



# 2001

**U.S. Army Corps  
of Engineers**  
Omaha District

## Annual Report for the Missouri River Biological Opinion



# **2001 ANNUAL REPORT**

**IMPLEMENTATION OF THE BIOLOGICAL OPINION  
FOR THE  
MISSOURI RIVER MAIN STEM SYSTEM,  
MISSOURI RIVER BANK STABILIZATION AND NAVIGATION PROJECT,  
AND  
KANSAS RIVER RESERVOIR SYSTEM**

**August 30, 2002**

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Omaha District  
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**2001 Annual report  
for the  
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**

**Summary**

The Endangered Species Act (ESA) requires that the Corps of Engineers (Corps), in coordination with the appropriate resources agency, will ensure that any action authorized, funded, or carried out is not likely to jeopardize the continued existence of any federally listed threatened or endangered species or result in the destruction or adverse modification of critical habitat. Formal consultation between the U.S. Fish and Wildlife Service (FWS) and the Corps under Section 7 of the ESA culminated with the "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" (Opinion), dated November 30, 2000. The Opinion concludes the existing operation of Missouri River Main Stem System, the maintenance and operation of the BSNP and operation of the Kansas Reservoir System jeopardizes the existence of the endangered interior least tern and pallid sturgeon and the threatened piping plover. It also concludes there will be an incidental take of bald eagles.

In its Opinion, the FWS recommends a Reasonable and Prudent Alternative (RPA) with numerous elements; Reasonable and Prudent Measures (RPM) to minimize take/harm of the noted species; and Conservation Recommendations (CR) that would benefit the species. **Main elements of the RPA are adaptive management, flow enhancement, unbalanced system regulation, habitat restoration/creation/acquisition, and species-specific measures to avoid jeopardy.** The RPA and RPM are required actions, and the CR are discretionary actions specific to the four species.

**Adaptive management** is the first element of the RPA. It is a process that allows modification of management actions in response to new information and changing environmental conditions. Under this element, an Agency Coordination Team (ACT) was established, a comprehensive threatened and endangered species monitoring plan is being developed, and this annual report, that documents Corps actions to implement the Opinion, has been prepared.

The **flow enhancement** element of the RPA requires that releases be modified from two main stem Reservoirs and studied for a third mainstem reservoir. For 2001 Fort Peck Dam releases were to be increased in the spring and be made primarily over the spillway from the warmer surface water of the lake.

Currently, releases from Fort Peck Dam in parts of May and/or June are lower and colder than FWS biologists feel are needed to provide the attributes that the pallid sturgeon need to spawn and, ultimately, to preclude jeopardy. To ensure that the spillway can handle

the required frequent releases (every third year on average), two test releases are planned by the Corps. Drought conditions in 2000 resulted in lake levels too low to allow spillway releases for the first of two tests, known as the mini test, in 2001. As soon as sufficient lake levels occur at Fort Peck Dam the mini-test of a spring flow from Fort Peck Dam will be conducted to determine if there may be adverse impacts to the spillway and to obtain data on the downstream impacts. A larger, full test will be conducted the year after the mini test if there is, again, sufficient water and NEPA requirements are met. In the meantime, portions of the overall monitoring plan are being implemented.

The **unbalanced system regulation** element specifies that a pattern of lower lake levels followed by normal levels be implemented for the three upper lakes - Fort Peck Lake, Lake Sakakawea, and Lake Oahe. Each lake would go through a 3-year cycle of lowering, refilling, and responding to system inflows. Each of these three lakes would have the cycle staggered so no two reservoirs were in the same stage of the cycle. This form of regulation benefits species in both the lakes and the river reaches.

Unbalanced Intrasystem Regulation was not implemented in 2001 due to insufficient water in the system.

Under the **Habitat** element of the RPA, the Corps is required to restore, create and acquire habitat to benefit the listed species. Specifically, additional shallow water habitat to benefit the pallid sturgeon and sandbar habitat to benefit the terns and plovers would be provided. Two shallow water habitat restoration goals listed in the Opinion are 2,000 acres by 2005 and 19,565 acres by 2020. Sandbar habitat acreage goals vary by year and river reach.

