the event that real estate interest is acquired at a site, future ESH and other restoration work may take place there. Table 1-1 shows specific activities proposed by Missouri RM:

Table 1-1
Activities at Proposed Site Locations in the 59-Mile Segment of the MNRR

Location (RM)	Characteristics	Activities	Acres
789.7	Existing, sparsely vegetated sandbars, and submerged sandbars	Veg. removal, overtop, build up to 50,000 cfs, shape	30
759.4	Existing, sparsely vegetated sandbars, and submerged sandbars	Veg. Removal, overtop, build up to 50,000 cfs, shape	71
756.7	Existing, heavily vegetated sandbars; previously cleared sandbar	Veg. Removal, overtop, build up to 50,000 cfs, shape	60
		Total	161

1.5 SCOPE OF STUDY

The actions called out in the PIR would contribute to the implementation of RPA IV.B.3 of the 2003 Amended BiOp – to mechanically create ESH to support tern and plover populations. Alternatives considered in this study were limited to those pertaining to the mechanical creation of ESH in the MNRR. This study is confined to the potential project sites shown in Figure 1-1 and Table 1-1.

1.6 SITE SELECTION

The ESH Program utilizes a multi-agency PDT approach when identifying and prioritizing ESH construction sites each year. Currently, project identification trips and meetings are conducted during the summer, approximately one and one half years prior to construction. The Nebraska and southern South Dakota ESH PDT encompasses individuals from the U. S. Fish and Wildlife Service, the National Park Service (Missouri National Recreation River (MNRR) projects only), state wildlife agencies, and other federal, state, and local agencies as appropriate. Corps members of the ESH PDT are from the threatened and endangered species section, the project environmental resource specialists, and representatives from construction, engineering, real estate, and programs and project management divisions.

The ESH PDT uses three main categories of selection criteria to choose ESH construction locations. These include:

- 1) avoidance of sensitive resource areas;
- 2) capitalizing on areas of natural sand accumulation; and
- 3) areas where terns and plovers have successfully nested in the past.

Sensitive resource areas have been solicited from agencies and municipalities as part of the NEPA process. Sensitive resource areas include such things as the thalweg, wetlands, eagle nests, municipal water intakes, populated areas, boat ramps, etc. where construction activities should be avoided. The criteria used largely follow the results of technical work completed for the ESH PEIS which analyzed nest spacing with regard to certain resources that were believed to be tied to nest selection and an analysis of the characteristics of areas of high productivity over the period of record (1998-2006). In addition, expert opinion about resources that could be adversely impacted by ESH creation was sought and employed to establish buffers around certain sensitive resources. Once the sensitive resources were identified, they were added into a GIS layer, along with a buffer. Figure 1-2 is an example of this buffer mapping.

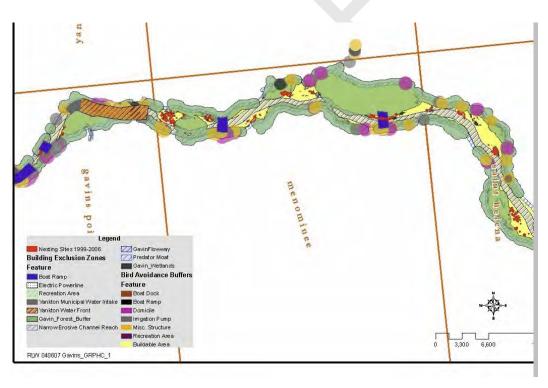


Figure 1-2. Example of Sensitive Resources Mapping to Determine Construction Buffers for ESH in the Gavins Point River Segment

The buffer areas assist in defining three possible zones; (1) exclusionary areas where ESH construction/maintenance truly would be excluded; (2) restrictive areas where ESH could be constructed and maintained at relatively low physical risk, but may either a) put nesting birds at greater risk from predation or recreational encroachment or b) be locations of past limited bird use and productivity or in proximity to certain sensitive resources (any local/site specific issues would be further coordinated); and (3) available areas that are most suitable for and protective of nesting birds with minimal physical risk. Site selection is then guided by these defined buffers, with primary focus being in "available areas."

The ESH PDT has annual meetings to view recent and current imagery to discuss locations in the river to construct ESH. During these annual meetings team members contribute information about the potential positive and negative aspects associated with construction at each location. A list of potential projects is identified and prioritized at these meetings. A new tool available to the ESH PDT is the Emergent Sandbar Habitat Evaluation and Ranking (ESHER) system, a GIS-based Decision Support System that has been created to help rank potential sites. The ESH PDT determines a site condition score and assigns weights to the different variables (sensitive resources). ESHER correlates this information along with the GIS layers of the sensitive resources to estimate which sites would be of highest priority. The PDT uses this information, along with team members' personal knowledge of the trends at the prioritized sites (e.g. channel stability/thalweg shifts, vegetation, previous bird usage), and selects which areas to focus on in the upcoming year.

The three proposed ESH sites meet all three of the selection criteria listed above. Each site is outside of any sensitive resource boundaries, located on areas of exposed, partially-exposed or submerged sandbars, and located in areas of documented historical bird usage.

The three proposed ESH sites were in the top 6 priority sites identified by ESHER in the Gavins Point River Segment. The PDT chose these specific sites because:

- The site at RM 789.7 is part of a series of remnant, well-established and successful sandbars, is in an area of previously constructed bars (RM 791 built in 2007/2008), providing additional connectivity in the area, and is easily accessed for staging because the land on the right descending bank on the Nebraska side is Corps-owned (Audubon Bend).
- The site at RM 759.4 is located in a large area of the Gavins Point River Segment with little habitat available from river mile 761 to approximately 754. This proposed complex would extend the available habitat further downstream. In addition, this sandbar has been a historically successful tern and plover nesting site, although currently it is in a degraded condition for ESH because of vegetation encroachment.

 The site at RM 756.7 is also located in the area of Gavins Point River Segment where ESH is limited, and is in an area of high historical bird usage.



Chapter 2 PROJECT GOALS AND OBJECTIVES

2.1 PROJECT GOALS AND OBJECTIVES

The specific goals for ESH creation are aligned with the BiOp RPA to augment natural habitat to support target fledge ratios and assist in the recovery of tern and plover populations. The Corps defines the fledge ratio as the number of fledglings divided by the number of adult pairs. Target fledge ratios are 1.22 for the plover and 0.94 for the terns. The proposed construction of the projects addressed in this PIR will contribute to meeting these goals.

Specific objectives include:

- 1) Construction of ESH to meet BiOp acreage requirements (40-80 acres per river mile in Gavins Point-Segment 10) to support bird populations and productivity The objective of this PIR is to identify projects for near term implementation in the Gavins Point River Segment at RM 789.7, RM 759.4 and RM 756.7.
- Provide foraging areas for terns and plovers through sandbar design incorporating varied edges and shallow backwaters. The proposed projects would be designed to incorporate such features.
- 3) Optimize nesting area for terns and plovers through sandbar design incorporating varied elevations. The proposed projects would incorporate designs with elevations including the 20,000 cfs and 50,000 cfs levels.

2.2 PURPOSE AND NEED FOR ACTION (PROBLEMS & OPPORTUNITIES)

This project is part of an ongoing effort to restore a sufficient amount of ESH to stabilize, and eventually recover, tern and plover populations along the Missouri River. These measures are recommended by the USFWS in the 2003 BiOp Amendment. This project addresses the problem of the loss of ESH due to channelization and flood control efforts along the Missouri River and the resulting decline of tern and plover numbers. The Gavins Point segment (identified as Segment 10 in the BiOp) is identified as a "High Priority" reach for both terns and plovers under RPA Section IV of the 2003 Amended BiOp.

While the ESH program is concurrently being analyzed in a Programmatic Environmental Impact Statement (PEIS), the need remains to implement interim actions prior to the completion of this document. The proposed action is permissible under section 1506.1(c) of NEPA in that it is justified independently of the program due to time restrictions described in the BiOp and a need to aide species productivity in the interim; it is being analyzed in an appropriate NEPA document; and this action will not preclude the ultimate decision of the PEIS and/or limit the alternatives within the PEIS.

The purpose of these interim actions is to restore a portion of the continually declining habitat in order to help sustain the population while the programmatic analysis is being completed. This need is particularly critical in light of the findings of the 2007-2009

monitoring efforts. These findings show that the adult least tern population on the Missouri River declined to a level below that recommended in the recovery plan.

2.3 CONSTRAINTS

The following constraints have been identified for the system and individual projects:

Missouri National Recreational River: The proposed projects are located in the 59-Mile Segment of the MNRR. ESH projects must not adversely impact the values for which the Segment was designated for protection. The NPS and the Corps manage the MNRR through a cooperative agreement. The NPS is represented on the ESH PDT and therefore is heavily involved in the selection and design of the sandbars. The NPS has final permitting authority in the MNRR.

<u>Construction Window:</u> The construction period is discussed in detail in section 3.7.3. However, specifically in the Gavins Point river segment, the temporal limits discussed dictate that, due primarily to weather, construction and maintenance activities are limited to approximately two and one half months (approximately 77 days) in any given year, from September 15 until December 1.

<u>Flood Elevations:</u> Projects must not adversely impact other authorized purposes, such as flood control. Projects must avoid increases in flood elevations that would require mitigation of adverse effects. Because of the potential high cost associated with mitigation actions, efforts will be made to avoid this threshold.

<u>Legal Compliance:</u> All efforts conducted in the implementation of the BiOp and the Mitigation Project shall comply with all Federal regulations pertaining to the activities undertaken by the Corps of Engineers.

2.4 RESOURCE SIGNIFICANCE

The importance of completing the proposed action is emphasized by the significance of the Missouri River, sandbars, and endangered species to the Region and Nation. The Missouri River, the longest river in the United States, flows 2,341 miles from the Rock Mountains in Montana to the confluence with the Mississippi River near St. Louis, Missouri. The basin encompasses 560,000 square miles, approximately 1/6th of the continental US and portions of 10 states and 2 Canadian provinces. The following sections clearly identify the significance of the environmental resources that are associated with the proposed project. The Army Corps of Engineers' Principles and Guidelines defines significance in terms of institutional, public, and technical recognition of the resources.

2.4.1 Institutional Recognition

Institutional recognition is based on the significance of resources acknowledged in laws, adopted plans and other policy statements by agencies both public and private. The

formal recognition of the Missouri River basin by Congress and the following agencies and private groups illustrates the significance of the basin to these institutions.

U.S. Congress has repeatedly recognized the significance of the Missouri River Basin through continued authorizations and appropriations for study and implementation of water resources projects. Recent authorizations include Section 108 of the Omnibus Appropriations Act of 2009 establishing the Missouri River Authorized Purposes Study (MRAPS), Section 5018 of WRDA 2007 authorizing the Missouri River Ecosystem Restoration Plan (MRERP) and establishing the Missouri River Recovery Implementation Committee, and Section 3176 of WRDA expanding the BSNP authorization to cover upper basin Recovery Activities, and continued funding and support for the MRRP. The Missouri River currently has two segments designated as National Wild and Scenic Rivers including a total of 34,159 acres.

The creation of the Missouri River Recovery Implementation Committee (MRRIC) established a formal institutional framework at the direction of Congress and as chartered by the Assistant Secretary of the Army for Civil Works (ASA(CW)). MRRIC was established under the provisions of Section 5018 of the Water Resources Development Act of 2007 to provide guidance to the Secretary with respect to the Missouri River Recovery and Mitigation Plan in existence on the date of enactment of the act (November 9, 2007) and to provide guidance to the Secretary and any affected Federal agency, State agency, or Indian tribe with respect to a study of the Missouri River and its tributaries, to be conducted in consultation with the MRRIC, to determine actions required to mitigate losses of aquatic and terrestrial habitat; recover federally listed species protected under the Endangered Species Act (ESA); and restore the ecosystem to prevent further declines among other native species. Membership currently includes representatives from eight basin states, 16 basin tribes, 15 federal agencies, and 28 stakeholder categories. Commencing in 2005, the USACE, USFWS, Environmental Protection Agency (EPA) and other federal agencies enlisted the assistance of the U.S. Institute for Environmental Conflict Resolution (USIECR) to develop a process for establishing MRRIC and currently oversees facilitation.

2.4.2 Public Recognition

Public recognition means that some segment of the public, either individual or group, recognizes some importance of an environmental resource. In the Missouri River Basin the public widely acknowledges the importance of the river, its associated activities, uses, resources and ecosystem services as something that provides benefits to people and their well-being. The Missouri River has strong and vocal support of its uses and activities including navigation, flood risk management, agriculture, hydropower, thermal power, water supply for municipal and industrial use, public use, and irrigation, water quality, fish and wildlife, recreation, commercial fishing, plant gathering, and cultural resources, among others.

2.4.3 Technical Recognition

Technical Recognition is based on the consultation of the importance of the environmental resource by reviewing relevant published and non-published literature

and documents. Numerous scientific analyses and long-term evaluations of the Missouri River basin have documented many of these significant resources.

In a 1995 report, the U.S. Department of the Interior (DOI) listed large streams and rivers as endangered ecosystems in the United States. The DOI documented an 85 to 98 percent decline in this ecosystem type since European settlement. In particular, large floodplain-river ecosystems have become increasingly rare worldwide. In 2002, the National Academy of Sciences Water Science and Technology Board (WSTB) published Missouri River Ecosystem: Exploring the Prospects for Recovery that describes the Missouri River ecosystem—the Missouri River's main channel and its flood-plain—as having experienced significant reductions in natural habitat and in the abundance of native species and communities.

The historic Missouri River aquatic and terrestrial habitats provided a unique large-river ecosystem including braided channels and chutes, backwaters, oxbow lakes, wetlands, islands, sand bars, riparian forests, and prairie grasses (NRC, 2002). The natural hydrology of the river maintained connectivity between the terrestrial and aquatic habitats, and sustained the natural floodplain communities. Channels and backwater areas provided slower-moving waters critical for the reproduction, shelter, and feeding of fish species. The Missouri river with its ephemeral sand bars, islands, chutes, wetland, and incredibly diverse riparian zone served as a major migration corridor for nearly 90 species of water birds, or 40 percent of all those in North America. Many of these reproduced in great numbers along the river.

The significance of the Missouri River is also emphasized by its provision of critical habitat for three listed species — the endangered Interior least tern (*Sternula antillarum*), threatened Northern Great Plains piping plover (*Charadrius melodus*), and the endangered pallid sturgeon (*Scaphirhynchus albus*).

Modifications to the system have resulted in significant impacts to the Missouri River ecosystem such as, alteration of three million acres of natural river habitat; 51 of 67 native fish species now listed as rare, uncommon or decreasing; reproduction of cottonwoods has largely ceased; aquatic insects, a key link in the food chain, have been reduced by an estimated 70 percent; and sandbar habitat availability reduced by over 90 percent on some reaches. The Natural Resource Council concluded their 2002 report stating "this report recommends the use of an adaptive management approach to reverse the ecological decline of the Missouri River."

2.5 PRIOR REPORTS

The following previous reports are related to this PIR:

• U.S. Army Corps of Engineers, Missouri River Division, 1981. Missouri River Bank Stabilization and Navigation Project Final Feasibility Report and Final EIS for the Fish and Wildlife Mitigation Plan.

- U.S. Army Corps of Engineers, 1987. Letter from General Robert H. Ryan to Mr. Galen L. Buterbaugh dated October 19, 1987, with enclosed biological assessment concerning the effects of Missouri River main stem system operations on the interior least tern and piping plover. 34pp.
- U. S. Fish and Wildlife Service, 1990. Recovery plan for the interior population of the least tern (Sterna antillarum). U. S. Fish and Wildlife Service, Twin Cities, Minnesota. 90 pp.
- U.S. Fish and Wildlife Service, 1990. Biological Opinion on the Operation of the Missouri River Mainstem Reservoir System.
- U.S. Army Corps of Engineers, 1993. Final Environmental Assessment for Endangered Species Habitat Improvement/Creation along the Missouri River Main stem System.
- U.S. Army Corps of Engineers, 1999. Biological assessment, Missouri River Bank Stabilization and Navigation Project, effects of annual maintenance activities on pallid sturgeon, piping plover, interior least tern, Indiana bat, and bald eagle. U.S. Army Corps of Engineers, Kansas City and Omaha Districts. 69pp + appendices.
- U.S. Fish and Wildlife Service, 2000. Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System.
- U.S. Fish and Wildlife Service, 2003. Amendment to the 2000 Biological Opinion on the Operation of the Missouri River Main stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System.
- U.S. Fish and Wildlife Service, 2003. Recovery Plan for the Great Lakes Piping Plover (Charadrius melodus). Ft. Snelling, Minnesota. viii + 141 pp.
- U.S. Army Corps of Engineers, Northwestern Division, 2004. Missouri River Mainstem Reservoir System Master Water Control Manual, Missouri River Basin.
- U.S. Army Corps of Engineers, 2006. Missouri River Mainstem Reservoir System Master Water Control manual, Missouri River Basin.
- U.S. Army Corps of Engineers, 2008. 2007 Annual Report: Biological Opinion on the Operation of the Missouri River Main Stem System, Operation and maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System.
- U.S. Army Corps of Engineers, 2009. Environmental Assessment Predation Management Plan for Least Tern and Piping Plover Habitat Along the Missouri River.

- U.S. Army Corps of Engineers, 2009. Evaluation of Vegetation Removal and Control Methods to Create Emergent Sandbar Habitat on the Upper Missouri River.
- U.S. Army Corps of Engineers, 2010. Draft Programmatic Environmental Impact Statement for the Mechanical Creation and Maintenance of Emergent Sandbar Habitat on the Upper Missouri River. Appendices include an Adaptive Management Plan.

2.6 AGENCY COORDINATION

In accordance with the National Environmental Policy Act and regulations for its implementation, the Fish and Wildlife Coordination Act, the National Historic Preservation Act, and Executive Order 13175 (Consultation and Coordination with Indian Tribal Governments), numerous agencies and Tribes were contacted for information and comments during the development of this project and the resulting EA. Designs were developed collaboratively with an interagency project delivery team (PDT) with representatives from the NPS and USFWS.

These potential sites had been identified during planning in previous years through various interagency site visits and meetings and were included in the 2009 EA in design phase. Preliminary project designs were reviewed for the projects during an interagency PDT phone conference February 24, 2010. Changes as a result of this discussion were incorporated and another interagency PDT phone call took place March 10, 2010. Additional discussion occurred for each sandbar and changes were requested. Edits for all three sandbars were made and the interagency team approved the final designs on March 29, 2010.

Scoping letters were sent to organizations including South Dakota State Historic Preservation Office, Nebraska State Historical Society, Nebraska Game and Parks Commission, Nebraska Department of Agriculture, Nebraska Department of Water Resources, Lewis and Clark South Dakota-Nebraska Preservation Association, Nebraska Department of Natural Resources, Nebraska Department of Environmental Quality (NDEQ), Nebraska Chapter of the Sierra Club, American Rivers, Missouri River Fisheries Center, Missouri River Natural Resources Committee, South Dakota Game, Fish and Parks, South Dakota Parks and Wildlife Foundation, South Dakota Cooperative Fish and Wildlife Research Unit, South Dakota Department of Agriculture, South Dakota Department of Environment and Natural Resources (SDDENR), Bureau of Indian Affairs, local Tribal chairpersons, Environmental Protection Agency (EPA), U.S. Geological Survey (USGS) and the Natural Resources Conservation Service. The agencies provided information on federally listed and candidate threatened and endangered species, state species of special concern, and natural communities (Appendix A).

2.7 EXISTING AND FUTURE WITHOUT PROJECT CONDITION

Without construction of these three ESH complexes, the area would continue to provide minimal, if any, sandbar habitat, particularly since there is a large area between RM 761 and 754 where there is virtually no existing ESH. In addition, because somewhat higher releases and therefore higher river levels in 2010 (and likely beyond) will submerge lower elevation bars and portions of bars, the majority of ESH available for nesting in the reach is the higher elevation, previously constructed sandbars created through the ESH program; this amount is a fraction of what had recently been available for the birds following the 1997 high flow event that created a large amount of habitat. The habitat created following the 1997 high flow event has been steadily lost due to erosion and vegetative succession. These trends in habitat loss on the flow created bars are anticipated to continue and are unlikely to be replaced by flow-created bars due to the fact that it takes near period of record flooding/releases to create habitats. The loss and degradation of flow-created bars has resulted in bird population and productivity declines in the past few years. By taking no action, the trends of habitat loss and declines in the species productivity are anticipated to continue. A detailed account the existing condition is available in Chapter 4, Affected Environment.

Chapter 3 ALTERNATIVES

3.1 INTRODUCTION

This chapter presents the measures and alternatives considered for the creation of ESH for 2010. The Corps considered four approaches to mechanically create ESH — creation of new sandbar (on top of submerged bars), vegetation removal, vegetation removal with subsequent overtopping to 0.5 - 1.5 ft, and vegetation removal with subsequent overtopping to the 20,000 cubic feet per second (cfs) and 50,000 cfs (see 3.2.1 below) elevations — and the no action alternative. These measures were evaluated against their ability to fulfill the site objectives as previously defined in Section 1.1.4. This chapter includes a description of each alternative, an evaluation of the alternatives, and a detailed description of the recommended actions.

3.2 PRELIMINARY MEASURES CONSIDERED

3.2.1 Creation of New Sandbar

This measure would involve building sandbars atop existing submerged sandbars to increase their height to the 20,000 and 50,000 cfs levels. These levels are based on the Gavins Point Dam summer operating scheme. 50,000 cfs is exceeded approximately 5% of the time. Taking into consideration average daily releases and a standard deviation in the annual mean discharge, this level leaves the top of the islands at 50,000 cfs with enough elevation to provide nesting habitat. The 20,000 cfs level is exceeded 70% of the time on an annual basis. Working below the 20,000 cfs level would be infeasible due to the substrate likely being under water. Creating habitat above the 20,000 cfs level, sloping up to the 50,000 cfs level, provides foraging habitat. This methodology often requires large amounts of material. Constructed sandbars provide immediately available bare sand for nesting. This is the primary construction methodology for the mechanical creation of ESH.

3.2.2 Vegetation Removal

This measure would involve clearing of an existing, vegetated sandbar to provide bare sand nesting grounds. Vegetation removal techniques alone have yet to successfully replicate bare sand habitat. Projects completed to date have shown minimal usage for nesting and primarily low to moderate productivity. A vegetation removal study looking at various removal methodologies is currently being conducted.

3.2.3 Vegetation Removal with Subsequent Overtopping

This measure would involve clearing of an existing, vegetated bar and then placing 0.5 – 1.5 feet of fill uniformly over the entire sandbar to prevent future vegetation growth. This methodology is considered experimental and a project that utilized this method would be considered a pilot project.

3.2.4 Vegetation Removal and Building up to 20,000 and 50,000 cfs Elevations

This measure is a variation of vegetation removal with subsequent overtopping; however, the intent is to build the sandbar up in elevation to support suitable nesting habitat. Vegetation removal would be performed, then, rather than prescribing that fill only be added uniformly across the sandbar $(0.5-1.5 \, \text{ft.})$, enough material would be utilized to build the sandbar up to the 20,000 and 50,000 cfs (nesting) flow elevations (e.g. $3.0-4.0 \, \text{ft.}$, but variable due to existing elevations). This methodology would often require more material than simply overtopping to prevent vegetation growth. This methodology is considered experimental and a project that utilized this method would be considered a pilot project.

3.2.5 No Action

Under the "No Action" alternative, no steps would be taken to create tern and plover habitat within the project area. This alternative would hinder the Corps from meeting the ESH acreage goals set forth for this river segment under the BiOp. Under this alternative, erosion trends would likely continue unless another significant hydrologic event occurred in the near future, and sandbars would also likely continue to vegetate. It is likely that species productivity would continue to decline in these stretches of the river.

3.3 PRELIMINARY SCREENING

This section will discuss the measures considered but eliminated from further consideration for each site. Once potential ESH sites are prioritized, the selection of the appropriate measures is based on site-specific conditions, including whether the site consists of completely submerged versus exposed sandbars, if the sandbars are vegetated, and what the expected flows are in a given year. The sections below will describe the screening process at each proposed ESH construction site.

3.3.1 River Mile 789.7

This site consists of an area of exposed (varied elevation) and shallowly submerged sandbars. The sandbars had been historically successful (based on bird productivity), however, exposed portions are currently heavily vegetated. Because this site consists of a mix of exposed bars and shallowly submerged bars that would need to be built up to nesting elevations, the measures of vegetation removal and vegetation removal with overtopping alone were eliminated. A combination of building up submerged sandbars (creation of new sandbar) and vegetation removal and building up to nesting elevation would be pursued.

3.3.2 River Mile 759.4

This site consists of exposed (vegetated) sandbars of varied elevations and shallowly submerged sandbars. Because this site consists of a mix of exposed bars and shallowly submerged bars that would need to be built up to nesting elevations, the measures of vegetation removal and vegetation removal with overtopping alone were eliminated. A combination of building up submerged sandbars (creation of new sandbar) and vegetation removal and building up to nesting elevation would be pursued.

3.3.3 River Mile 756.7

The plans for this sandbar initially focused on creating an entirely new complex on submerged bars in the center of the channel; therefore the measures of vegetation removal, vegetation removal with overtopping and vegetation removal followed by building up to nesting elevations were eliminated. However, discussions with the PDT, particularly Gavins Point field office staff, revealed that the thalweg was very active here and it was determined too risky to build on these sandbars.

The focus then shifted to a part of this sandbar complex that was shielded from the thalweg, had high historical bird usage, but was currently heavily vegetated. Because these sandbars were heavily vegetated and were at varied elevations, the measures of creation of new sandbars, vegetation removal only, and vegetation removal with overtopping alone were eliminated. Plans to remove vegetation and build the sandbars up to nesting levels would be pursued.

3.4 RECOMMENDED ALTERNATIVE

Due to similar site conditions, the recommended alternative at the three identified sites in the Gavins Point River Segment involves performing vegetation removal and building ESH at the 20,000 and 50,000 cfs levels. This was determined to be the most viable and cost effective measure due to the existing site conditions. At all three sites, creation of new sandbars at other locations would have greater costs due to needs to add greater elevations to existing rive bed elevations and likely would be less sustainable due to geomorphic and hydrologic conditions than building over the existing low elevation bars. Vegetation removal as a stand alone measure or with overtopping of 0.5-1.5 feet of sand were both eliminated due to the fact that these would not result in bars available during a large number of years due to potential for submersion in years of relatively higher releases.

3.4.1 Description of Recommended Actions

3.4.1.1 River Mile 789.7

This site entails building a complex of three sandbars over an expanse of several exposed and shallowly submerged sandbars that are part of a series of remnant, historically successful (bird productivity) sandbars. Construction activities would involve the removal of any vegetation on exposed bars and placement of fill atop them and surrounding submerged sandbars in order to create 30 acres of ESH. Channels would be excavated between the three sandbars to increase foraging habitat for piping plovers. This project would be staged from the right descending bank on the Nebraska side of the river, in an area located on Corps-owned land at Audubon Bend. The proposed project would require approximately 150,000 cubic yards of material to create 30 acres of ESH at the 20,000 cfs level, with the top elevation on each bar built to the 50,000 cfs level.



Figure 3-1: Design for RM 789.7

3.4.1.2 River Mile 759.4

This site entails building a complex of five sandbars, with channels excavated between them, over an expanse of several exposed and shallowly submerged bars. Construction activities would involve the removal of any vegetation on exposed bars and placement of fill atop them and surrounding submerged sandbars in order to create 71 acres of ESH. To increase wetted edge (foraging habitat for piping plovers), in addition to the channels, three of the bars would have small backwater areas excavated within them. This project would be staged from the right descending bank on the Nebraska side of the river, in an area to be determined pending landowner cooperation.

The proposed project would require approximately 300,000 cubic yards of sand to create 71 acres of ESH habitat at the 20,000 cfs level, with the top elevation built to the 50,000 cfs level. These sandbars are located near other heavily vegetated sandbars, which could increase predation risk. In order to provide a predation barrier, vegetation would be removed on the exposed sandbar to the west of the complex at RM 759.5 (no contours shown), which has vegetation on the west and east ends, but is mostly barren in the middle.

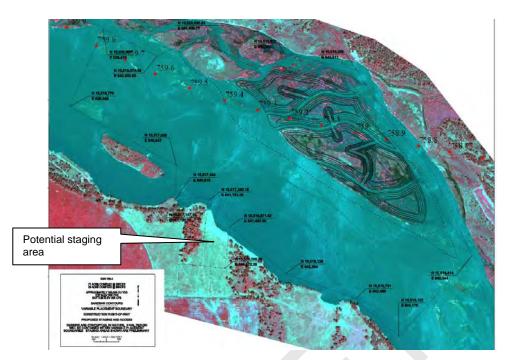


Figure 3-2: Design for RM 759.4

3.4.1.3 River Mile 756.7

This area consists of two higher, heavily vegetated sandbars and a sandbar on which vegetation removal has occurred in the past, and is in an area of historical bird usage. Construction activities would involve the removal of any vegetation on exposed bars and placement of fill atop them in order to create 60 acres of ESH. To increase wetted edge (foraging habitat) each bar would have backwaters excavated within them and there would be channels excavated between each bar. This project would be staged from the right descending bank on the Nebraska side of the river, in an area to be determined pending landowner cooperation.

The proposed project would require approximately 250,000 cubic yards of sand to create 60 acres of sandbar at the 20,000 cfs river stage, with the top elevation built to the 50,000 cfs level.

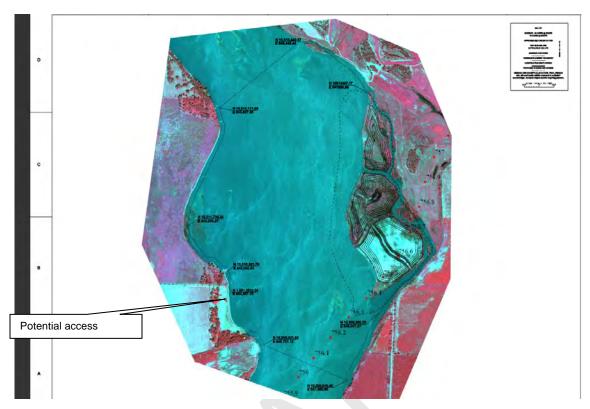


Figure 3-3: Design for RM 756.7

3.5 DESIGN AND CONSTRUCTION CONSIDERATIONS

3.5.1 Design Criteria

All proposed ESH complexes have a few general design considerations. They are in areas where the river is wider and sand naturally deposits (in the Gavins Point River Segment, minimum width is 2,300 ft.). This characteristic promotes sandbar longevity. Within these wide areas of the river, sandbar complexes generally are designed to be placed atop areas of shallow, submerged sandbars, which provide a base upon which to build ESH and limit the amount of disturbance to the existing flow pattern in the vicinity of the project. This also displaces a minimal amount of water in the channel. Other complexes are designed to utilize existing emergent bars that have succumbed to vegetation encroachment. At these sites, vegetation would be removed and new sand would be placed atop the existing bars to raise the elevation and help prevent future vegetation growth. Complexes of multiple small sandbars with small channels between them are preferred over large, single sandbars because experience has shown that multiple small bars optimize foraging (edge) habitat and provide additional barriers to predators. In addition, placement 300 feet off-bank is recommended where feasible if predation risk is high.

Construction guidelines have been developed in order to limit impacts to the local hydrology. Initially, designs avoid areas of known high-flow and remain outside of the thalweg. Based on hydrologic conveyance equations and knowledge of bed transport in

this segment of the river, the Corps places restrictions on the depth of dredge cuts made during construction (4 feet or the elevation of the thalweg, whichever is less; this area is assumed to be part of the active bed). If kept within these criteria (working within the active bed), material would only be shifted within the same cross-section and would remain below flood stages, meaning that no localized change (no net impact) in hydraulic conveyance would be anticipated from the proposed projects.

A 100-foot dredging/excavation buffer adjacent to existing bank lines would be established to decrease erosion potential. In addition, a 75-foot "buffer" would be established around the footprints of the constructed sandbars from which no borrow material would be taken. This is intended to retain the designed slope of the constructed sandbar at the water's edge. A shallow slope (2-4% above 20,000 cfs water surface) helps maintain a wide wetted edge that provides important habitat for plovers to forage on, as well as reducing erosion on the edges of sandbars. The contractors are also provided the leeway to make all edges irregular with variations of up to 50 feet landward and riverward of the edges shown on the drawing to produce the same effect. A further variation on this would be additional shaping of the downstream edge of each sandbar. These features would only be utilized only if they could be accomplished while meeting design slopes. In order to adhere to the 75-foot buffer, temporary haul roads may need to be constructed to access fill material. Construction guidelines mandate that the roads be removed prior to completion of the project, returning the area(s) to preconstruction conditions.

USFWS recommendations in the BiOp regarding physical conditions for nesting, brood rearing and foraging habitat are also taken into consideration during ESH design:

- Nesting habitat of 1 acre minimum; 10 acres preferred
- Circular or oblong in shape
- Slopes of 1:25 not to exceed 1:10 (greater wetted/forage area)
- Foraging surfaces 18" above water surface

Due to the dynamic nature of the river in this reach, it is sometimes necessary to field-adjust sandbar design based on hydrology changes that have occurred between planning and construction of a project. In order to allow for this, the Corps establishes a "Maximum Placement Area" zone for each project. Changes in the project footprint or layout would be within this boundary. This allows the Corps to respond to changing conditions during construction and avoid placing sediment in the path of a primary or secondary channel. This further limits impacts to local hydrology as well as minimizing material lost during construction and decreasing future erosion of the sandbar.

3.5.2 Site Access and Staging

In order to construct these projects, equipment may need to be transported to the sites via truck or other land vehicle. The Corps has chosen and obtained real estate interests on areas for the purpose of setting up equipment, fueling, and launching vessels into the river. These sites have been analyzed for the presence of cultural resources,

wetlands and other sensitive resources. Best Management Practices (BMPs) would be used to avoid negative impacts to these areas and all modifications resulting from use of staging and fueling areas, as well as access to these areas, would be returned to the original state upon completion of construction activities. Known or potential staging areas for each project site are discussed in Section 3.6.

3.5.3 Construction Period

In general, there are four factors that limit timeframe in which ESH construction can take place. The first is related to the nesting season for terns and plovers. The period can begin as early as April 15 and end as late as August 25. Construction activities are restricted within ¼ mile of sites where active nesting or brood-rearing is taking place. Construction typically begins in September or October, following the end of the nesting season, and continues to the beginning of the next nesting season in April. However, if there is no nesting activity within ¼ mile of a project site, then work may begin as early July 15. After this date there is a very low risk of re-nesting taking place within the construction area. The end of the construction season may be extended until May 15 if nesting activity is not initiated within ¼ mile of the project.

The second factor is weather. Construction activities must cease in the winter when the river freezes and cannot start again until the river thaws in the late winter/early spring. Typically this down period occurs sometime between December 1 and March 1. The third factor is construction methodology. If the contractor chooses to use a dredge to collect borrow material, construction must be initiated when the river is high in order to be able to launch the dredge. The river is highest during the navigation season which typically occurs from mid-March to mid-October. If contractor chose to use bulldozers and scrapers to collect borrow material, construction would not begin until the end of the navigation season because the borrow material would likely be submerged until that time.

The fourth factor is recreational pursuits. In an August 2008 letter, NPS raised concerns regarding heavy equipment impacts on recreationists and their activities, including canoeing/kayaking, boating, fishing, hunting and camping. They asked that until NPS has the opportunity to complete studies regarding these impacts, the prime recreational season from Memorial Day to Labor Day be off limits for construction. Because this could severely shorten the window of opportunity to dredge in the summer months and affect the timetable of many of the ESH projects, the Corps is addressing this issue with the NPS on a case by case basis, including timing of mobilization of equipment to staging areas.