For 2001, shallow water habitat (less than 5 feet deep with a velocity of less than 2 feet per second) was created under the BSNP Missouri River Fish and Wildlife Mitigation Project. This effort created approximately 835 acres of shallow water habitat and 3,635 acres of reconnected floodplain in FY01. A plan was also developed and is part of this report for reaching the 2,000 acre shallow water habitat goal by 2005 in reaches 10 through 16.

The Corps continued to enhance and manage emergent sandbar habitat through flows, reservoir intrasystem regulation, and by mechanical manipulation. Habitat creation included diking and island construction in a secondary bay, overburden removal and fencing of peninsula habitat, dewatering, vegetation removal, and use of flows and pool management to rejuvenate degrading habitat. Other efforts in 2001 focused on describing habitat, determining factors that affect nesting success, and measuring rates of habitat degradation due to vegetation encroachment and erosion.

Elements applicable to **specific species** includes, for terns and plovers, determining the value of the Kansas River to benefit the birds; meeting recruitment goals; and conducting a piping plover foraging ecology study. Sturgeon requirements are propagation and augmentation support; and conducting a pallid sturgeon population assessment on the Missouri River.

The Corps continued to monitor tern and plover fledge ratios as it has done for the last 12 years on the Missouri River and 5 years on the Kansas River. Fledge ratio goals were

met on the System in 2001 with a running three year average of 1.22 for least terns and 1.38 for piping plovers. The Great Plains piping plover forage ecology study was scoped in 2000 and commenced during the 2001 nesting season.

Propagation and augmentation support by the Corps in 2001 included supplies and materials assistance to Blind Pony State Fish Hatchery and the Gavin's Point and Garrison National Fish Hatcheries in excess of \$100,000.

Population assessment activities were funded by the USACE in high priority river segments in 2001. Several state agencies and the USFWS conducted pallid sturgeon population assessment surveys in accordance with the "Pallid Sturgeon Population and Habitat Monitoring Plan for the Missouri and Kansas Rivers" (Draft-2001).

**Reasonable and prudent measures** implemented in 2001 included cottonwood stand surveys, continuation of the tern and plover nesting surveys, captive rearing of terns and plovers, evaluation and implementation of operational changes to avoid take, predator aversion efforts for the birds, and a comprehensive public outreach program for both the birds and the sturgeon.

**Conservation Recommendations** were implemented for three of the four species of concern. For the bald eagles, winter surveys were conducted, a habitat management plan was developed for Segment 10, and public outreach was implemented. For the birds research concerning the connectivity or interchange between Missouri River piping plovers and plovers nesting in the Northern Great Plains was initiated.

Pallid sturgeon work under the Conservation Recommendations included initiation of a feasibility study to identify and evaluate the effects of tributary dams and other structures on spawning migrations; implementation of education and outreach programs for anglers; initiated the evaluation of the cumulative effects of bank stabilization; participated as a partner in regional pallid sturgeon recovery work groups; assisted the Service and other partners with fish health issues as they relate to pallid sturgeon; and assisted the Service and other partners with cyropreservation banking of pallid sturgeon sperm.

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## LIST OF ACRONYMS AND ABBREVIATIONS

<u>Acronym/Abbreviation</u>	<u>Phrase</u>
ACT	Agency Coordination Team
AOP	Annual Operating Plan for the Missouri River
AZAA	American Zoo and Aquarium Association
BSNP	Missouri River Bank Stabilization and Navigation Project
CAP	Continuing Authorities Program usually in reference to Section 1135 of the Water Resources Development Act of 1986.
cfs	cubic feet per second
CR	Conservation Recommendations
Corps	U.S. Army Corps of Engineers
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FWS	U.S. Fish and Wildlife Service
FY	Federal Fiscal Year from October 01 to September 30
GP	Gavins Point
GPS	Global Positioning System
HABCARP	Habitat Conservation And Restoration Plan
HQUSACE	Headquarters, U.S. Army Corps of Engineers
IP	Implementation Plan
Master Manual DEIS	Master Manual Revised Draft Environmental Impact Statement
MNRR	Missouri National Recreational River

<u>Acronym/Abbreviation</u>	<u>Phrase</u>
MRBA	Missouri River Basin Association
Missouri River NRC	Missouri River Natural Resources Committee
MTFWP	Montana Department Fish, Wildlife and Parks
NAS	National Academy of Science
NEPA	National Environmental Policy Act
NPS	National Park Service
NRCS	Natural Resources Conservation Service of the U.S. Department of Agriculture
NWR	National Wildlife Refuge
Opinion	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 dated November 30, 2000.
PMP	Project Management Plan
RPA	Reasonable and Prudent Alternative
RPM	Reasonable and Prudent Measures
SDGFP	South Dakota Game, Fish and Parks
SDSU	South Dakota State University
Section 1135	Section 1135 of the Water Resources Development Act of 1986.
SEIS	Supplemental Environmental Impact Statement
T&E	Threatened and Endangered
USDA	U.S. Department of Agriculture
USGS	U.S. Geological Survey
WRDA	Water Resources Development Act

# **2001 ANNUAL REPORT**

## **Introduction**

This annual report is furnished to comply with reporting requirements of the 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 dated November 30, 2000 (Opinion).

This report is formatted similar to the Table 24 (List of Biological Opinion Requirements) from the Opinion for the ease of cross referencing. Only those items that are required to be done in 2001 or, have been accelerated from the Opinion schedule, are included. Table 24 is included as Appendix C to this report. It is anticipated future annual reports will follow a similar format for ease of tracking progress.

## **Reasonable and Prudent Alternative**

### **Actions Applicable for Multiple Listed Species in the Ecosystem**

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#### **I. Adaptive Management**

##### **I.A) Establish an ACT**

**Implementation Date:** March 2001

##### **I.A)1) Coordination Meetings**

**Implementation Date:** Twice a year

First meeting was held March 28, 2001 in Denver, Colorado. Minutes from the meeting were provided to the participants

The 2001 Fall meeting was held in conjunction with the Missouri River Natural Resource Commission fisheries working group in Pierre, SD. A follow up meeting was held November 28, 2001 at the Minnesota Valley National Wildlife Refuge with final minutes provided to all of the participants. The Spring 2002 meeting was postponed awaiting release of the Master Manual.

##### **I.B) Develop Endangered Species Monitoring Plan**

**Implementation Date:** Within 1 Year

Efforts to develop a comprehensive monitoring and evaluation (M&E) program were initiated by the Corps in 2001. A Project Manager was designated to coordinate the development and implementation of an M&E plan. Activities in 2001 focused on four main areas. 1) Development of monitoring protocols for pallid sturgeon population assessment activities. These protocols are intended to provide the framework for a standardized program not unlike the tern and plover program in place on the river. 2) Formalizing a communication strategy so that all M&E activities within the Missouri River Basin are coordinated and receive some level of quality control. This will help insure that any implemented M&E program is comprehensive and subsequent data can

be used to better understand benchmark conditions, analyze actions, and identify modifications. 3) Structuring a framework so that relevant research questions are identified, scoped, proposed, prioritized, and findings are reviewed and built into the adaptive management framework if prudent. 4) Determining near term and long term resource needs to implement a M&E program.

The Corps continued to conduct their now institutionalized monitoring program for piping plovers and least terns in 2001. Additionally, various activities were initiated concerning pallid sturgeon population assessment. Descriptions and results of these activities, including initial results from several research projects, are contained in subsequent sections of this annual report.

### **I.C) Annual Report**

**Implementation Date:** Annually

This report meets this requirement.

## **II. Flow Enhancement**

### **II.B) Fort Peck Dam.**

#### **Implement mini-test**

**Implementation Date:** 2001

The mini-test was not implemented due to insufficient water in Fort Peck Reservoir during 2001.

The mini-test consists of a discharge of up to 11,000 cubic feet per second (cfs) down the spillway for Fort Peck Dam for a period of up to four weeks during the month of June. During the same time, at least 4,000 cfs would be released through the powerhouse, with total discharges (powerhouse + spillway) not to exceed 15,000 cfs.