Table 3-1 is a graphical representation of the construction period based on nesting activity and primary equipment. The primary months for ESH construction are noted in green. Months are noted in yellow if some construction activities could be conducted if conditions are adequate and there is no anticipated disturbance to nesting birds. The primary recreation season is noted in orange. Months during which work would generally not be conducted are noted in red. Primary equipment and recreation time frames are not as fixed as bird presence. Gray squares with an "X" are those times

when construction would not usually take place and blank squares represent times when work can be accomplished given the right circumstances.

JUL **AUG** SEP NOV DEC **FEB** MAR APR JUN OCT MAY No Nearby Χ X Χ Χ Χ Χ Χ Nests Nesting Activity Nests on Bar or X X X X Χ Χ Χ Χ Χ X Χ X within 1/4 mile Χ Χ Χ Χ Χ Χ Χ Dredge Χ Χ **Primary** Equipment Bulldozers X X X X Χ Χ Χ Χ Χ Χ Χ Χ Recreation Χ Χ Χ Χ Χ Χ Activity

Table 3-1: ESH Construction Windows*

3.6 RISK AND UNCERTAINTY

Risk and uncertainty for this project are derived from the level of releases from Gavins Point dam, the potential of the main river thalweg shifting, and from vegetation encroachment, which could both impact sandbar stability or longevity, as well as predation risks, and ultimately tern and plover productivity. Dynamic river conditions are being addressed through an adaptive management approach (Section 7.2) and in-field flexibility which includes variable placement within a boundary (section 3.7.1). A predation management plan is in place (Section 7.4).

^{*} Blank squares represent times when work can be accomplished given the right circumstances; in time periods where nesting, primary equipment limitations or recreation activities overlap, the presence of birds would be give first consideration.

Chapter 4 AFFECTED ENVIRONMENT

4.1 PHYSIOGRAPHY/TOPOGRAPHY

The project area is located within the physiographic subdivision known as the Missouri River Trench, which is part of the Great Plains province. The proposed project area consists of active alluvial channel and accreted river sediments. Relief in this area is predominantly level.

4.2 HYDROLOGY, GEOMORPHOLOGY, EROSION

Releases from Gavins Point Dam follow the same pattern as those from Fort Randall Dam because there is little active storage in Lewis and Clark Lake. Releases from both dams are based on the amount of water in system storage, which governs how much water will be released to meet service demands in the portion of the Lower River from Sioux City to St. Louis. Constraints for flood control, threatened and endangered bird nesting, and fish spawning requirements are factors governing releases. In the navigation season, (April 1-December 1) releases from Gavins Point Dam are generally 25,000 to 35,000 cfs. In the winter, releases are in the 10,000- to 20,000-cfs range. In wet years with above-normal upstream inflows, releases are higher to evacuate flood control storage space in upstream reservoirs. Maximum winter releases are generally kept below 24,000 cfs to minimize downstream flooding problems caused by ice jams in the Lower River. Navigation releases are provided through November if July 1 system storage is at least 41million acre-feet (MAF). Navigation releases cease in mid-September if July 1 system storage is 25 MAF or lower. Full-service navigation releases vary, depending on the demand for water at downstream navigation target points at Sioux City, Omaha, Nebraska City, and Kansas City.

Generally, an average navigation season release of 35,000 cfs at Gavins Point Dam will provide downstream flows necessary for full service. If downstream tributary inflow above Kansas City is abnormally low, then additional water must be released from Gavins Point Dam to meet the 41,000 cfs target at Kansas City. If downstream tributary inflows are high, then the flow target at Sioux City will determine the system release rate. When system storage is low, less than full service is provided by lowering target flows by up to 6,000 cfs (minimum service). In extended droughts when navigation has ended or during floods, releases may be reduced to 9,000 cfs or less. Usually, navigation flow target requirements result in increasing summer releases to meet target flows as tributary inflows decline. Releases as high as 39,000 cfs from Gavins Point Dam have been necessary to provide full service at Kansas City.

Operation constraints dictate that releases from Gavins Point Dam not be increased between mid-May and mid-August because islands with nesting terns and plovers could

be flooded. This constraint necessitates higher-than-needed late spring and early summer releases to anticipate the demand for late-summer navigation releases. The forecasted maximum late-summer navigation release requirement is established in mid-May, prior to nest initiation. This commitment dictates releases at least through early summer. During the 1987 to 1993 drought, summer release restrictions at Gavins Point Dam for the protection of terns and plovers resulted in not always meeting Nebraska City and Kansas City targets during August. A portion of the shortfall for the Kansas City target was met by water released from the Corps' Kansas River projects. Conversely, when the system water supply is unusually large, as in 1996 and 1997, service levels for the orderly evacuation of stored floodwaters take precedence over nesting birds. Consequently, release rates from Gavins Point Dam may have to be increased to as much as 25,000 cfs over and above full-service navigation flows during nesting (USACE, 2004).

Prior to dam construction, the Missouri River was a dynamic, free-flowing river. As such, continuous bank erosion was common. There has been a gradual erosion of the riverbed below Gavins Point Dam to Ponca, Nebraska, since 1955. The extent of erosion is highest (about 10 feet) in the reach immediately below the dam. The bed material in this reach has also become progressively coarser than in the lower reach of the segment, thus indicating gradual armoring of the channel bed over time. The rate of riverbed erosion has diminished since 1980. Stream bank erosion has also occurred below Gavins Point Dam. The rate of erosion declined after 1955. Rates of erosion since closure in 1956 have averaged 157 acres per year between Gavins Point Dam and Ponca State Park, compared to a pre-dam rate of 202 acres per year. Rates of erosion have declined somewhat since 1975 (USACE, 2004).

One concern expressed during previous scoping efforts was the potential loss of gravel bars due to sandbar construction. Gravel bars are believed to be spawning locations for sturgeon (USFWS, 2003) and also appear to be important areas for mussel species (Ecological Specialists Inc, 2007). A recent survey of gravel bars in the 59-mile reach indicated that the vast majority of the gravel bars in the 59-mile reach exist in the 7.5 miles (12 km) immediately below the dam (Laustrup et al, 2007). This is attributed to greater channel degradation in this reach. The survey did not identify any gravel deposits in the vicinity of the proposed projects, with the exception of a deposit on the Nebraska bank at RM 764 which is outside of the proposed project's construction footprint.

As previously mentioned, because of the dynamic nature of the river, channel bathymetry can change on a yearly basis, including thalweg and bar position. Table 4-1 describes the last observed thalweg location in the vicinity of the proposed projects (Jons, personal communication, March 2010).

Table 4-1: Thalweg Locations

(RDB - Right Descending Bank, LDB – Left Descending Bank, Center – Mid-channel)

Location (RM)	Thalweg Location
789.7	LDB
759.4	LDB
756.7	LDB

4.2 BIOLOGICAL RESOURCES

4.2.1 Fish

About 100 species regularly use the main channel or flood plain habitats downstream from Gavins Point Dam. About 35 native species are thought to be declining, whereas some 23 species (including 9 introduced species) are thought to be increasing (Hesse, 1996). Studies of benthic fish in the Missouri River were conducted between 1995 and 1999 (USACE, 2001). These studies indicate that overall diversity of species in the unchannelized reaches is greatest. These areas contain the greater number of microhabitats and available niches that are reflective of a more natural river channel.

The most commonly captured species in the project areas (channelized reach) include emerald shiners (Notropis atherinoides), red shiners (Cyprinella lutrensis), gizzard shad (Dorosoma cepedianum), and river carpsuckers (Carpiodes spp.). The study also shows that fish more often use habitats associated with shallow depths and slower velocities. Species that utilize fast current are shovelnose sturgeon (Scaphirhynchus platorynchus), blue sucker (Cycleptus elongatus), sicklefin chub (Macrhybopsis meekii) and sturgeon chub (Macrhybopsis gelida); while walleye (Stizostedion vitreum) and sauger (Stizostedion canadense) utilized medium flow areas; and bigmouth buffalo (Ictiobus cyprinellus), freshwater drum (Aplodinotus grunniens), and river carpsuckers used slow water habitat. Suitable nursery areas for many fish species in the river are limited because of high velocity, turbulent flows, and silt and sand loads (USACE, 1994). Freshwater drum, suckers (Catistomidae), minnows, and common carp (Cyprinius carpio) are the dominant larval species in the Missouri River. Other common fish species include the lowa darter, longnose gar, black crappie, largemouth bass, common carp, walleye, white bass, carpsucker, emerald shiner, green sunfish, sauger, northern pike, gar, goldeye, gizzard shad, minnows and shiners (Gasper et al., 2002).

Fish species common to the 59-mile segment include freshwater drum, channel catfish, common carp, walleye, and goldeye/herring. Less common species found in this reach include sauger, flathead catfish and shovelnose sturgeon (NPS, 1997).

4.2.2 Wetlands

Historically the Missouri River represented one of North America's most diverse ecosystems with a dynamic complex of braided channels, riparian lands, chutes, sloughs, islands, sandbars, wetlands and backwater areas. The River has been

transformed from a free-flowing river into a system of main stem reservoirs and reaches influenced by self-channelization, bank stabilization and regulated flows. Much of the River's habitat diversity and balance has been lost, including wetlands.

The areas proposed for sandbar restoration in the Gavins Point segment are largely sandbars which are underwater during the growing season. Exposed areas are higher elevation remnant sandbars from the high water events that occurred between 1993 and 1997 that have succumbed to terrestrial vegetation encroachment and erosion over the last few decades. Some edge areas of the sandbars could contain temporary wetland communities.

4.2.3 Vegetation

Some general observations can be noted regarding vegetation on the proposed projects. Vegetation on the existing bars includes a mix of forbs, shrubs and trees and is largely dominated by willow species and young cottonwood trees on higher elevation bars. As with most of the sites in the Gavins reach, the proposed ESH sites have varying amounts of sparse vegetation. Partridge pea (*Cassia fasciculata*) is often present at the higher elevations (Jons, G., U.S. Army Corps of Engineers, personal communication, March 2010). Acres of vegetation on existing bars at each site are listed in Table 4-1.

Table 4-2: Vegetation	on Existing Bars at Pro	posed Project Locations
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Location (RM)	Acres
789.7	10
759.4	20
756.7	30

4.2.4 Wildlife

The lands near the project site are likely inhabited by a variety of wildlife species typical to lowlands adjacent to the Missouri River.

4.2.4.1 Mammals

There are a variety of small mammals common to the project area including ground squirrels, fox squirrels, rabbits, gophers, badgers, moles, skunks and opossums. Large mammals common to the area include coyotes, red foxes, white-tailed deer, and bobcats. White-tailed deer prefer patchwork patterns of cover and cropland. Also in this area are some aquatic and semi-aquatic mammals such as beavers, weasels, muskrats and mink (Gasper et al., 2002). Mink are of concern as they are a potential predator of both terns and plovers.

4.2.4.2 Birds

The Missouri River in the vicinity is home to 25 year-round resident bird species, 58 migrant species which nest along the river, 15 species that are winter residents, 115

species that are spring migrants and 110 species that are fall migrants (NPS, 1999). The MNRR corridor is home to many species of waterfowl and shorebirds including geese, ducks, herons, bitterns, pelicans, avocets, plovers, sandpipers, gulls, terns and kingfishers. Birds of prey include eagles, hawks, vultures, osprey, falcons and owls. Other species that would be expected along the river include doves, woodpeckers, swallows, blackbirds and sparrows.

4.2.4.3 Amphibians and Reptiles

A 2003 survey of reptiles and amphibians in the vicinity found the following species: bullfrog, bullsnake, common garter snake, common snapping turtle, cope's gray treefog, eastern hognose snake, false map turtle, northern cricket frog, northern leopard frog, painted turtle, plains garter snake, racer, ringneck snake, six-lined racerunner, smooth softshell turtle, western chorus frog, western fox snake, and woodhouse's toad. Species expected but not found during the survey were the Great Plains toad, milk snake, northern prairie skink, northern water snake, plains leopard frog, plains spadefoot toad, spiny softshell turtle, tiger salamander, and western hognose snake. The study also notes that surveys of islands only found species of frogs, toads and turtles (Fogell, 2003). A study performed by Doug Backlund and Keith Perkins (2000) found that softshell turtle nests were common on inter-channel sandbars.

4.2.4.4 Invertebrates

The substrate of sandbars is home to a number of invertebrate species, the primary food source for the piping plover. One study found that invertebrate populations within this reach were typically higher along protected shoreline as opposed to exposed shoreline (Le Fer, 2006). Plovers foraged for invertebrates in all available habitats including dry sand, on vegetation, and in both moist and saturated sand, but spent the majority of their time foraging in moist sand. While Diptera (flies) were the most abundant invertebrates collected during sampling, Coleoptera (beetles) were most numerous in plover fecal samples. This finding is aligned with prior study results, suggesting that beetles are typically the main food source for plovers. Other taxa captured in this reach included Hemiptera, Homoptera, Hymenoptera, Odonata, Orthoptera, and Araneae.

4.2.4.5 Mussels

Historically, the Missouri River was thought to be devoid of mussel species. It wasn't until 1976 that some indication was given that mussels may be present in backwaters of the Missouri River. This prompted survey work by Hoke, who collected mussels at one site within the 59-mile MNRR, just below the Gavins Point Dam around RM 810 (Hoke, 1983). He documented 9 species at this location, including a single fresh-dead specimen of scaleshell (Leptodea leptodon). In this report, Hoke notes the scaleshell was collected in areas shielded from the main current but with a moderate current and stable sand substrate. When the scaleshell was listed in 2001, due to a lack of any live specimens being found, the Missouri River was not included in the scaleshell's range.

Large scale surveys of the 59-mile reach were completed in 1999 and 2006 (See Table 6). The vast majority of live specimens were collected in an area known as "The Bubble," just below the Gavins Point dam on the South Dakota side of the river around RM 810, presumably the same area where Hoke collected a scaleshell in 1982. Perkins

and Backlund found the largest number of mussels in backwaters and shallow areas along the river's shore.

Table 4-3: Mussel Species of the 59-Mile Missouri National Recreational River

Common Name	Scientific Name	
White heelsplitter	Lasmigona complanata	Common Species
Fragile heelsplitter	Leptodea fragilis	
pink heelsplitter	Potamilus alatus	Uncommon but Present
Pink papershell	Potamilus ohiensis	
giant floater	Pyganodon grandis	
Deertoe	Truncilla truncate	
Threeridge	Amblema plicata	
flat floater	Anodonta suborbiculata	
rock pocketbook	Arcidens confragosus	
fat mucket	Lampsilis siliquoidea	
yellow sandshell	Lampsilis teres	
stout floater	Pyganodon grandis corpulenta	
Mapleleaf	Quadrula quardula	
Creeper	Strophitus undulates	
Lilliput	Toxolasma parvus	
Fawnsfoot	Truncilla donaciformis	
pimpleback	Quadrula pustulosa	

When the Corps proposed its first major ESH creation projects in the 59-mile MNRR in 2004, this prompted a number of other surveys within the footprint of the proposed islands. This survey indicated that mussels on the river may be using some habitat types, namely inter-channel submerged sandbars, where they were previously thought only to occur in small numbers. Just days after this survey was completed, Backlund discovered a weathered shell at the Bubble that was later determined to potentially be the endangered Higgin's Eye (*Lampsillis higginsii*) mussel (Backlund, 2004). These findings prompted a third survey in 2004 to determine the presence/absence of federally listed mussel species at the proposed construction sites RM 810-809, RM 770, and RM 761) (Ecological Specialists, Inc., 2005).

While completing mussel surveys for the NPS in October 2005, Perkins discovered a fresh-dead scaleshell mussel, the only other in the 59-mile MNRR since Hoke's discovery 22 years earlier. This event, along with the previously reported discovery of a Higgin's eye, prompted the Corps and NPS to assemble a group of malacologists from the area to discuss these findings at a Mussel Roundtable held in June 2006. The

general consensus was that it was unlikely that there was a population of Higgin's eye in the river, but that it was possible that the scaleshell may have a small population in the 59-mile MNRR. The Corps hired Ecological Specialists, Inc. to complete a targeted survey of the 59-mile MNRR for the scaleshell mussel. The survey concluded that, in contrast to other large rivers of the Midwest, both mussel density and species richness of the Missouri river were low. No evidence of *L. Leptodon* or *L. Higginsi* was found during this survey. The report stated that while it was possible that *L. Leptodon* was in this reach, the probability of the species' occurrence is extremely low. The report identified areas of higher than usual densities and habitat types that mussels tended to use (RM 810 - 790), resulting in the most diverse mussel population in the MNRR being located in those river miles.

While the above mentioned mussel species are believed to be beneficial to the overall ecosystem, two invasive mussel species are threats to the existing community: the zebra mussel (*Dreissena polymorpha*) and the Asian clam (*Corbicula fluminea*). Neither species requires a fish host so larvae can spread much more rapidly than other freshwater species. Asian clams were first introduced to the U.S. in the 1930's and have spread throughout the country. They were first documented in the Missouri River below Gavins Point in 2003 and are now common in this reach. Zebra Mussels were first introduced to Lake St. Clair in 1988 and have been extremely destructive to the ecosystems of the Great Lakes. While zebra mussels have been found in the Missouri River near Sioux City Nebraska, their population in this system is not yet widespread. Zebra mussel "veligers" or reproducers were recently found in the MNRR near the St. Helena boatramp, some indication that there may be reproducing adults in the reach. Although neither of these species were collected during the most recent mussel survey in the Missouri river, the threat of their spread via boats and other aquatic equipment remains.

4.2.4.6 Bald Eagle

The bald eagle (Haliaeetus leucocephalus) is known to inhabit forested areas along the Missouri river. While previously listed as "threatened" under the ESA, the Bald Eagle was de-listed on June 28, 2007 (effective August 8, 2007). However, this species is still protected under the Bald and Golden Eagle Protection Act as well as the Migratory Bird Treaty Act. These birds tend to construct their nests in mature trees near aquatic habitats, especially in cottonwood trees.

Bald eagles are common winter residents along the Missouri River. Eagles will tolerate some human disturbance around a roosting site, but prefer low activity. The National Bald Eagle Management Guidelines (NBEMG) provide recommendations for avoiding disturbance to nesting sites consistent with the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. In this area, eagles typically begin laying eggs in February and young are fledged by the end of August. During this period, the NBEMG recommends avoiding active nests by a maximum distance of 660 feet if the activity will be visible from the nest (USFWS, 2007b). Table 4-3 lists distances from the proposed ESH projects to the nearest known eagle nest location based on GIS data collected and maintained by the NPS.

Table 4-4: Bald Eagle Nests

Site (RM)	Closest Nest (Ft.)
789.7	1,500
759.4	N/A
756.7	N/A

4.3 FEDERALLY THREATENED AND ENDANGERED SPECIES

The USFWS has already considered the biological effects of the construction of ESH in the development of the RPA for the BiOp and determined that it is an integral component to avoid jeopardy to listed species. Therefore, the Corps is not required to prepare a Biological Assessment (BA) for this action. However, for the purposes of the National Environmental Policy Act (NEPA), this environmental assessment discloses the effects/benefits of the project on threatened and endangered species. In communications dated March 30, 2010 (Appendix A), the U.S. Fish and Wildlife Service identified the pallid sturgeon, least tern, piping plover, whooping crane, Eskimo curlew, Topeka shiner, scaleshell mussel, Higgenseye pearlymussel, western prairie fringed orchid and American burying beetle as Federally listed species within the vicinity of the project.

The following federally-listed threatened and endangered species are known to occur in the project area. The species intended to benefit from the Corps' actions are the interior least tern and the piping plover. These species utilize sparsely vegetated sandbars for nesting, foraging and brood-rearing habitat during the period from approximately late April to late August. Both of these birds are primarily colony nesters, and in this area the species frequently cohabitate, establishing residence on the same sandbars (EA Engineering, 1988).

4.3.1 Pallid Sturgeon, Scaphirhynchus albus (Endangered)

The endangered pallid sturgeon (*Scaphirhynchus albus*) is a descendant of a group of ancient (Paleozoic) fish. The pallid was federally listed on September 6, 1990. This species' habitat is submerged sand flats and gravel bars. They are believed to prefer the cooler (32 - 85° F), turbid waters typical of the historic Missouri River. They feed primarily on macroinvertebrates and small fish. These fish are most often found over a sandy substrate in waters of velocity 0.3 to 1.0 feet per second (fps) and depths of 3.5 to 10 feet (USFWS, 1993).

Pallid sturgeon abundance has declined throughout the Missouri River since construction of the BSNP (Carlson and Pflieger, 1981). Overfishing, pollution, and hybridization that have occurred due to habitat alterations have also contributed to the population decline of the species (USFWS, 1993). Destruction and alteration of habitats by human modification of the river system is believed to be the primary cause of decline

in reproduction, growth and survival of pallid sturgeon. Recovery of the species is unlikely if habitat elements of the Missouri and Mississippi River are not restored (USFWS, 1993). Historically, pallids were threatened due to harvest by commercial fisheries. The more recent threat to these species is loss of habitat due to the inundation resulting from the dams and reservoirs and the channelization of the Missouri River, which have altered water temperature, turbidity and nutrient levels (USFWS, 1993).

Although there are numerous ongoing studies, currently little is known about the pallid sturgeon population of the Missouri River. Compared to other species, capture and recapture are relatively infrequent. Hatchery-raised juvenile pallid sturgeon have been stocked on a regular basis in the lower Missouri river below Gavins Pont Dam since 1997 (Krentz et al. 2005) and in the lower Platte River. Rough estimates of one to five pallid sturgeon per kilometer in the channelized river have been made to provide a total estimate of between 1,303 and 6,516 in this river section (Duffy et al., 1996). In a study conducted in the lower 200 miles of the Missouri River, it was noted that the ratio of pallid sturgeon to all river sturgeon (including shovelnose, pallid, hybrid, and lake sturgeon) decreased from 1:311 in 1996-2000 to 1:387 in 2002 (USFWS, 2003).

In 2005, the Corps and the Nebraska Game and Parks Commission (NGPC) began sampling the segment of the Missouri River between Ponca State Park (RM 753.0) and the mouth of the Platte River (RM 595.0). A total of 15 pallid sturgeon were captured during the 2005 sampling season and 17 pallid sturgeon were captured during the 2006 sampling season. Most pallid sturgeon were captured in channel border habitats within inside bends (Barada and Steffensen 2006; Hamel and Steffensen 2007).

Substrates associated with spawning in the Missouri River and major tributaries include rock, rubble, and gravel (USFWS, 1993). It is believed that pallids spawn during the period of May 1 – August 1. In 2007, the first direct evidence was provided that pallid sturgeon spawn in the Missouri National Recreational River segment and in the channelized river upstream from the Platte River. Two female pallid sturgeon were recorded spawning, one upstream of Ponca State Park, and one in the channelized reach downstream of Sioux City, Iowa (RM 734) (USGS 2007). However, there is no information available detailing whether the eggs hatched and contributed to the pallid sturgeon population.

4.3.2 Interior least tern, Sternula antillarum (Endangered)

The interior least tern was listed as a federally endangered species on June 27, 1985. The least tern is a shorebird that prefers to nest in colonies on unvegetated to sparsely vegetated sandbars. They feed primarily on small fish, which are gathered from shallow areas along sandbars or shores (USFWS, 1990). Least terns begin arriving on the MNRR in mid to late May. The least tern prefers sandbars that are toward the center of the river, with little vegetation and a sandy/gravelly substrate. Adults and juveniles will head for the wintering grounds after fledging (when chicks learn to fly), with most terns departing the MNRR by the end of August. Much of the habitat historically utilized by these birds has been lost due to reservoir inundation, vegetative encroachment, erosion, and high summer releases. Many of the remaining bare sandbars along the

Missouri are used for recreation and are prone to human disturbance during the bird's nesting season. Predation can also be a problem.

There were 706 least tern adults counted on the Missouri River in 2009. In 2008 the population dropped below the recovery goal for the first time in four years (800 adults, as set in the 1990 Interior Least Tern Recovery Plan) (Figure 4-1). Much of this drop may be attributable to higher storage levels in the reservoirs, particularly Lake Oahe and Lake Sakakawea. In order to meet recovery objectives, the population would have to be above 800 for ten years (USFWS, 1990).

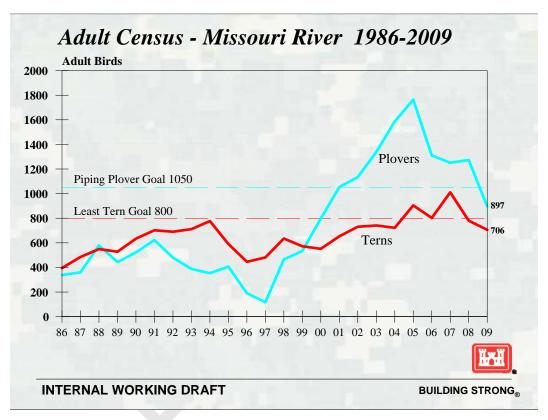


Figure 4-1: Adult Census of Least Terns & Piping Plovers on the Missouri River

The 2003 BiOp amendment set a fledge ratio goal for terns of 0.94 fledglings per breeding pair which is to be measured on a three-year running average (Figure 4-2). Decreases may again be tied to rising storage in the reservoirs.

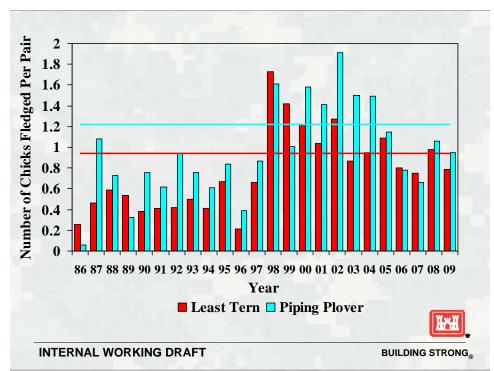


Figure 4-2: Fledge Ratios of Least Terns & Piping Plovers on the Missouri River

4.3.3 Piping Plover, Charadrius melodus (Threatened)

The piping plover was listed as a federally threatened species on December 11, 1985. This small shorebird feeds primarily on insects, crustaceans and mollusks.

The piping plover arrives on the MNRR in mid April with nest initiations beginning in late April and continuing through May and June. The plover prefers sandbars with little vegetation, and the birds' preferred substrate is a sand and gravel mix. Following fledging, the adults and young juveniles will depart for the wintering grounds, generally by the end of August.

With 897 adult piping plovers counted in 2009 marked the first year in nine years that the Missouri River recovery goal of 525 piping plover pairs (1,050 adults) was not met (Figure 11). The 2003 BiOp amendment set a fledge ratio goal for plovers of 1.22 fledglings per breeding pair which is to be measured on a three-year running average.

4.3.4 Piping Plover Critical Habitat

The project area lies within a reach designated as "Critical Habitat" for the piping plover. This designation was made on September 11, 2002 under recommendation of USFWS. All projects are within the designated area from Missouri RM 987.5-752.2. Critical habitat is defined as "the specific areas within the geographic area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (a) essential to conserve the species and (b) that may require special management considerations

or protection; and (c) specific areas outside the geographic area occupied by a species at the time it is listed, upon determination that such areas are essential to conserve the species." In order to be considered critical habitat, a specific area must exhibit one or more of the primary constituent elements for that habitat type. The Primary Constituent Elements (PCE) for riverine habitat are sparsely vegetated channel sandbars, sand and gravel beaches on sandbars, temporary pools on sandbars and interface with the river.

4.3.5 Whooping Crane (Endangered)

The Whooping crane was listed on June 2, 1970. Whooping cranes use shallow, sparsely vegetated streams and wetlands to breed, feed and roost during their migration. Whooping cranes feed on blue crabs, clams, frogs, rodents, small birds, and berries. Whooping cranes mate for life and generally live up to 24 years. Whooping cranes are not usually found around the proposed project area but could potentially be migrating through the project area.

4.3.6 Eskimo Curlew (Endangered)

There have been no reliable sightings of Eskimo curlews in more than 40 years. They fed in open natural grassland and tundra, burned prairies, meadows, and pastures. Spring migration was through the central United States and prairie provinces of Canada. Unrestricted market hunting and habitat loss, primarily due to cultivation and grazing, contributed to the curlew's decline. Eskimo curlew's would not be expected to utilize the proposed project area but could potentially be migrating through the project area.

4.3.7 Topeka Shiner (Endangered)

The Topeka shiner was listed as endangered in 1998. Topeka shiners are found in small prairie streams and creeks that exhibit perennial or nearly perennial flow. Substrate usually is clean gravel, cobble or sand but will utilize other substrates. Topeka shiners require open pools with cool, clean water. Topeka shiners are not known to occur within the project area.

4.3.8 Scaleshell Mussel (Endangered) and Higgin's eye pearlymussel (Endangered)

See Section 4.2.4.5. The general consensus at a 2006 Mussel Roundtable of agency experts was that it was unlikely that there was a population of Higgin's eye in the river, but that it was possible that the scaleshell may have a small population in the 59-mile MNRR.

4.3.9 Western Prairie Fringed Orchid (Threatened)

The western prairie fringed orchid is a species of the North American tallgrass prairie community. Western prairie fringed orchid populations have declined significantly throughout their range due to conversion of most of their habitats to cropland, overgrazing, intensive hay mowing, and drainage. Potential habitat typical of the project's ecoregion includes high quality, unbroken prairie with transition zones between sedge meadows and tallgrass prairie (U.S. Fish and Wildlife Service, 1996). No potential orchid habitat of this type is known to occur in the proposed project area.

4.3.10 American Burying Beetle (Threatened)

The American burying beetle was once widespread in the region. Its preferred habitat is reportedly areas such as forests where the topsoil is humousy, including along rivers. However, no captures of burying beetles have been reported in the area. No impact on the beetles is expected.

4.4 STATE THREATENED AND ENDANGERED SPECIES

4.4.1 South Dakota State Listed Species

A letter was sent to the South Dakota Department of Game Fish and Parks (SDGFP) on March 27, 2010. While no response was received regarding this years' proposed construction, SDGFP previously identified a state-listed threatened species, the false-map turtle (*Graptemys pseudogeographica*), that may occur within the project area (Backlund, 2003). In the Missouri, these turtles are active during the period of April-September. Nesting takes place during the late spring and summer months. Nests in the Missouri River are typically established in sandy banks or on emergent sandbars and turtle basking is typically restricted to inter-channel snags, rocks and sandbars. False-map turtles generally hibernate in soft sediments on the river bottom from October to April. Mussels are their main source of food (SDGFP, 2007).

4.4.2 Nebraska State Listed Species

A letter was sent to the Nebraska Game and Parks Commision (NGPC) on March 27, 2010. The NGPC previously provided information on state-listed species that have the potential to be affected by the proposed project. Excluding federally-listed species discussed in Section 4.3, NGPC identified four fish species that were of state concern: the state-endangered sturgeon chub (*Macrhybopsis gelida*), state-threatened lake sturgeon (*Acipenser fulvescens*), and "At-Risk" species blue sucker (*Cycleptus elongates*) and sicklefin chub (*Macrhybopsis meeki*).

Lake sturgeon are believed to have similar habitat requirements to pallid sturgeon, utilizing gravel bars for spawning and using a variety of large river features including backwaters, chutes, sloughs, islands and sandbars during different life stages. NGPC has records of lake sturgeon occurrence near Gavins Point Dam and downstream of Sioux City, IA but has no documented occurrence of the species in the immediate vicinity of the proposed project sites.

Sicklefin and sturgeon chubs are members of the minnow family that are well adapted to large turbid rivers and utilize a variety of habitats including submerged sandbars and gravel bars. These species have been collected in side chutes and backwaters which are thought to provide spawning habitat for these species. These two species were proposed for federal listing in 2000; however, USFWS found that populations of these two species in the Missouri River basin were more widespread than previously thought. Self-sustaining populations of both species were found in three locations: the Missouri River above Fort Peck reservoir, the Yellowstone-Missouri River confluence and in the lower Missouri from St. Joseph, Missouri to the Mississippi River confluence.

Additionally, sturgeon chub populations exist in 11 other tributaries of the Missouri and Yellowstone rivers. According to USFWS range maps, the project area is within the current range of the sicklefin chub but outside the current range of the sturgeon chub (USFWS, 2007a).

Adult blue suckers prefer deep water with moderate current while younger fish utilize shallower, less swift water. It is believed that blue sucker juveniles in this reach drift into the Missouri river from the James River near RM 800. Juvenile fish are also thought to use backwaters as nursery areas (Berry et al., 2004).

4.5 MIGRATORY BIRDS

All federal agencies are subject to the provisions of the Migratory Bird Treaty Act (16 U.S.C. 703-711) which regulates the take of any migratory bird species. If a Corps project is expected to impact any migratory bird species, coordination with the Service is typically initiated in order to minimize any impacts to these species. In a planning aid letter dated December 12, 2003, the Fish and Wildlife Service expressed to the Corps that, in this area, the main period of concern for affecting migratory birds is April 1-July 15. They also stated that raptors may nest from February 1-April 15 and that some wetland birds, such as sedge wrens, may nest from July 15-September 10.

On August 9, 2007, the bald eagle (*Haliaeetus leucocephalus*) (see 4.2.4.6) was removed from the federal list of threatened and endangered species but continues to be protected under the Bald and Golden Eagle Protection Act, Migratory Bird Treaty Act, and Lacey Act -16 U.S.C. § 701, May 25, 1900. Bald eagles are known to inhabit forested areas along the Missouri river. These birds tend to construct their nests in mature trees near aquatic habitats, especially in cottonwood trees. Bald eagle nests are typically easily identified due to their large size (they can be eight feet or more in diameter) and their height (up to twelve feet or more). They feed primarily on fish and crippled waterfowl, but may feed on upland game birds and other birds, carrion, and small rodents. Prior to any construction activity, the project area would be surveyed for eagle nests or nesting behavior.

4.7 PRIME FARMLAND

The NRCS considers prime farmland as land that has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods (USDA, 1993). A records search indicated that there is prime farmland and farmland of state importance near the project area. The projects themselves and probable staging areas are not within areas of prime farmland. Some temporary areas of access may be within areas prime farmland, but would not result in permanent conversion of farmland.

4.8 FLOOD PLAIN

The project areas are surrounded on both sides by the flood plain of the Missouri River. Based on interpretation of aerial photos and flood plain maps, the channel width of the river in the vicinity of these projects ranges from 1600 to 5000 feet and the average 100-year flood plain is approximately one mile wide.

Cedar and Dixon Counties in Nebraska do not participate in the National Flood Insurance Program and there are no flood plain maps for the proposed projects in these areas. Clay, Union and Yankton Counties in South Dakota participate in the National Flood Insurance Program and the project locations on the Missouri River are classified as being in Zone A. In an area designated as Zone A, flood plain developments are to cause no more than a 1.0 foot increase in the 100-year water surface elevation.

4.9 CLIMATE

The climate of the project area is characteristic of the Midwest. The average summer temperature is 74°F with an average high of 87°F. The average winter temperature is approximately 21°F with an average low of 10°F. The average annual precipitation of the project area is 25 inches, with about 75% falling between April and September. Snowfall averages about 30 inches per year. Humidity is generally high at an average of 60% at mid-afternoon. Tornadoes, severe thunderstorms and hailstorms occasionally occur in this area (Cooley, 2003).