As a prerequisite to the mini-test, sufficient water has to be available in Fort Peck Lake for the Corps to be able to discharge a known volume of water through the spillway gates. For the mini-test to run as described, for the duration described, and to gain the best information on discharge volume and resulting temperatures, at least 5 feet of water elevation is needed above the spillway crest (e.g. lake level of at least 2230 msl). Based on information in the 2001-2002 Annual Operating Plan, upper quartile or greater runoff would have to occur during the winter and spring of 2002 for this condition to be met before June 1. Due to the continued drought in the upper basin it is not anticipated that the mini-test will be run in 2002.

Environmental compliance, Tribal consultation, and baseline monitoring work was begun during 2001. This included agency and public scoping meetings, numerous tribal consultation meetings, and technical meetings with regard to the scope of the

monitoring effort. The first season of data collection was during the summer of 2001. A summary of the 2001 monitoring effort, as well as the monitoring plan, its assumptions, and its quality control measures is available on request.

**Implement full test.**

**Implementation Date:** 2002

The full test will be implemented the first year after the mini-test that there is sufficient water in Fort Peck Lake.

**III. Unbalanced Intrasystem Regulation**  
**Implementation Date: 2001**

Unbalanced Intrasystem Regulation was not implemented in 2001 due to insufficient water in the system.

Unbalanced Intrasystem Regulation was first included in 2000 annual operating plan and is repeated for the Upper Decile and Upper Quartile Simulations. The annual operating plan studies indicate Fort Peck Lake cannot be balanced on March 1, 2002, but 1 year later, on March 1, 2003, Fort Peck will be high, Garrison low, and Oahe allowed to float (normal operation) should Upper Quartile or greater runoff occur. This unbalancing is computed based on the percent of the carryover multiple purpose pool that remains in Fort Peck Lake, Lake Sakakawea, and Lake Oahe. In terms of elevations, Fort Peck would be 4.0 feet high, Garrison would be 3.0 feet low, and Oahe would be balanced on March 1, 2003, for Upper Decile and Upper Quartile. Median or lower runoff does not sufficiently refill the reservoirs in 2002 and no unbalancing would occur. The unbalancing would alternate at each project; high one year, float (normal operation) the next year, and low the third year as shown on Table 1.

**TABLE 1**  
**RESERVOIR UNBALANCING SCHEDULE**

Year	Fort Peck		Garrison		Oahe	
	March 1	Rest of Year	March 1	Rest of Year	March 1	Rest of year
2002	Unbalanced	High	Balance	Low	Balance	Float
2003	High	Float	Low	Hold peak	Raise and hold during spawn	Float
2004	Raise & hold during spawn	Float	High	Float	Low	Hold peak
2005	Low	Hold peak	Raise & hold during spawn	Float	High	Float

**Notes:**

**Float year:** Normal operation, then unbalance 1 foot during low pool years or 3 feet when System storage is near 57.1 MAF on March 1.

**Low year:** Begin low, then hold peak the remainder of the year.

**High year:** Begin high, raise and hold pool during spawn, then float.

#### **IV. Habitat Restoration/Creation/Acquisition**

##### **IV.A) Restoration of Submerged Shallow Water Habitat**

###### **Implementation Date:**

###### **IV.A)1) Ensure no-net-loss of existing shallow water habitat from O&M in lower river.**

As part of the BSNP maintenance program no net loss of habitat was accomplished by incorporating notches where appropriate. The notches help to maintain any existing habitat downstream of the repaired structures. The exception is dikes that are repaired where the landowner adjacent to the structure has concerns about bank erosion adversely affecting a levee or other structure. Notching is not done on these structures until an easement or some other form of permission is acquired from the landowner.

The notching effort also started creating habitat. Approximately 110 new notches were cut at various locations between mile 426 and mile 8. These notches are larger and deeper than a typical maintenance notch. The larger size notches are intended to allow for more aggressive habitat development in the area.

The Missouri River Bank Stabilization and Navigation Project Fish and Wildlife Mitigation effort created approximately 835 acres of Shallow water Habitat and 3,635 acres of reconnected floodplain in FY01. Complete details and locations are available in the Missouri River Bank Stabilization and Navigation Project Fish and Wildlife Mitigation Annual Implementation Report dated January 2002. Appendix B is a copy of this report.