4.10 WATER QUALITY

Current water quality in the Missouri River is generally considered to be good. Prior to dam construction, the Missouri River was a dynamic, free-flowing river. As such, continuous bank erosion was common, and the Missouri River naturally tended to be a turbid river. Many of the native fish species in the Missouri River, such as the pallid sturgeon, are specially adapted for life in turbid waters like those that were present in the historic river. Currently, as a result of the upstream reservoirs being constructed in the mid 20th century, turbidity is lower than the natural condition. The suspended sediment load has decreased by 69 to 99 percent, depending on location and proximity to the main stem dams. Releases from Gavins Point Dam tend to be cooler in temperature, free of sediment, low in nutrients, and saturated with dissolved oxygen. With increasing distance from Gavins Point dam, the water temperature, turbidity, and nutrients tend to increase due to tributary inputs.

Since the implementation of the Clean Water Act, over the last 30 years water quality has improved with regard to pollutant levels in the Missouri River. Primary sources of pollution in the river include runoff of fertilizer, pesticides, and herbicides from the predominantly agricultural watershed, as well as discharges from municipal wastewater treatment facilities and other urban industrial operations. Below, a few reports are cited to highlight the main pollutants that are known to occur in the Missouri River; however, the reports do not suggest any major impairment to the river due to pollution.

Levels of these fertilizer, pesticides, herbicides, and nutrients tend to increase with distance downstream from the Gavins Point Dam (USGS, 2002). Fish collections have been made in the Missouri River that show elevated levels of pollutants in tissue samples. For example, the Nebraska Department of Health issued consumption advisories for the Missouri River from Omaha to Rulo due to polychlorinated biphenyls (industrial use), and dieldrin (agricultural pesticide) concentrations in fish (NDEQ, 2008). While these pollutants now occur at very low levels in the river, they can tend to bioaccumulate in fish tissues. However, it is noted that a person eating 8 ounces of fish per week or less from this source is not considered subject to significant health risks.

Water quality management of the Missouri River is under the jurisdiction of individual states. As required by the Clean Water Act, the NDEQ and the SDDENR assessed and reported water quality data and information for the purpose of identifying the extent to which navigable waters support their designated uses, i.e., as a drinking water supply, for swimming and other recreation, fish and shellfish consumption, agriculture and as a habitat for wildlife. Nebraska has placed the Missouri River on the 303(d) list for water quality impairment mainly for reasons related to the beneficial use of aquatic life support. The Nebraska report states:

"The 2006 IR considered the dieldrin and PCB impairment of these waters category 4B parameters where "other pollution control requirements" would be pursued in lieu of a TMDL. EPA has verbally rejected the rationale as suitable "other requirements." It should be noted, EPA has not formally rejected this rationale. The waterbodies will be returned to or remain in category 5" (NDEQ 2008).

The Missouri River is listed as Category 1 in South Dakota and is not on the 303d list. The 2008 South Dakota Integrated Report for Surface Water Quality Assessment states:

"Water quality remains good although exceedances of the surface water quality standards for temperature and pH have exceeded the 10% criteria [found in Table 6]. However, these samples are taken from the power houses and are not considered representative of actual water quality within the river. More extensive monitoring is required for these large reservoirs to properly characterize the present water quality and reliably determine support. In 2005 and 2006, DENR conducted a water quality monitoring study of the Missouri River reservoirs. Data is currently being analyzed to determine if the river is fully supporting its beneficial uses and to develop a long term sampling strategy." (SD DENR 2008)

A report on the water quality of the Missouri National Recreational River stretch from Gavins Point Dam to Ponca, NE concluded that the water quality within the project area is generally good. Water quality conditions that were considered include pH, water temperature, dissolved oxygen, conductivity, and clarity. Water samples were also collected and evaluated in a laboratory for turbidity, total suspended solids, total organic carbon, total phosphorus, total Kjeldahl nitrogen, total ammonia, nitrate/nitrite nitrogen, chlorophyll a, atrazine, alachlor, and metolachlor. All water quality parameters measured met the appropriate state water quality standards (USACE, 2002a).

This reach is designated by the State of Nebraska as a "State Water Resource – Class A." This qualifies the stream for what is known as Tier 3 protection. This means that existing water quality conditions must be maintained and protected. It also means that no new or increased discharges are allowed into the river with the exception of some activities that temporarily alter water quality. Such activities must, however, be permitted by the state and not cause any permanent degradation of water quality (USACE, 2002a). There is no special designation for water quality for this reach within the State of South Dakota, however, it is classified for the following beneficial uses: domestic water supply waters; warm water permanent fish life propagation waters; immersion recreation waters; limited contact recreation waters; fish and wildlife propagation, recreation, and stock watering waters; irrigation waters; and commerce and industry waters.

4.11 AIR QUALITY

Sources of suspended particulate matter and air pollutants in the project area include agricultural, industrial, and recreational boating activities near the dredging site. Harrison County complies with the National Ambient Air Quality Standards (NAAQS), based on air quality monitoring conducted by the IDNR (Russell 2006). Washington County is also in compliance with NAAQS (Hetzler 2006).

4.12 NOISE

Sources of noise along the Missouri River project sites include recreational boating, hunting, and agricultural activities. These activities are seasonal. In the spring and fall, tractor and truck use increases on farms near the project site. Waterfowl are hunted along the River from September through January. Recreational boating on the Missouri River primarily occurs during the summer months. Overall, background noise levels are generally low.

4.13 HISTORIC PROPERTIES AND CULTURAL RESOURCES

This reach of the Missouri River contains historic and prehistoric sites. The project area lies along the path of the historic Lewis and Clark Expeditions, was home to a variety of Native American tribes, and was in the vicinity of early agricultural developments along the river. Sites of geological and cultural interest include the Ionia Volcano (located northeast of present-day Newcastle), many steamboat wreck sites, historic cemeteries and early town sites. More detailed descriptions of the various sites along this reach are available in the GMP. The authors of the 59-mile reach's GMP noted as party of the outstanding remarkable natural and cultural values the river setting at Hog Island, the entrance to the James River, and Missouri chutes paralleling Hog Island, the general bank shoreline forest dominated by cottonwood trees, clusters of sandbars, and the Nebraska wooded bluffs (Franklin et al., 1994).

4.14 SOCIOECONOMIC RESOURCES

4.14.1 Land Use

The existing sandbars on the South Dakota side of the Missouri River are owned by the State of South Dakota, while sandbars on the Nebraska side of the Missouri River are considered to be private property of the adjacent landowner. The adjacent land use near the proposed sandbar projects on both the Nebraska and South Dakota banks of the Missouri River is mainly agricultural. The major crops produced near the project sites consist of corn, soybeans, and alfalfa (Hoffman, 2004 and Subbeck, 2004).

4.14.2 Land Ownership

As part of the proposed project, the Corps is pursuing real estate interests on lands adjacent to the proposed projects. All actions would be pursued on a willing seller basis and could include fee title purchase and easements. Under the existing 59-Mile MNRR Real Estate Design Memorandum, there is an upward limit of 5,900 acres that could be purchased by the Corps on this stretch of the river. The Corps can pursue easements within the Gavins Point river segment under the Section 33 (Bank Stabilization) program.

As of March 2010, the Corps has acquired the following land within the MNRR:

- Audubon Bend fee title of 2,371.95 acres
- North Alabama Bend fee title of 546.32 acres
- Ponca State Park 296.64 easement acres
- St. Helena Island 84.20 sloughing easement acres

4.15 RECREATION

Recreational use of the sandbars is sporadic. In the fall and spring, sandbars are used for waterfowl hunting and during the summer months, sandbars are used for activities such as camping, picnicking, fishing and volleyball (USACE 2002b, USACE 1994, USACE 1989, USACE 1988, and USACE 1978). However, during tern and plover nesting season, which typically occurs from May 1 - August 15, signs are posted to deter utilization of the sandbars.

Recreational structures within the project area include boat ramps, fishing docks, camp sites, beaches, picnic facilities and overlooks. The nearest boat ramps to the planned projects are at St. Helena (RM 798), Weisman Boat Ramp, Myron Grove (RM 787), Bolton Game Production Area (RM 763.5) and Ponca State Park (RM 753). In addition, many boats are moored at private docks/slips near riverside residential developments (Wilson, pers. comm., 2009). Bolton Game Production Area (GPA) is public land managed by the SDGFP and is used by hunters and other recreationists. Ponca State Park is home to the Missouri National Recreational River Resource and Education Center and features camping cabins. Ponca State Park's north addition is adjacent to the Elk Point Bend Wildlife Management Area, and features facilities for hiking,

mountain biking, swimming, horseback riding, golfing (public course), boating, canoeing and kayaking, and river access for boaters and anglers.

4.15.1 National Wild and Scenic Rivers System

The proposed projects are located within the 59-mile segment of the Missouri River designated as a Recreational River under the Wild and Scenic Rivers Act (See Section 5.3 for details. The 59-mile segment's GMP states objectives for this reach as Desired Future Conditions. Objectives pertinent to this project include landscape preservation, visitor use, natural resources and cultural resources.

Chapter 5 ENVIRONMENTAL CONSEQUENCES

5.1 SUMMARY OF EFFECT

With the no action alternative, the future environment at the proposed project site would consist of a continuation of current existing conditions. The following sections describe what the future environment of the site would be if the proposed project were implemented.

5.2 PHYSIOGRAPHY/TOPOGRAPHY

The proposed construction of ESH would result in 140 acres of sandbar habitat in the active channel, however, the elevation of the surrounding land would not be affected. Therefore, the proposed changes to the topography of the site would have no significant impacts on the surrounding land.

5.3 HYDROLOGY, GEOMORPHOLOGY, AND EROSION

Many stakeholders expressed concerns over whether the proposed sandbars have the potential to increase erosion in the vicinity of the project area. As this area of the river is prone to erosion and deposition due to its highly unstable bed and bank, and erosion rates are not consistent from year to year, attempting to correlate ongoing erosion trends or newly eroded areas to an activity within the river is difficult.

One-dimensional or two-dimensional hydrologic modeling was deemed either ineffective at projecting erosion rates or unfeasible because the MNRR lacks historic data to create, calibrate and verify such models. Thus, instead of calculating expected erosion rates on specific areas for the "with project" scenario, the problem was approached from the converse perspective. Designs were developed that did not significantly alter the conveyance capacity of the overall channel or any sub channels. This reduces the potential impact on flooding (see Flood Plain, section 10.6). The depth of dredge cut was limited to four feet or the depth of the thalweg (whichever is less) in order to prevent the project from causing a change in inflow distribution. This limits the project to the most active portion of the river bed and prevents the projects from compromising any armoring layer. If dredging occurred deeper than the thalweg, it could cause a local shift in thalweg location which could result in changes in erosion patterns in the area. Additionally, all projects are designed in order to prevent a change in the conveyance of side channels (the area between the sandbar and the nearest adjacent shoreline). This prevents the project from increasing or decreasing the deposition or erosion of material in these side channels.

These criteria were followed during the construction of similar ESH complexes at RM 761.4 and 769.8. Following construction, monitoring efforts were initiated on the adjacent banks upstream and downstream to look for evidence of increased erosion that may have resulted from these projects. No such evidence was found in the first

one and a half years. These two sites will undergo continuous monitoring along with sites constructed last year at RM 774 and 791.5. These four sites will undergo detailed surveys consisting of extensive surveys (50-100 foot spacing) in the construction area, less extensive (500-1000 foot spacing) for a minimum distance of 1 mile upstream and downstream of the project. Pre and post construction surveys of the immediate construction area, a post construction survey of the upstream and downstream areas, a complete survey a year following construction, and complete survey at five years after construction or after the next major event, which ever comes first, will be collected for each site. After each survey, analysis will be performed to determine if additional surveys are necessary. After the 5-year (or major event) survey is complete a report will be written that documents the geomorphic conditions of the survey sites. The report will also provide recommendations as to what additional monitoring is needed, if any.

5.3 BIOLOGICAL RESOURCES

5.3.1 Fish

Dredging activities may cause an initial disturbance to fish species. Entrainment rates from various studies are presented that range from 0.001 to 0.341 fish/cubic yard. However, specific rates are difficult to predict as it is influenced by a number of factors including fish density, type of water body being dredged and area being dredged (Reine and Clark, 1998.) Mobile species of fish and wildlife would be expected to find refuge in the abundant nearby habitat until the construction disturbance ended. However, sessile and dormant species could be destroyed during construction. Indirect construction-related effects to fish and wildlife species (e.g., noise, vibration, equipment emissions) within adjacent terrestrial or aquatic habitat would persist for the duration of construction. Dredging operations would be avoided during the spawning season of the majority of fish species which should eliminate impacts to many juvenile fish.

Studies of the effects of glyphosate on salmonid species, trout and flagfish have found that, when used at recommended rates, it poses little or no risk of acute toxicity (Giuseppe et. al. 2006). Studies of imazapyr indicated that is was practically non-toxic to freshwater fish (WSDA, 2003). No significant impacts to fish species are expected as a result of this project.

5.3.2 Wetlands

The areas proposed for sandbar restoration in the Gavins Point reaches are largely sandbars which are underwater during the growing season. Those areas that are exposed are remnant sandbars from the high water events that occurred between 1993 and 1997, and have succumbed to vegetation encroachment. As water levels vary, edges do temporarily contain some wetland plants. A National Wetlands Inventory (NWI) map was checked for information regarding potential wetlands in the proposed project area (NRCS, 2010) (Appendix A). This project would involve the removal of vegetation from existing inter-channel bars to restore the natural bare sand condition of these bars. No significant impact to wetlands is anticipated due to construction activities.

5.3.3 Vegetation

Vegetation on the existing bars in the Gavins Point segment includes a mix of forbs, shrubs and trees and is largely dominated by willow species and young cottonwood trees on higher elevation bars. Projects intended to be built on existing vegetated bars would involve the removal of vegetation from those bars prior to construction. This is intended to create suitable bare sand habitat and reduce potential predator habitat, as well as slow the re-establishment of vegetation on the completed projects.

Approximately 60 acres of vegetation would be removed from 789.7, 759.4 and 756.7. Vegetation removal activities would entail the use of glyphosate-based aquatic herbicide (such as RODEO) on leafed-out vegetation by ATV with boom or backpack spray application methods, mowing of vegetation with sickle mower and overtopping.

Previous communication from the USFWS and NPS expressed concerns regarding the proposed overtopping as an untested method of vegetation removal and control. Throughout the 2009 planning process, the ESH PDT discussed this issue in detail multiple times. It was recognized by all parties that as the program proceeds, it is increasingly difficult to find sandbars without vegetation, and it was agreed that while the Vegetation Removal Study is being conducted, vegetation removal and overtopping could be performed. Results from complexes constructed in this manner would be incorporated into the ESH Monitoring Plan which is designed to look at such data.

Spraying would follow BMPs and standard environmental protection specifications for handling of chemicals. Only aquatically approved chemicals would be used and in quantities deemed safe by the EPA. There are two types of herbicides proposed for use by the Corps on the Missouri River, Glyphosate and Imazapyr. Details of each chemical and its usage are detailed in the Vegetation Removal Study Plan. Overtopping would involve the placement of material at least one foot above mowed stubble.

Vegetation removal would have localized impacts only on the islands and would not impact the general area due to the abundance of mature and immature wood- and shrublands. Removed vegetation could be pushed into the river, burned, piled in a designated area or hauled from the site. Pushing the vegetation into the river is the preferred method of disposal because of the ease as well as the added benefit of returning critical habitat and complexity to the river. Other disposal methods would be secondary options because of potential drawbacks. For example, burning can be a potentially property and life-threatening method and most sandbars lack sufficient combustible material to carry the fire. Piling material on the sandbars could inadvertently provide habitat for predators such as mink. Leaving material on the shorelines could encroach upon foraging habitat for the terns and plovers.

Disturbance of vegetation due to staging for construction equipment and site access is anticipated to be minimal. As part of the contract, disturbed areas would be restored following construction. Due to the abundance of vegetated sandbars in these reaches, as well as the trend of progressive vegetation of bare sandbars, removal of vegetation from the proposed sites is not believed to have a significant impact on these segments.

5.3.4 Wildlife

Some animals may be disturbed or displaced during construction; however, this would be temporary and of minor impact. After construction is complete, the backwater produced would attract and provide food and cover for a diversity of waterfowl and other wildlife. Small mammals would be able to find food and cover in the area. Several species of passerines such as common yellowthroats, indigo buntings, and sedge wrens would be expected to use the drier wetland areas. Other bird species such as herons, rails, red-winged blackbirds, and marsh wrens would be expected to use wetter wetland areas. Waterfowl such as mallards, blue-winged teal, and northern pintails would use the open water areas. Moist-soil regions would provide brood and foraging habitats for game birds such as northern bobwhite quail, turkeys, and pheasants. Hawks and other raptors would hunt for prey in and around the backwater. Deer would use the project area as a nursery and feeding area. The backwater channels and chute would also provide valuable habitat for a number of furbearers such as raccoons, mink, muskrats, and beaver.

Grubbing and clearing of vegetation such as grasses, forbs, and shrubs prior to dredging may temporarily impact resident nests, if present; however, this impact is small in comparison to available nesting areas. Additionally, the completed project would provide benefits to riparian bird species by increasing available habitat as well as restoring a more natural ecosystem.

5.3.4.1 Mammals

Project staging and construction activities may temporarily displace terrestrial mammals in the vicinity of the proposed projects. This disturbance will be temporary and minimized by the environmental provisions found within the specifications package (Appendix C).

Similar to bird species, impacts to small and large mammals from the use of glyphosate were largely linked to changes in vegetation composition. The herbicide itself did not appear to have direct toxic effects to the species (Guiseppe et. al., 2006). Similarly, imazapyr is believed to be virtually non-toxic to mammals with no significant bioaccumulation reported (WSDA, 2003).

5.3.4.2 Birds

During the primary construction window of September-November and March-April, the nesting season for many birds would be avoided. Ideally vegetation would be cleared in the fall or winter prior to construction. If that is not possible, then prior to construction, a survey would be completed by a qualified biologist to determine and document the presence or absence of any nesting migratory birds and state-listed species. The Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-711) which regulates the take of any migratory bird species, is also of concern to this project. A letter was sent to the NGPC on March 27, 2010 requesting information regarding this project. If a Corps project is expected to impact any migratory bird species, coordination with the USFWS is typically initiated in order to minimize any impacts to these species. During past coordination, the Fish and Wildlife Service has expressed to the Corps that, in this area, the main period of concern for impacting migratory birds is April 1-July 15. However, some species do nest outside of this main period, so in order to avoid impacts to nesting

migratory birds, the Corps has established a window when contractors are free to clear and grub between September 15 – January 31. Any clearing and grubbing work that occurs outside of this timeframe is subject to survey results by a qualified biologist prior to commencement of the work.

Impacts to birds from herbicide spraying have largely been tied to changes in vegetation composition and not direct impacts to birds themselves (Guiseppe et. al., 2006). In a 1993 study, Rodeo, an aquatically approved form of glyphosate with a chemical composition similar to AquaNeat, was used on waterfowl habitat. No impacts to nesting success were detected and duck use actually increased on treated areas (Solberg and Higgins, 1993). Imazapyr has also been reported as not posing a significant risk to birds and showed no significant bioaccumulation (WSDA, 2003). Therefore, no significant impacts to birds are anticipated due to herbicide spraying.

5.3.4.3 Amphibians and Reptiles

Similar to other species, reptiles and amphibians including turtle species may suffer a temporary disturbance from construction activities. Construction operations, staging areas, noise and other factors may temporarily displace these species. Certain species, including frog and turtle species, may benefit from the completed project as they utilize sandbar habitat for nesting. The primary construction windows of September-December and March-April would avoid the nesting season of most turtle species.

The effects of glyphosate formulations on four species of frogs suggested that effects were largely due to the surfactant, citing no significant acute toxicity from glyphosate itself and the highest toxicity from the surfactant POEA, which is used in the common form of glyphosate known as Roundup (Howe et. al., 2004). Similarly, a study of the effects of Rodeo found that moderate toxicity to larval frogs was from the surfactant R-11 and not Rodeo (Trumbo, 2005). The surfactant proposed for use as part of this project, LI-700, was studied for its effects on a turtle species. The study indicated that under normal field operations, the use of glyphosate with LI-700 presents a low-risk to red-eared sliders and their embryos (Sparling et. al., 2006). No studies were found on the effects of imazapyr on reptiles or amphibians. Until information is available, its effects on reptiles and amphibians are assumed to be similar to its effects on fish and certain soil-dwelling invertebrates.

5.3.4.4 Invertebrates

As part of an ongoing study, Dan Caitlin at Virginia Polytechnic Institute has been measuring invertebrate numbers of both created and natural sandbars in the MNRR for the past two years. These samples were collected using the same methods employed by Danielle Le Fer for her dissertation. The created bars that were measured as part of this study were built in 2004 and early 2005. While the created sandbars showed lower numbers of invertebrates on all habitat types in 2005, numbers in 2006 were mostly similar to or greater than the natural bars (Caitlin. 2007). Although this data is preliminary and limited in scope, it may indicate that it takes a full season for the invertebrate population on constructed bars to reach the level of natural bars. On the other hand, plover populations on the created bars had higher productivity rates in 2005 than they did in 2006, which may indicate that overall invertebrate numbers or biomass is not the limiting factor controlling plover productivity.

Glyphosate's effect on invertebrates appears to be largely tied to changes in vegetation. When used at recommended application rates, there are little or no direct effects to aquatic arthropods, soilborne microbial communities, nematodes or stream macroinvertebrate communities (Guiseppe et al., 2006). Aquatic invertebrates were similarly unaffected by herbicide applications in wetlands (Gardner, 2005). Studies suggest that imazapyr applications in wetlands do not affect the invertebrate community (Fowlkes et al., 2002). Additionally, glyphosate did not lead to mortality or have effects on the reproduction rates of earthworms (Yasmin and Souza, 2007). Tests of the imazapyr formulation Arsenal found that toxicity to fruit flies was from the surfactant nonylphenol ethoxylate and not from imazapyr itself (Grisolia et. al., 2004). Therefore, no significant impacts to invertebrates are anticipated due to herbicide spraying.

5.3.4.5 Mussels

A number of agencies have raised concerns that mussel communities may be disturbed during construction activities. Based on recent survey information, the Corps does not believe that a significant percentage of the reachs' mussel community would be affected by the construction of the project. In the unlikely event a population of scaleshell mussels exists within this segment, the most likely location is outside of the proposed project footprints, upstream of RM 800.

At a "Mussel Roundtable" meeting held in 2007 to discuss the results of the 2006 survey of the 59-mile MNRR, malacologists in attendance recommended that annual mussel surveys were not necessary. Based on these recommendations and coordination with NPS and FWS, pre-construction surveys for mussels would generally not be conducted. Since pockets of mussels were identified near the sandbar at RM 790, construction efforts are focused downstream at RM 789.7, which should help avoid direct affects to those pockets. Because the RM 790 area is known to have one of the more diverse mussel populations in the MNRR, efforts will be made during construction to minimize direct effects to mussels (e.g. potentially adjusting borrow areas to avoid areas known to contain mussels). Indirect effects to mussels, primarily turbidity, may occur downstream of the three proposed sandbars. Turbidity effects would be limited to relatively short distances downstream from the sandbars. These effects would be related to construction and therefore temporary. The contractor would be required to follow the zebra mussel specification found in the project specs in order to decontaminate all equipment prior to it entering the river. It is for these reasons no significant impacts to mussels are anticipated.

5.3.4.6 Bald Eagle

In 2007, following the Bald Eagle's delisting, the USFWS issued the National Bald Eagle Management Guidelines (USFWS, 2007b) which recommended a minimum distance of 660 feet be maintained between construction activities and active bald eagle nests. Currently there are no active bald eagle nests within 660 feet of the proposed projects' footprints. If an active nest was discovered within 660 of proposed construction activities, construction activities would cease. If these measures are followed, no adverse impact to bald eagles is anticipated

5.4 THREATENED AND ENDANGERED SPECIES

The proposed herbicide applications are to be conducted outside of the nesting season of terns and plovers and on sites which have had few or no nests in recent years. As such, it is anticipated that these activities will not directly impact tern and plover nesting. As discussed in previous sections, no impacts to tern and plover food sources (fish and invertebrates) are anticipated. While no studies have been conducted specifically on the impacts of glyphosate or imazapyr to terns, plovers or pallid sturgeon, impacts are expected to be similar to other bird and fish species discussed in section 5.3. No significant impacts to federally listed species are anticipated due to the proposed herbicide applications. The impacts of dredging and bulldozing activities are covered in the subsequent species-specific sections.

5.4.1 Pallid Sturgeon

There is a slight possibility that some incidental take of pallid sturgeon could occur as a result of dredging/habitat creation. This is acknowledged in the 2003 BiOp Amendment, and in regard to the effects of this take, states:

In the accompanying Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species when the Reasonable and Prudent Alternative is implemented. In other words, any incidental take that may occur would be largely offset by the implementation of the Reasonable and Prudent Alternative, and Reasonable and Prudent Measures (USFWS, 2003)."

Pertaining to the creation of ESH, the 2003 BiOp Amendment offers the following Reasonable and Prudent Measure to minimize impacts of incidental take of pallid sturgeon:

"The Corps shall minimize the effect of incidental take associated with dredging and construction of sandbars and shallow water habitat through entrainment of early life stages of pallid sturgeon (USFWS, 2003)....The Corps shall annually confer with the Service about location and timing of proposed dredging for sandbar and shallow water habitat construction activities. The Service will strive to minimize impacts of entrainment to early life stages of pallid sturgeon by recommending to the Corps' locations that are acceptable and unacceptable for dredging. The Corps shall evaluate means to avoid impacts to pallid sturgeon, quantify and track impacts, and provide recommendations to the Agency Coordination Team (ACT)."

A field study that focused specifically on pallid sturgeon used 3 different sampling techniques and found no entrainment of fish as a result of dredging operations preformed (ERDC 2008). In another study, for the entire period of 1990-2005, there were fewer than 25 confirmed cases of sturgeon entrainment by dredges operating in Gulf and Atlantic waters (Hoover et. al. 2005). Mobile species of fish and wildlife would be expected to find refuge in the abundant nearby habitat until the construction disturbance ended. However, sessile and dormant species could be destroyed during construction. Indirect construction-related effects to fish and wildlife species (e.g., noise, vibration, equipment emissions) within adjacent terrestrial or aquatic habitat would persist for the duration of construction.

In April 2008, the Service initiated discussions with the Corps and other fishery experts regarding the impacts of ESH construction on pallid sturgeon and other fish, specifically with regard to the timing of construction activities. That same month, a conference call was held to discuss the potential impacts of increasing the construction season to include the period of July 15 – September 1. On this call, experts from the Corps, US Fish and Wildlife Service, National Park Service and South Dakota Game Fish and Parks concluded that there were no significant fisheries concerns with this expanded construction window. Comments received from fisheries experts with the Nebraska Game and Parks Commission and the University of South Dakota concurred with this decision. Similar to other fish species, no significant impact to pallid sturgeon is anticipated.

5.4.2 Interior Least Tern

The main purpose of these projects is to restore ESH for the benefit of interior least terns and piping plovers. The proposed ESH sites would provide approximately 200 acres of habitat for the benefit of terns and plovers. Figure 5-1 shows the conceptual decline of sandbar acreage on the Missouri River 1998, with points projected through 2015. The overall downward trend is due to erosion and vegetation of sandbars formed during the period of 1993-1997. Sandbars restored under the ESH program are anticipated to help slow the downward trend in ESH acreage.

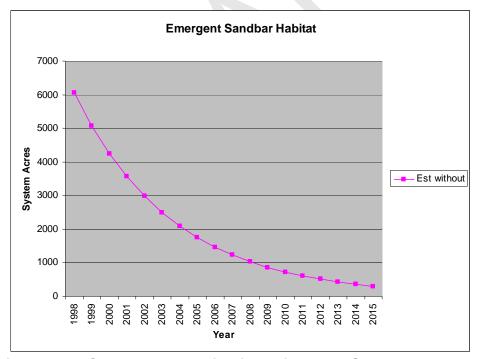


Figure 5-1: Conceptual Decline in Estimated ESH Acreage Trends

Previously constructed sandbars have shown success. Figure xx shows the productivity of natural sandbars, bars where the Corps conducted vegetation removal, three

sandbar complexes created prior to 2007 (755, 761, and 770) and three constructed in 2008 (775, 777.7 and 791.5).

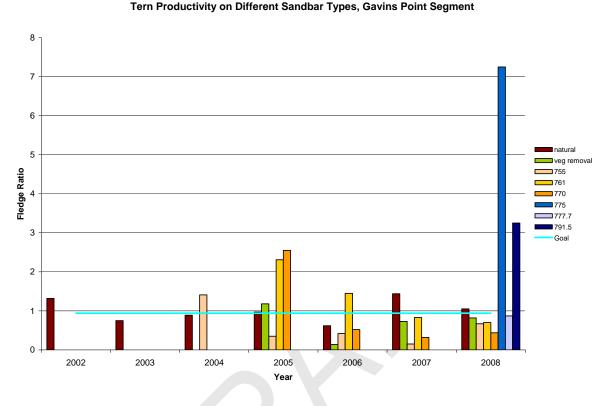


Figure 5-2: Tern Fledge Ratios on the Gavins Point Segment (Goal = 0.94)

Figure 5-2 shows the high productivity rates of all created bars in their first year. The created bars were densely populated. However, productivity rates on both 755 and 770 dropped sharply after that first year and productivity on 761 dropped below the goal after the second year. This may be due to a number of factors. The complex at RM 755 was a beneficial use of dredged material from an adjacent backwater and may not have been an ideal location for ESH due to narrow channel width. As a result, this complex saw high erosion rates (up to 60% loss between year 1 and 2) while densities remained high. The complex at RM 770 also saw high erosion rates, due to migration of the river channel and ice scraping during the winter months. At this location, over 60% was lost after the first year while the tern population more than doubled. In contrast, RM 761 saw minimal erosion and densities remained comparatively low.

In addition, the first three created sites had higher than normal predation rates following the first year. Vegetation encroachment has occurred on at least one sandbar and it is believed this has reduced its attractiveness to the birds, while providing habitat for predators in the immediate area. As more sandbars are constructed, increased habitat will distribute the birds and nests more widely, making them less attractive to predators, and resulting in greater overall productivity throughout the system. The Corps believes that it has addressed these issues of erosion and predation by more carefully selecting

sites based on thalweg position and trends and through the predation management program which is currently being developed.

In 2008, productivity decreased slightly on natural bars, but increased on 755 and 770, and stayed nearly the same on 761 (Figure 5-2). Two of the newly created bars, 775 and 791.5 had high productivity rates this first year, and 777.7 was just under the 0.94 goal. The figure also shows a slight increase of productivity on bars where vegetation was removed (veg removal). While these bars were not treated in 2008, birds did utilize the bars and productivity was recorded. It is anticipated that the proposed bars will be similarly productive in their first years and remain highly productive longer than the previously constructed bars because of the steps taken to reduce erosion and predation. Thus the proposed projects are expected to produce approximately 200 acres or more of highly productive habitat for interior least terns.

5.4.3 Piping Plover

As stated above, the intent of the proposed projects is to restore rapidly declining nesting habitat (see Figure 5-1) to benefit this species as well as interior least terns. As shown in Figure 5-3, piping plovers had similar responses to the previously constructed bars as the interior least terns. Productivity was high on all bars in the first year following construction. In the second year, productivity on 755 and 770 both fell sharply. However, in 2006 and 2007, productivity on the created bars was largely close to or above that of the natural bars in this reach. While similar problems of eroding habitat and predation affected plovers, they may also have been affected by lack of feeding habitat for plover chicks. The new sandbar designs have incorporated greater amounts of wetted edge habitat to address this problem.

In 2008, productivity increased on all of the bars except 770, which had no fledglings. 755 was above the goal, as were all three of the new bars, 775, 777.7 and 791.5. The figure also shows an increase of productivity on bars where vegetation was removed (veg removal). While these bars were not treated in 2008, birds did utilize the bars and productivity was recorded. Similar to terns, it is anticipated that the proposed bars will be similarly productive in their first years and remain highly productive longer than previously constructed bars because of efforts to reduce erosion and predation. Thus the proposed projects are expected to produce about 200 acres of highly productive habitat for piping plovers.

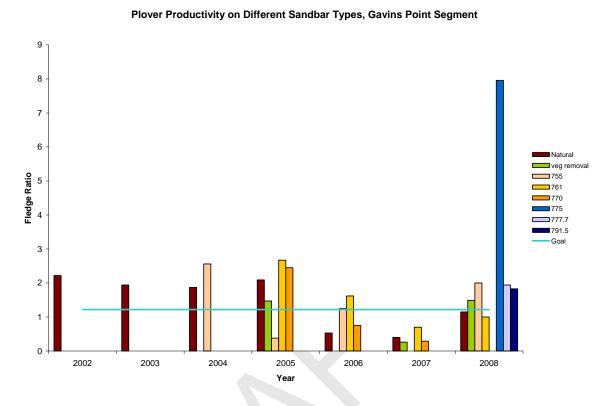


Figure 5-3: Plover Fledge Ratios on the Gavins Point Segment (Goal = 1.22)

5.4.4 Piping Plover Critical Habitat

Section 7 of the Endangered Species Act requires that federal actions be evaluated for their potential to adversely impact critical habitat. Up to 200 acres of critical habitat would be created as a result of the proposed action. The sandbars were designed to reflect the four PCEs for riverine habitat outlined in 50 CFR Part 17. An overall positive impact to piping plover critical habitat is expected. Upon completion, the habitat projects planned would reflect the four PCEs in the following way:

- 1. Sparsely vegetated channel sandbars: Constructed sandbars would be initially devoid of any vegetation. However, vegetation succession is likely to begin following construction activities. The Corps may undertake vegetation control in order to prolong the sparsely vegetated nature of the created sandbars.
- 2. **Sand and gravel beaches on sandbars:** Sandbars would be composed of sands, gravels, silts and other particulate matter in the quantities recommended under RPA IVB.
- 3. **Temporary pools on sandbars and sandbars:** These projects have been designed so that, during nesting season, flows should be such that the sandbars would form a complex featuring shallow pools and waterways. However, these

- would only last until the water levels drops, thus giving them a temporary quality as well.
- 4. **Interface with the river:** All projects maximize the wetted area that results from the river interface, important for plover foraging habitat. The use of the multisandbar complex design, as opposed to building one large sandbar at each site, would also increase the amount of wetted area at each project site.

5.4.5 Whooping Crane (Endangered)

Whooping cranes are not usually found around the proposed project area but could potentially be migrating through the project area. No significant impacts are anticipated.

5.4.6 Eskimo Curlew (Endangered)

Eskimo curlews are not usually found around the proposed project area but could potentially be migrating through the project area. No significant impacts are anticipated.

5.4.7 Topeka Shiner (Endangered)

Topeka shiners are found in small prairie streams and creeks that exhibit perennial or nearly perennial flow and require open pools with cool, clean water. Topeka shiners are not known to occur within the project area and therefore no significant impacts to the Topeka shiner are expected.

5.4.8 Scaleshell Mussel (Endangered) and Higgin's eye pearlymussel (Endangered)

See Section 4.2.4.5. The general consensus at a 2006 Mussel Roundtable of agency experts was that it was unlikely that there was a population of Higgin's eye in the river, but that it was possible that the scaleshell may have a small population in the 59-mile MNRR. Surveying would only be recommended if a known pocket could be disturbed. Because the construction of the sandbar at RM 789.7 is downstream of potential mussel pockets it is expected the project would have no significant impacts to any potential endangered mussel populations.