###### **IV.A)2) Develop habitat restoration plans and strategies in Segments 10 through 16 by 2001**

Appendix A is the shallow water habitat plan to create habitat in Segments 10 through 16.

In Segment 10, the Corps developed a Preliminary Restoration Plan (PRP) for the restoration of approximately 35 acres of shallow backwater habitat at Ponca State Park, within the Missouri National Recreational River.

As part of this early design process, several coordination meetings were held with the landowner (the State of Nebraska), Ponca State Park, the Better Ponca Foundation, and appropriate political aides. Coordination with the Corps' Northwestern Division office was also accomplished, and a business process for proceeding was established and approved.

## **IV.B) Emergent Sandbar Habitat**

### **IV.B.2) Provide Reservoir beach and island habitat. Maintain reservoir habitats through intra-system regulation Implementation Date: 2001**

The 2001-2002 Annual Operating Plan included provisions for unbalancing the Fort Peck, Garrison, and Oahe reservoirs for Upper Quartile and greater runoff scenarios. Unbalancing is intended to benefit threatened and endangered species production in the long term by maintaining and exposing sandbar and shoreline habitat. The unbalancing is also beneficial to reservoir fisheries in the long term by ensuring a periodic rise in reservoir elevation sufficient to provide good spawning conditions and inundating vegetation, thereby increasing young-of-the-year fish survival.

Fort Peck had a 4,000 cfs reduction in flows during the tern and plover nesting season. The resulting stage difference provided excellent nesting habitat. A constant 8,500 to 9,000 cfs discharge through the nesting season resulted in good habitat conditions for nesting terns and plovers.

When flood flows entered the Missouri River below the project during the nesting season, hourly releases were lowered to no less than 3,000 cfs in order to keep traditional riverine fish rearing areas continuously inundated while helping to lower river stages at downstream nesting sites. The threatened and endangered flow modification "mini-test" involving releasing water through the spillway for 4 weeks beginning in late May or early June was not conducted due to low water in Fort Peck. Fort Peck Lake must be at elevation 2229 msl to allow releases through the spillway.

Garrison had a reduction in flows during the tern and plover nesting season in the 500 to 1,000 cfs range. Hourly peaking was limited to no more than 30,000 cfs for 6 hours when the daily average release was lower than 28,000 cfs.

Lake Sakakawea elevations did reach levels considered necessary for optimum fish spawning during the month of May. In addition to the poor runoff conditions, the actual timing of the rise in lake elevation was dependent upon the pattern of inflow (storm events) at that time.

Oahe releases in the spring and summer were for backing up those from Gavins Point. Oahe's elevation in the spring was steady or slightly rising. The Oahe pool fell during the summer.

Fort Randall was operated to provide for a pool elevation near 1355 during the fish spawn period, the lake was held above elevation 1337.5 feet msl in the fall to ensure adequate supply for water intakes.

Gavins Point. Based on the results of last year's operation (2000), releases were not increased in May when terns and plovers began to initiate nesting. The release rate was

be based on an assessment of flows needed to support the immediate navigation target. Sufficient habitat was available above the release rates to provide for successful nesting, thereby, saving water in the upstream reservoirs. The resulting steady release prevented inundation of nests and chicks. Flows during the nesting season were near or above what they were for the past nesting season (1999). Cycling releases every third day is no longer done except during downstream flood control operations.

The Gavins Point pool was operated near 1206.0 feet msl in the spring and early summer with variations day to day due to rainfall runoff. Greater fluctuations occurred in the river, increasing the risk of nest inundation in the upper end of the Gavins Point pool. The pool was increased to elevation 1208.0 feet msl following the nesting season.

#### **IV.B)3) Artificial or Mechanically Created Habitat**

##### **IV.B)3) Provide created sandbar habitat on Segments 2, 4, 8, 9, 10 to supplement B1 above.**

**Implementation Date:** 2001, continuing

Cooperative habitat enhancement activities were continued in 2001 with the U. S. Fish and Wildlife Service (USFWS) and Bureau of Reclamation on Lake Audubon National Wildlife Refuge. Memorandum of Understanding was signed by the agencies to formalize this activity in the future. Efforts were initiated in 2001 to develop a management plan for piping plovers and their habitat within the Refuge.

The Stessman Marsh Project continued with Audubon Refuge. The marsh behind Dike 1A was pumped down and the two plover islands created in the marsh were de-vegetated prior to the nesting season to allow for more nesting habitat. Additionally, East Dike and Dike 44 were pumped down to allow for island construction in 2002.

As habitat quality declines following the high water years of 1995-1997, efforts are being focused on chemical control of vegetation. Gavins Point Project is scoping an experimental application of Arsenal herbicide on an island below Gavins Point to determine its effectiveness in carryover control of vegetation.

In Segment 10, the Corps developed a Preliminary Restoration Plan (PRP) for the restoration of approximately 35 acres of shallow backwater habitat at Ponca State Park, within the Missouri National Recreational River.

As part of this early design process, several coordination meetings were held with the landowner (the State of Nebraska), Ponca State Park, the Better Ponca Foundation, and appropriate political aides. Coordination with the Corps' Northwestern Division office was also accomplished, and a business process for proceeding was established and approved.

## **Initiate studies of the lack of sediment transport and impacts on habitat regeneration and turbidity**

**Implementation Date:** 2003

Though specific sediment transport studies were not conducted in 2001 the Corps did begin "baseline" water quality data collection in Segment 10 during the summer of 2001. A total of nine monitoring locations were established on the Missouri, James, and Vermillion Rivers as part of this initial study. Sampling sites consisted of four types: Thalweg, backwater, special turbidity sites, and tributaries. Field measurements were obtained using a Hydrolab, Secchi disc, and GPS receiver. In addition, water samples were collected for laboratory analysis. Lab analysis consisted of turbidity, total suspended solids, total organic carbon, total phosphorus, total Kjeldahl nitrogen, total ammonia, nitrate/nitrite nitrogen, chlorophyll a, atrazine, alachlor, and metolachlor.

The water quality data were assessed in the following ways: 1) descriptive statistics (mean, median, minimum, and maximum) were calculated for all measured parameters; 2) box plots were constructed to visually display the distribution of the measurements for each parameter; and 3) a simple, two-tailed, paired t-test was used to test for significant differences between selected monitoring locations and sampling sites.

Details on the sampling methodology, as well as water quality conditions observed during this study, will be available in the report "A Scoping Study of Water Quality Conditions in the Missouri National Recreational River Reach from near Gavins Point Dam to Ponca State Park, Nebraska." This report will be available for distribution by the end of March 2002.

In addition to this initial effort, a scope of work was prepared for follow-up studies of water quality within the Missouri National Recreation River in order to better understand existing water quality parameters prior to implementing any change toward increased turbidity in this reach.

Coordination meetings and conference calls were held with the Nebraska Department of Environmental Quality, since state regulations generally promote actions resulting in less turbid waters, rather than supporting an increase in water turbidity. Additional coordination will be needed with the states, as well as with EPA as this action proceeds forward.

## **Monitoring of tern and plover nesting habitat**

**Implementation Date:** Once every 3 years

The major emphasis of tern and plover habitat assessment activities during 2001 included continued development of the Corps Habitat Conservation and Recovery Plan (HABCARP). This effort, initiated in 1999, is expected to be completed in 2002. Objectives of the plan include:

Conduct basin-wide classification of sandbar, shoreline, and shallow water aquatic habitat using digital imagery and Global Positioning System (GPS) data sources. Use remotely sensed data to identify landscape level features and characteristics of occupied nesting and foraging habitat to identify indicators of habitat suitability. Define and determine extent and distribution of suitable nesting and foraging habitat along the Missouri River and monitor changes in habitat creation/destruction. Identify priority areas for habitat management activities.

Activities undertaken with the HABCARP in 2001 include:

Data acquisition and classification activities continued as the 2000 digital imagery for Fort Peck, Garrison, Fort Randall, and Gavins Point river segments was received and processed; classification is nearing completion. This is the final year of monitoring data to be included in HABCARP, which includes data back to 1996.

Analysis of nest site and sandbar characteristics is ongoing. Efforts in 2001 focused on describing habitat, determining factors that affect nesting success, and measuring rates of habitat degradation due to vegetation encroachment and erosion.