5.4.9 Western Prairie Fringed Orchid (Threatened)

The western prairie fringed orchid is a species of the North American tallgrass prairie community. Potential habitat typical of the project's ecoregion includes high quality, unbroken prairie with transition zones between sedge meadows and tallgrass prairie (U.S. Fish and Wildlife Service, 1996). No potential orchid habitat of this type is known to occur in the proposed project area and construction would be taking place in the active river channel. For these reasons no significant impacts are anticipated.

5.4.10. American Burying Beetle (Threatened)

The American burying beetle was once widespread in the region. Its preferred habitat is reportedly areas such as forests, including along rivers. However, no captures of burying beetles have been reported in the area. No impact on the beetles is expected.

5.5 STATE LISTED SPECIES

A South Dakota state-listed species, the false-map turtle, is expected to benefit from the completed ESH project as this habitat is used by the turtle for nesting. Inter-channel formations are typically preferred by this species for protection from predation. Construction activities may impact individuals if they are hibernating within the construction footprint. However, no significant impact is anticipated.

No significant impacts to Nebraska state-listed species are anticipated. It is unlikely that either sicklefin chub or lake sturgeon would be within the project area. While sturgeon chub and blue suckers have a higher likelihood of being affected by the project if dredging is used, effects of construction would be similar to the effects on other fish species. As the primary construction window is outside of the spawning season for most fish species, the potential effects should be reduced significantly. The finished projects should benefit these species which utilize backwaters and the edges of sandbars. No significant short-term impact is anticipated due to construction and an overall long-term benefit to these species is expected.

5.6 MIGRATORY BIRD TREAT ACT

Although the provisions of MBTA are applicable year-round, most migratory bird nesting activity in Nebraska occurs during the period of April 1 to July 15. However, some migratory birds are known to nest outside of the aforementioned primary nesting period. Clearing and grubbing would be scheduled to occur outside the primary nesting period. If construction of the project has to occur during the primary nesting season or at any other time that may result in the take of nesting migratory birds, a qualified biologist would conduct a field survey of the affected habitats to determine the absence or presence of nesting migratory birds. Surveys would be conducted during the nesting season and immediately preceding the proposed construction activities. The USFWS's lowa Ecological Services Field Office would be contacted immediately for further guidance and assistance in project modification if a field survey identifies the existence of one or more active bird nests.

Under the Migratory Bird Treaty Act (MBTA) (16 U.S.C. 703-712: Ch. 128 as amended), construction activities in rivers, wetlands, streams, riparian forest, woodland, and grassland habitats that would otherwise result in the taking of migratory birds, eggs, young, and/or active nests should be avoided and completed outside the primary nesting season. Construction activities involved with this restoration project would have the potential to result in disturbing migratory birds.

5.7 PRIME FARMLAND

It is not anticipated that staging areas would be established atop land designated by the Natural Resources Conservation Service as "Prime" farmland, however, some access could be within areas designated as prime farmland. Nonetheless, the intent of the Farmland Protection Policy Act (FPPA) is to resist the *irreversible* conversion of prime farmland and emphasizes highway development and urbanization. As all staging areas would be returned to their pre-project condition, the proposed projects would not result in the irreversible conversion of any prime farmland. The NRCS reviewed project information and in communications dated April 8, 2010 determined that a Farmland

Conversion Impact Rating Form (AD-1005) would not be needed on this project since it will not take additional cropland out of production. The project was cleared of FPPA significant concerns (Appendix A).

5.8 FLOODPLAIN

The design of this project has been reviewed in accordance with FEMA Guidance <u>Certification Requirements for Simple Floodway Encroachments</u>, (October 31, 1990) by the Flood Risk and Floodplain Management Section of the United States Army Corp of Engineers Omaha District which is responsible for ensuring compliance with Executive Order 11988 (Flood Plain Management) (Appendix A).

The projects are constructed using mechanical excavation equipment such as excavators, bulldozers, and scrapers or hydraulic dredges. The design criteria in relation to flood conveyance are as follows:

- All materials associated with the ESH project construction will come from onsite sources
- no new material will be brought in from offsite
- no material will be transferred into the floodway from outside of the floodway
- no material will be taken from above the regulatory base flood elevation and placed at a point below the regulatory base flood elevation
- construction will be as such that material from a lower elevation is repositioned to a higher elevation, as such the overall cross sectional area will not be impacted, and a net increase in hydraulic conveyance will be achieved

These design elements ensure that the project will not result in the loss of flood conveyance and will not cause an increase in base flood elevations.

Actions within the base flood plain are subject to review for compliance with Executive Order 11988 (24 May 1977). ER 1165-2-26 Implementation of Executive Order 11988 (30 March 1984) provides a process to ensure that proposed actions are undertaken in accordance with these requirements. The following comments are in relation to the General Procedures outlined in ER 1165-2-26.

- a. The proposed action is located in the base flood plain
- b. Due to the nature of the project it must be located within the floodplain
- c. The actions are taken in order to conform with the requirements of the 2003 Amended Missouri River Biological Opinion
- d. The proposed actions will result in increases to natural and beneficial floodplain functions
- e. The project is not likely to induce development in the base floodplain
- f. Adverse impacts resulting from this project are minimized by ensuring the project does not result in a decrease in conveyance

5.9 CLIMATE

No change in climactic conditions is expected due to the proposed projects.

5.10 WATER QUALITY

Water quality within the immediate vicinity of the project area may be affected through increased sediment load or release of fuels, oils or greases from construction equipment or residual chemicals already in the river.

Increased sediment load would be a localized impact that may occur due to flowing water carrying off some dredged material during the initial placement and the slow erosion of the sandbars. Erosion and deposition of sediments within the Missouri river is a natural function of this dynamic river system.

BMPs would be used to minimize any release of fuels or lubricants from construction equipment. In addition, biodegradable hydraulic fluids will be used for all construction equipment and the contractor is required to submit a spill control plan as part of the environmental protection plan to the construction representative prior to initiating work.

The composition of the sediment that would be disturbed is almost entirely sand and gravel with small amounts of organics. This material is redistributed within the river on a semi-regular basis and is not likely to contain residual chemicals from agricultural practices or other human activity. As such, the dredging of aquatic sediment in these reaches is not likely to release harmful chemicals that would affect water quality.

Section 401 water quality certifications are currently being pursued with the States of Nebraska and South Dakota. Projects located in the Gavins Point River Segment would be authorized under the Nationwide 27 Section 404 regulatory permits. The Nationwide 27 permit is for activities of stream and wetland restoration. Pertinent conditions of the Nationwide 27 permit include (CFR, 2000):

- Condition 4: No activity may substantially disrupt the necessary life-cycle movements of native or migratory species
- Condition 7: No activity may occur within a component of the Wild and Scenic Rivers System unless the appropriate managing Federal agency has determined in writing that the proposed activity will not affect the Wild and Scenic Rivers designation.
- Condition 8: No activity or its operation may impair reserved tribal rights.
- Condition 11: No activity may jeopardize the continued existence of a threatened or endangered species, or which will adversely modify or destroy habitat of such species.
- Condition 12: No activity may affect historic properties listed, or eligible for listing, in the National Register of Historic Properties.
- Condition 17: No activity may occur in areas of concentrated shellfish populations.
- Condition 20: Activities in spawning areas during spawning season must be avoided to the maximum extent possible.
- Condition 21: To the maximum extent possible, the activity must be designed to maintain preconstruction downstream flow conditions.

On the Gavins Reach, the only drinking water intake is near Yankton, SD, upstream of all the proposed project sites and the closest irrigation intake is 3.2 miles downstream of the proposed construction at 756.7.

Under ideal conditions, all of the glyphosate would be absorbed by existing vegetation which would then be cleared, meaning little to no glyphosate would actually enter the water. A study of the effects of Glyphosate in drinking water determined that the presence of glyphosate in drinking water does not represent a hazard to human health (WHO, 2003). Imazapyr is being used as a pre-emergent and would be sprayed on relatively bare sand. The desired outcome is that imazapyr would remain within the sand in order to effectively slow vegetative growth rates; however some may enter the water column due to runoff. It is highly unlikely that imazapyr concentrations in drinking water would ever exceed levels that would be of concern to human health (EPA, 2003). Based on the available information, it is unlikely that glyphosate would have deleterious effects to water quality, even in the unforeseen event that it does enter the river due to runoff.

5.12 AIR QUALITY

Impacts to air quality would be associated only with construction period. Minor and temporary increases in dust and equipment exhaust are expected during construction. Equipment needed to construct the proposed sandbars would likely include bulldozers, scrapers, front-end loaders, excavators and dredges. Due to the relatively short estimated construction period and the use of BMP's with regard to air quality, emissions from construction would not be expected to have a significant affect on air quality.

5.13 NOISE

Increases in noise from construction equipment are expected at the project site during construction. The expected increases in noise would be minor, temporary, and similar to those already occurring in the area from farm machinery. Therefore, the expected increases in noise levels from project construction would not be significant.

The proposed sandbar creations may contribute to additional waterfowl hunting or recreational boating activities, thus rifle and boat motor noise may increase. However, the additional rifle or shotgun discharges and boat engine noise would still result in relatively low noise levels. The expected increases in noise after project construction would not be significant.

5.14 HISTORIC PROPERTIES AND CULTURAL RESOURCES

The sandbars in this section of the river mainly consist of accreted soils. A February 2009 file search revealed no sites recorded in the proposed project areas as part of the three proposed site being part of the 2009 EA. A Corps archeologist agreed that the information is still current. A Corps archeologist reviewed the sites and sent a letter to potential interested parties under the Corps' Programmatic Agreement (PA) requesting

comment or potential consultation. A request for further information was received from the Ponca Tribe of Nebraska. The Three Affiliated Tribes wish to be notified in the event of an unanticipated discovery. Letters received from the Bureau of Indian Affairs and several Tribes expressed no concerns for the project as planned (Appendix A). No further requests were received from any tribe or other interested party. A determination letter was sent to both the Nebraska and South Dakota State Historic Preservation Officers (SHPOs). Both agencies sent letters indicating concurrence with the No Effect determination (Appendix A).

While there are no records of cultural resources within the project footprints or staging areas, it is possible that unreported cultural resources may be disturbed during construction. In this event, construction activities at the site would cease until such point that the article in question can be identified and proper measures taken. However, this scenario is unlikely due to the dynamic nature of the river and flood plain in the project area and the many changes that have taken place in the last 100 years.

The historic and cultural landscape would be temporarily affected during construction. After construction, the addition of sandbar complexes and restoration of remnant backwaters would be consistent with the cultural landscape of the MNRR.

For these reasons, the proposed project is not likely to adversely impact cultural resources.

5.15 SOCIOECONOMIC RESOURCES AND HUMAN USE

5.15.1 Land Use

The impact to land use from the proposed projects has been considered. Given that the proposed sandbar creations involves work mainly within the Missouri River channel, project construction is not expected to have any significant impact on the surrounding land use. The construction of access roads or boat ramps required for project purposes could be returned to pre-existing conditions upon project completion. Overall, the proposed project should not have any significant effect on the land use near the project areas. The proposed project is consistent with land use objectives (desired future conditions) of the 59-mile segment GMP.

5.15.2 Land Ownership

As these actions may involve the fee-title purchase of land and possibility of easement purchases along the river, some land along this stretch may be transferred from private to federal holding and development may be limited along the river in these areas. However, the proposed real estate actions are within the scope of the 59-mile MNRR Real Estate Design Memorandum and in accordance with the intent of the Wild and Scenic Rivers Act. The impacts of land acquisition under this program were analyzed in the Environmental Impact Statement completed on the GMP for this reach. In order to avoid financial impacts to counties which would no longer receive taxes from land that is purchased in fee title, Payments in Lieu of Taxes (PILT) would be made in accordance with Public Law 97-258. These annual payments would be made by the Bureau of Land Management (BLM) to the state in which the land would be purchased. The state would

then distribute the funds to the county in which the land resides. This is the standard protocol for PILT distribution.

5.16 RECREATION

Research on recreational usage including boating, fishing, hunting and other visitations confirms that primary use for fishing, boating and other visitations occurs spring through fall, while hunting occurs primarily during the autumn and winter months. Under the proposed project, activities such as hunting, fishing and boating may suffer a slight negative impact during construction due to restricted use of the river in the immediate vicinity of construction operations. However, this would be a short-term impact which should have no long term effects or change people's future use of recreational resources in the vicinity of the project.

In a letter dated August 2008, NPS raised concerns regarding heavy equipment impacts on recreationists and their activities, including canoeing/kayaking, boating, fishing, hunting and camping. They asked that until NPS has the opportunity to complete studies regarding these impacts, the prime recreational season from Memorial Day to Labor Day be off limits for construction. Because this could severely shorten the window of opportunity for construction during the summer months and affect the timetable of many of the ESH projects, the Corps is negotiating this limitation with the NPS on a case by case basis, including mobilization of equipment to staging areas

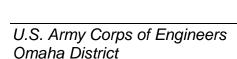
After construction is completed, signs would continue to be posted during nesting season to deter utilization of the sandbars and to avoid unnecessary take. While sandbar use would be discouraged during nesting season, these complexes may appeal to birdwatchers. Also, outside the nesting season, the creation of additional acres of sandbar should contribute to enhanced recreational usage for the area. Overall, the sandbars should have no long-term effect on recreation.

5.16.1 NATIONAL WILD AND SCENIC RIVERS SYSTEM

The primary focus for management of the MNRR segments is to "protect and enhance river values" or ORV's. The purpose of the ESH creation is to develop additional habitat for two federally listed bird species. These species were included in the pre-listing document for the 59-mile segment, which studied the inclusion of the MNRR as a segment of the National Wild and Scenic Rivers System, even before the birds were listed (USACE, 1977). These birds are "values" for which the river was designated, within the "fish and wildlife" general value. The proposed projects are consistent with the desired future conditions identified in the GMP for the 59-Mile segment in that:

- Although site aesthetics would be temporarily impacted due to the presence of construction equipment, the completed projects should reflect the natural, historic landscape of the Missouri River while also providing scenic views and wildlife habitat viewing opportunities
- The projects do not involve any permanent "development (such as subdivisions and roads)" within these segments
- Water and Air quality would not be negatively impacted
- Threatened and Endangered species habitat is being enhanced
- The habitat restored would also benefit other native species
- Any easements established or land acquisitions pursued as part of these projects have the potential to reduce future bank stabilization efforts

- No significant fossil resources would be impacted
- No archaeological, historical, and ethnographic resources would be impacted



Chapter 6 COMPLIANCE WITH ENVIRONMENTAL **STATUTES**

6.1 INTRODUCTION

This section summarizes the statutory and regulatory environmental compliance requirements and discusses the major Federal and state permits and clearances that would be required for the approval and implementation process for ESH. The status and applicability of these environmental requirements is presented in Table 6-1 and a discussion of the most important follows.

Table 6-1: Compliance of Preferred Alternative with Environmental Protection Statutes and Other Environmental Requirements

Statutes and Other Environmental Requirements Applicability a, b, c, d						
Federal Environmental Requirements	Applicability	Status a, b, c, d				
Archeological Resources Protection Act, 16 U.S.C. 470, et. seq.	Applicable	Full Compliance				
Clean Air Act, as amended, 42 U.S.C. 7401-7671g, and et. seq.	Applicable	Full Compliance ^a				
Clean Water Act (Federal Water Pollution Control Act),	Applicable	Full Compliance				
Endangered Species Act, 16 U.S.C. 1531, et. seq.	Applicable	Full Compliance				
Federal Water Project Recreation Act, 16 U.S.C. 4601-12, et. seq.	Applicable	Full Compliance				
Fish and Wildlife Coordination Act, 16 U.S.C. 661, et. seq.	Applicable	Full Compliance				
Land and Water Conservation Fund Act, 16 U.S.C. 4601-4, et. seq.	Not Applicable	Not Applicable				
National Environmental Policy Act, 42 U.S.C. 4321, et. seq.	Applicable	Full Compliance				
National Historic Preservation Act of 1966, as amended, 16 U.S.C. 470a, et. seq.	Applicable	Full Compliance				
Rivers and Harbors Act, 33 U.S.C. 403, et. seq.	Applicable	Full Compliance				
Watershed Protection and Flood Prevention Act, 16 U.S.C. 1001, et. seq.	Not Applicable	Not Applicable				
Wild and Scenic River Act, 16 U.S.C. 1271, et. seq.	Not Applicable	Not Applicable				
Farmland Protection Policy Act, 7 U.S.C. 4201, et. seq.	Applicable	Full Compliance				
Protection & Enhancement of the Cultural Environment (Executive Order 11593)	Applicable	Full Compliance				
Floodplain Management (Executive Order 11988)	Applicable	Full Compliance				
Protection of Wetlands (Executive Order 11990)	Applicable	Full Compliance				
Environmental Justice (Executive Order 12898)	Applicable	Full Compliance				
Migratory Bird Conservation (Executive Order 13186)	Applicable	Full Compliance				

a. Full Compliance. Having met all requirements for the statute for the current stage of planning

<sup>b. Noncompliance.
c. Not Applicable.
Violation of a requirement of the statute.
No requirements for the statute required; compliance for the current stage of planning.</sup>

6.2 AIR QUALITY

The Federal policy to protect and enhance the quality of the air to protect human health and the environment is established under the Clean Air Act [42 USC 7401 et seq., as amended]. The expected impacts to air quality due to the proposed project are considered insignificant. Therefore, no additional actions would be required for full compliance.