To aid in the HABCARP analysis, work was begun on a comprehensive Geographic Information System (GIS) database of all historic least tern and piping plover nest sites on the Missouri River. This database includes spatial information as well as nest fate, productivity, and management activity information. This information will provide additional benefits beyond HABCARP, including streamlining Corps Regulatory and Planning processes pertaining to least terns and piping plovers and serve as a medium for sharing data with interested Federal and state agencies. It will also serve as a comprehensive data source for current and future research programs. Completion date for the database is October 2002.

A pilot project to assess the utility of building 3-dimensional models of existing interchannel sandbar habitat below Gavins Point Dam was conducted in March and early April. Highly precise Real Time Kinematic GPS equipment mounted on an ATV was used to collect a grid of elevation points on four historic nesting sites. Elevation points were collected with approximately 0.5 inch horizontal precision and 1.0 inch vertical precision. Digital elevation models were developed from these grids. The data collection techniques and analysis proved useful and will be implemented in future years for monitoring purposes. Some uses of the elevation data include:

- 1) Estimate area of emergent sandbar habitat at various flow levels.
- 2) Assess vegetation encroachment and scouring processes.
- 3) Investigate the effects of sandbar topography on piping plover and least tern nest site selection.
- 4) Allow more detailed assessment of nests at high risk from flow changes.

Current HABCARP efforts focus on river segments of the Missouri River. Initial planning efforts to incorporate reservoir habitat were conducted in 2001. Early planning focused on determining data needs and identifying existing data sources.

The Environmental Protection Agency (EPA) is currently conducting the Upper Missouri River Monitoring and Assessment Program (EMAP) to assess the health of the Missouri River between Garrison and Oahe Dams. The Corps provided support through equipment sharing and training for personnel. HABCARP and the EMAP program complement each other, as the EPA's statistically based field sampling protocols measure several variables not measured in the remote-sensing based approach of HABCARP. This partnership is expected to continue and expand in future years.

### **Elements Applicable to Specific Species**

#### **V. Least Tern and Piping Plover**

##### **V.A) Operate the Kansas River to provide overall benefits to conservation of least terns and piping plovers**

**Implementation Date:** 2001

During the nesting season, the Corps has coordinated extensively with the Manhattan office of the USFWS to avoid adverse impacts. In general, the altered lake operation has involved reducing target stages on the Kansas River to avoid flooding existing nests with releases from Corps lakes. In coordination with the USFWS, weekly field observations are made of nest elevations and a river elevation selected that will provide protection for the nests. No water is released from Corps lakes which would increase river stages and inundate nests.

Releases from Corps lakes are only increased when there is a decrease in the base flow of the Kansas River and then only enough to maintain the existing river stage. Releases from Corps lakes are reduced when a rise in the unregulated base flow of the Kansas River occurs upstream. The USFWS is consulted with after unregulated high flow events occur on the river that flood nests and also prior to resuming normal lake operations. This operation leads to abnormal storage of water in Corps lakes within the Kansas basin.

##### **V.B) Provide habitat to meet or exceed fledge ratio goals of 0.70 for least terns and 1.13 for piping plovers**

**Implementation Date:** 2001 (3 year average)

Fledge ratio goals were met on the System in 2001 with a running 3-year average of 1.22 for least terns and 1.38 for piping plovers. (See Terns and Plovers RPM 1.2.b for more information).

**V.C) Initiate and conduct a piping plover foraging ecology study on the Missouri River.**

**Implementation Date:** 2005

This effort is ahead of schedule. The Piping Plover Foraging Ecology research project was begun in 2001. The Corps and Virginia Polytech University in cooperation with the Nature Conservancy, USFWS-Ecological Services, Audubon National Wildlife Refuge, and the Audubon Wetland Management District will evaluate piping plover forage ecology on four habitat types within the Missouri River Basin.

Specific goals for the project include:

- 1) Determine factors limiting piping plover reproductive output on the Missouri River, with an emphasis on the role of the prey base.
- 2) Compare reproductive output on the Missouri River to reproductive output on "high quality" alkali wetland sites.
- 3) Identify characteristics of high quality plover foraging habitat in the Great Plains.
- 4) Determine factors affecting nest site selection on the Missouri River.