6.3 WATER RESOURCES

Federal limits on the amounts of specific pollutants that may be discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water are governed by CWA [33 USC 1251 et seq., as amended], National Pollutant Discharge Elimination System (NPDES). Discharge of stormwater resulting from construction activities that would disturb more than one acre of surface area requires an NPDES permit under Section 402 of the CWA. The SDDEQ and NDEQ authorize NPDES permits in the state of Iowa and Nebraska. The construction contractor for this project will be required to obtain a NPDES permit prior to beginning construction

The objective of the Clean Water Act, as amended, (Federal Water Pollution Control Act) 33 U.S.C. 1251, et seg. is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters (33 U.S.C. 1251). The Corps regulates discharges of dredge or fill material into waters of the United States pursuant to Section 404 of the Clean Water Act. This permitting authority applies to all waters of the United States including navigable waters and wetlands. The selection of disposal sites for dredged or fill material is done in accordance with the Section 404(b)(1) guidelines, which were developed by the U.S. Environmental Protection Agency (see 40 CFR Part 230). The dredging activity for this project will be covered under a type of Section 404 permit called an Individual permit. Individual permits are issued following a full public interest review of an individual application for a Department of Army permit. After evaluating all comments and information received, a final decision on the application is made. The permit decision is generally based on the outcome of a public interest balancing process where the benefits of the project are balanced against the detriments. A permit will be granted unless the proposal is found to be contrary to the public interest. Section 401 of the Clean Water Act allows states to grant or deny water quality certification for any activity that results in a discharge into waters of the United States and requires a Federal permit or license. Certification requires a finding by the effected states that the activities permitted would comply with all water quality standards individually or cumulatively over the term of the permit. Section 401 and 404 water quality certification for the proposed project will be obtained before construction begins.

6.4 BIOLOGICAL RESOURCES

Federal agencies are required to determine the effects of their actions on federally listed endangered or threatened species and their critical habitats under ESA [16 USC 1531]

et seq.]. Steps must be taken by the Federal agency to conserve and protect these species and their habitat, and to avoid or mitigate any potentially adverse impacts resulting from the implementation of the proposed project.

6.4.1 Fish and Wildlife

The Fish and Wildlife Coordination Act (16 U.S.C. 661, et seq.) provides the basic authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features. It also requires that Federal agencies that construct, license or permit water resource development projects must first consult with USFWS (and the National Marine Fisheries Service in some instances) and state fish and wildlife agency regarding the impacts on fish and wildlife resources and measures to mitigate these impacts. Coordination under this act was conducted by meetings, letter, and email exchange. The USFWS, SDGFP, and NGPC all provided responses in favor of the proposed project, and provided information on state and Federally listed threatened and endangered species (Appendix A).

6.5 ENVIRONMENTAL POLICY

The Corps is preparing a PIR for each Missouri River Recovery habitat development site. Each PIR will document the planning for the project and will provide the information needed to ensure compliance with respect to environmental considerations.

Federal agencies use NEPA [42 USC 4321 et seq.] to evaluate the environmental impacts of a proposed project. Through the NEPA process, public officials and citizens are given opportunity to be involved in the environmental review and receive information about environmental impacts before any decisions are made on Federal actions regarding the proposed projects. This PIR is intended to serve as the documentation necessary to incorporate the NEPA process into the MRRP planning and implementation. If no significant impacts are determined, a Finding of No Significant Impact (FONSI) will be prepared and NEPA compliance will be fulfilled.

6.6 CULTURAL REOURCES

Section 106 of NHPA of 1966 (amended June 17, 1999) requires Federal agencies to take into account the effects of their undertakings on historic properties. By definition, historic properties are properties eligible for or listed on the NRHP. Federal undertakings refer to any Federal involvement including funding, permitting, licensing, or approval. Federal agencies are required to define and document the APE for undertakings. The APE is defined as the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist.

The Advisory Council on Historic Preservation (ACHP) issues regulations that implement Section 106 of NHPA at 36 CFR Part 800, Protection of the Historic Properties. Section 106 sets up the review process whereby a Federal agency consults with the SHPO, Native American tribes, and other interested parties including the public to identify, evaluate, assess effects, and mitigate adverse impacts on any historic properties affected by their undertaking. The proposed project was coordinated with the appropriate State Historic Preservation Officers. Letters received from the Nebraska State Historical Society (May 19, 2009) and the South Dakota Department of Tourism and State Development (May 28, 2009) noted that a review of their files indicates that there are no recorded historic resources in the project area, and it was determined that there would be no adverse effects to cultural resources (Appendix A).

6.7 PRIME FARMLANDS

The Farmland Protection Policy Act [7 CFR 658] minimizes the extent to which Federal actions contribute to the unnecessary conversion of prime farmlands to nonagricultural use. The NRCS takes steps to ensure that prime farmlands lost to development are documented and provided to congress in a yearly report. The NRCS reviewed the proposed project and has determined that a Farmland Conversion Impact Rating form (AD-1006) is not needed on this project since the project will not take additional cropland out of production. Thus, the NRCS has determined that the project was found to be cleared of FPPA significant concerns (April 8, 2010, Appendix A).

6.8 SHORT TERM VERSUS LONG-TERM PRODUCTIVITY

Implementation of the ESH program would result in various impacts related to construction of ESH. The majority of impacts associated with construction of ESH would be temporary, short-term impacts. Consistent implementation of the site selection and pre-construction site surveys should minimize short-term impacts and protect long-term productivity of the environment. The proposed ESH program is grounded in a comprehensive planning process which considers key resource components of the of the river ecosystem. The short-term resource uses are not anticipated to have a detrimental effect on the long-term productivity of the environment.

6.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Changes to the project site resulting from the preferred alternative would be reversible but would require extensive labor and budget. The time, labor, materials, and Federal funds expended on the project construction should be considered irretrievable.

Chapter 7 OTHER CONSIDERATIONS

7.1 INTRODUCTION

The recommended alternative includes construction of Emergent Sandbar Habitat for the benefit of terns and plovers. This section describes the monitoring and evaluation plan, vegetation removal study, predation management plan, the Programmatic EIS, the Missouri River Recovery Program, the Missouri River Ecosystem Recovery Plan EIS, maintenance plan, implementation responsibilities, cost estimate, schedule, and conclusions and recommendations for the ESH recommended alternative.

7.2 MONITORING AND ADAPTIVE MANAGEMENT

As a draft program-level Adaptive Management (AM) strategy has been created for the ESH PEIS, the following discussion will focus on the proposed project's relationship to the overall AM strategy and site-specific uncertainties to be addressed in the monitoring of these projects. The three proposed projects would all employ the use of the pilot project methodology "vegetation removal with subsequent overtopping and building up to nesting elevations", or simply overtopping, described in the Design and Construction Strategy section of the document. This methodology has the potential benefits of reduced cubic yards of material needed for construction and less cost as compared to the primary mechanical creation methodology employed in the ESH program. However, uncertainties remain regarding the amount of material required at each site, subsequent rates of vegetation encroachment and biological response to sites created in this manner.

7.2.1 Objectives

The proposed projects are part of a larger effort of the ESH program to achieve the stated objectives of meeting or exceeding tern and plover productivity targets, increasing and subsequently stabilizing tern and plover populations, and meeting ESH acreage targets. Use of the proposed pilot project methodology of overtopping is specifically directed at achieving Objective 4 – Minimize negative impacts due to ESH construction activities. This objective seeks to reduce the area affected due to mechanical construction of ESH as measured by the cubic yards of material moved annually. Overtopping alone could require less cubic yards per acre of ESH created when compared with the primary mechanical construction methodology of increasing the height of shallowly submerged sandbars. Subsequent overtopping and building up to 20,000 cfs and 50,000 cfs levels could also require less material than creating new complexes on completely submerged sandbars, depending on the amount of material required.

7.2.2 Monitoring

The proposed projects would be monitored as part of the program-level efforts focused on tracking trends in ESH and bird response. Due to the particular uncertainties associated with this pilot project methodology, rates of vegetation encroachment, bird use, and the actual number of cubic yards moved would be of particular concern for the proposed projects. Rates of vegetation encroachment would be measured from habitat delineations derived from satellite imagery collected annually during the nesting season on all target river segments. The programmatic cost for this effort is approximately \$250,000 per year. Bird usage of these sites, including adult populations and fledge ratios, would be monitored as part of the annual adult census and productivity surveys. The programmatic cost for this effort is approximately \$1,050,000. Cubic yards of material moved would be monitored by construction firms contracted to construct the sandbars. The cost for this effort is encompassed in the construction cost for the proposed projects. Overall construction cost for each site would also be monitored and reported for these projects.

7.2.3 Assessment

The monitoring data collected would be used to assess the overall program's progress towards the stated objectives and used to validate predictive models on an annual basis. As part of the annual strategic review, rates of vegetation encroachment at these sites would be compared with that of sites constructed through other methodologies to determine whether there is a noticeable difference amongst sites conducted with different methodologies. Additionally, bird use of these and other constructed sites would be compared to see if there are noticeable differences in species composition, density, productivity, or overall population per site. Cubic yards of material moved and cost would also be compared amongst the various methodologies. These factors would be used to assess whether or not this construction and design methodology should be used or further explored in the future and to determine whether subsequent site-specific adaptive management actions are needed to improve project performance.

7.2.4 Adaptive Management

On a programmatic level, the assessment of these sites would be used to determine whether this pilot project methodology should be incorporated as a primary construction methodology within the ESH program. On a site-specific level, the assessment would be used to determine whether site-specific actions are needed.

If the rate of vegetation growth at one or more of the proposed sites is greater than desired and is thought to be inhibiting nesting, vegetation removal actions - as described in the productivity enhancement strategy section of the ESH PEIS AM strategy - may be initiated. The estimated annual cost for this action is \$750 per acre. Other potential productivity enhancement actions described in the PEIS strategy include restoring intended slopes and contours at constructed sites through re-shaping and removal of predators. The anticipated costs for these

actions are captured in the table below. Note that these actions would be in response to unanticipated changes at the proposed sites and would be contingent on available funding.

Table 7-1: Potential Adaptive Management actions

		Annual Costs			
Site	Acres	Vegetation Removal	Re-shaping	Predator Removal	Total
789.7	30	\$22,500	\$30,000	\$7,000	\$ 59,500
759.4	71	\$53,250	\$71,000	\$7,000	\$131,250
756.7	39	\$29,250	\$39,000	\$7,000	\$ 75,250

7.2.5 Implementation

Collection of data would be implemented by the USACE Omaha District Threatened and Endangered Species section. Analysis and Assessment of this data, along with subsequent recommendations, would be conducted by the ESH Project Delivery Team (PDT) in conjunction with the Adaptive Management Work Group (AMWG). These recommendations would be captured in annual strategic review documents and forwarded to the USACE Executive Steering Committee who would make the decision as to whether the recommendations receive funding within the annual MRRP budget.

7.3 VEGETATION MODIFICATION STUDY

Beginning in the fall of 2008, the Corps initiated tests of vegetation removal techniques including use of pre- and post-emergent herbicides, mowing, raking, and overtopping. As previously mentioned, vegetation removal efforts thus far have had mixed success. The study was designed cooperatively with USFWS NPS, USGS, and representatives from numerous state agencies. It involves testing combinations of methods on 25 m² test plots on 15 sandbars on the Missouri River from the Gavins Point Segment to the Garrison segment. Once the most successful combination of treatments is identified, broad use of the treatment(s) will be analyzed and may be incorporated into the program. It is believed that vegetation removal, if viable, would be more cost effective and require a shorter construction period than mechanical creation.

7.4 PREDATION MANAGEMENT

The Corps developed a predation management plan for least terns and piping plovers on the Missouri River. Numerous incidents of predation on the two species by a variety of predators are documented annually by the Corps' Tern

and Plover Monitoring Plan crews as well as by other agencies and organizations conducting research on behalf of the Corps. Recent data suggest that predators are a likely cause for poor nest productivity in the last few years (6.7% of known nests 2004-2008) (USACE 2008a). Implementation of the plan would increase the productivity of least terns and piping plovers by reducing the impacts of predation on eggs, chicks, and adults. A range of management actions may be used. Non-lethal methods include the use of predator exclusion cages, hazing of predators away from nest areas, and live-capture and translocation. Some predators will defeat all attempts at hazing or capture and when deemed necessary by the Corps and/or responsible trapper, lethal removal by shooting or body grip traps may be used to take predators that are identified as known and immediate threats to endangered or threatened species.

The predation management plan describes the types and amounts of predators that will be targeted and the methods that will be used. The environmental effects of the plan are analyzed in the EA. The intended result is to increase tern and plover productivity while avoiding significant impacts to predator populations.

7.5 MAINTENANCE OF CREATED EMERGENT SANDBAR HABITAT

Maintenance activities are different from original construction in that these activities are intended to retain the original "as built" conditions to the extent possible, an activity for which NEPA compliance and 404 compliance and WSRA compliance has already been attained. Maintenance of constructed ESH would be performed on an "as needed" basis for the lifespan of the bars, and would be fully coordinated with the interagency ESH PDT.

Efforts could include removal of early successional vegetation from nesting areas as well as repair of intended slope ratios and channels. An accounting of maintenance activities will be included each year in the end-of-year report of tern and plover activities. Maintenance activities may include:

- Use of glyphosate-based aquatic herbicide (such as RODEO) on leafed-out vegetation by ATV with boom or backpack spray application methods
- Mowing of vegetation with sickle mower
- Hand cutting woody saplings (<4 inches)
- Removal of large driftwood and other non-living potential predator perch sites
- Reshaping and/or dredging efforts in the event that cut banks occur and/or channels fill in with sediment

The use of contractors or the need for staging areas for maintenance is not anticipated, but would be determined on a case by case basis. All actions would take place after terns and plovers have left the area.

7.6 DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT (PEIS)

The Draft Programmatic EIS (PEIS) completed an internal Omaha District Quality Control (DQC) review as well as an Agency Technical Review (ATR) in 2009. The document is currently undergoing an Independent External Peer Review (IEPR), which will be completed in April, 2010. A Cooperating Agency (CA) review of the document will occur in the spring of 2010, followed by public review of the Draft PEIS in the summer of 2010. A Final PEIS and Record of Decision (ROD) are expected in late 2010.

The PEIS evaluates a number of alternatives ranging from continued implementation of the current program, to full implementation of the acreages recommended in the BiOp. Table 7-2 shows the current list of proposed alternatives. The Adaptive Management framework will be incorporated into the PEIS and the process of Alternative selection.

The PEIS analyzes the cumulative effects of the various alternatives. No change in the current implementation strategy of the ESH program will be initiated without analysis of its impacts, whether in the PEIS or another form of NEPA documentation.

Table 7-2: PEIS Acreage Alternatives

River Reach	Alt. 1 BiOp 2015	Alt. 2 BiOp 2005	Alt. 3 Measured 1998	Alt. 3.5 Average 1998-2005	Alt. 4 Measured 2005	Alt. 5 Manipulate Sufficient Habitat	No Action Current Program	Do Nothing
Fort Peck	883		883	565	247	30	TBD	0
Garrison	4,295	2,148	2,066	1,327	588	500	TBD	0
Fort Randall	700	350	295	212	128	135	TBD	0
Lewis & Clark Lake	1,360	680	566	354	142	80	TBD	0
Gavins Point	4,648	2,324	2,944	1,912	880	570	TBD	0
Total	11,886	5,502	6,754	4,370	1,985	1,315	150/yr	0

7.7 MISSOURI RIVER ECOSYSTEM RESTORATION PLAN AND ENVIRONMENTAL IMPACT STATEMENT

In 2007, the Corps received new authorizations from Congress under a Water Resources Development Act, including authorization to conduct a broad study to integrate Recovery, Mitigation and other Restoration Activities. As such, the Corps has initiated a long-term planning effort entitled the Missouri River Ecosystem Restoration Plan which involves a multi-agency planning group in order to develop a shared vision for the future of ecosystem restoration on the Missouri River, including the restoration of ESH. This study will take place over

the next several years and will conduct its own cumulative effects analysis prior to implementation.

7.8 IMPLEMENTATION RESPONSIBILITIES

The Corps is responsible for study management and coordination with USFWS, and other affected/interested agencies. The Corps will prepare and submit the subject PIR and complete all environmental review and coordination requirements. The Corps will then prepare any design plans that may be required, finalize any plans and specifications, prepare and implement a monitoring and evaluation plan, advertise and award a construction contract, perform construction contract supervision and administration, and develop and implement Real Estate agreements.

7.9 COST ESTIMATE

The total estimated construction cost of the proposed ESH projects is \$5.7 million, with individual sites ranging from \$1.4 to \$2.3 million depending on the estimated amount of material to be moved. This estimate includes contractor mobilization, vegetation removal, dredging, overtopping and shaping. ESH would be federally funded in its entirety.

Table 7-3 Estimated Cost of each Proposed ESH Site

Site (River Mile)	Acres ESH	Quantity Material	Relative Cost*	Cost Per CY
RM 789.7	30	150,000 CY	\$1,400,000	\$6
RM 759.7	71	300,000 CY	\$2,300,000	\$6
RM 756.7	60	250,000 CY	\$2,000,000	\$6

^{*}Includes contractor mobilization \$500,000 for each ESH site.

7.10 SCHEDULE

Table 7-4 Estimated Schedule

Task	Proposed Completion <u>Date</u>
Project initiation Meeting	18 Feb 2010
PDT development of Tentative Site Concept	3 March 2010
PDT selection of Tentative Selected Plan	10 March 2010
Preliminary Design and Quantities from ED	22 March 2010
Draft PIR/EA	5 Apr 2010
30 day public comment period	25 May 2010
Final PIR – Signed FONSI	31 May 2010
404/401 Permit Received	8 Jun 2010
BCOE Review	8 Jun 2010
Final Plans and Specs	22 Jun 2010
Ready to Advertise	29 Jun 2010
Receive proposals	20 Jul 2010 (3 weeks)
Award Const Contract	3 Aug 2010

7.11 CONCLUSIONS AND RECOMMENDATIONS

The development of 161 acres of ESH at three locations in the Gavins Point River Segment, at an estimated cost of \$5,700,000 has been identified as a priority project for inclusion into the Missouri River Recovery Program. The value of ESH in the area is either limited or non-existent. Construction of the sandbars would benefit piping plovers and least terns.

It is recommended that the three proposed sandbars be constructed as described in this PIR. The construction of all three sandbars would result in the greatest beneficial impacts to tern and plover habitat, and would not significantly adversely affect the human environment.

Chapter 8 Chapter 8 REFERENCES

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APPENDICES

- D.
- E.
- Correspondence Project Plans (pending) Environmental Protection Specifications F.