To achieve these goals a series of hypotheses about the relationships among foraging habitat, foraging rates, and plover reproductive output will be tested. Hypotheses to be tested include:

- 1) Invertebrate abundance near nesting sites limits chick fledging success.
- 2a) Higher parental quality results in higher probability of chicks fledging.
- 2b) Parental quality is lower in lower quality sites (lower invertebrate abundance).
- 3) Invertebrate abundance is related to habitat characteristics.
- 4) Habitat selection is a function of habitat characteristics and invertebrate abundance.

The second field season will be undertaken in 2002. For more information, contact U.S. Army Corps of Engineers, P.O. Box 710, Yankton, SD 57078.

Reference Reports: Thesis Working Plan, Danielle Le Fer, Virginia Polytech University  
Annual Report: 2001 Field Season, Piping Plover Foraging Ecology

**VI. Pallid Sturgeon**

**VI.A) Support, assist, and increase pallid sturgeon propagation and augmentation efforts.**

**Implementation date:** 2001 - 2011

**VI.A)5) Meet annually through ACT**

Three hatcheries, two Federal and one state received assistance in spawning and propagation efforts in 2001.

The Blind Pony State Fish Hatchery (Missouri Department of Conservation), was provided fish feed to facilitate their propagation efforts in 2001. Commercial (pellets) diet and brine shrimp were purchased directly by the Corps and shipped to Blind Pony State Fish Hatchery. Additionally, Leutinizing Hormone Releasing Hormone was purchased to induce spermiation and ovulation in wild brood stock pallid sturgeon. Aerators were also purchased for use during the culture process.

The hatchery successfully spawned two female and two male pallid sturgeons, which were captured in the middle Mississippi River. Propagation of the progeny proceeded well in the early stages; however, mortality of the young-of-year sturgeon increased and the entire year class was lost (approximately 28,000 fish). Fish health sampling was conducted and it is the belief of the fish health experts that a "Herpesvirus" was responsible for the loss of these fish. As a result, no fish were stocked in the lower Missouri River or middle Mississippi River in 2001.

Funding was provided to the South Dakota office of the USFWS for iridovirus sampling. Iridovirus issues have curtailed pallid sturgeon propagation efforts at several hatcheries, pending the identification of the virus in the wild. PCR testing was developed and utilized to identify the virus in the wild. A report should be available for inclusion as an appendix soon, but has been delayed due to the USFWS' loss of internet service.

The Gavins Point National Fish Hatchery (U.S. Fish and Wildlife Service) tested positive for the "Missouri River Iridovirus" in 2001. As a result, the facility was placed under quarantine. Therefore, the hatchery continued in a "status quo" format by maintaining the sturgeon already on station. This includes the future captive broodstock from the 1997, 1998 and 1999 year classes. Additionally, several hundred pallid sturgeon representing the 1999 year class above and beyond the needs of future captive broodstock were maintained. (These fish may be available for stocking in 2002 depending on decisions made concerning the iridovirus).

A variety of supplies were purchased by the Corps for the Gavins Point National Fish Hatchery during FY 2001. Fish food, replacement parts for the filter and ultraviolet disinfection systems were purchased as well as other miscellaneous items. Additionally, the Corps funded improvements to the lake water supply line (siphon system) that feeds the hatchery. The original dry vacuum pumps were replaced with a more reliable, efficient and environmentally sound system. The Corps purchased over 10,000 Passive Integrated Transponder Tags and accessories to be used for marking hatchery produced and wild fish sampled during population monitoring activities.

The Garrison Dam National Fish Hatchery (U.S. Fish and Wildlife Service) is considered "suspect" for the Missouri River Iridovirus after testing positive in FY 2000. One female and five male pallid sturgeon were spawned streamside above Fort Peck Reservoir and two females and four males were spawned at the Miles City State Fish Hatchery (Montana Fish, Wildlife, and Parks). Progeny from these spawning efforts were transferred to the Garrison Dam National Fish Hatchery and Bozeman Fish Technology Center for rearing. Continued monitoring of the status of the iridovirus at the facility are

ongoing. The Corps purchased a variety of cryopreservation equipment identified under conservation measures.

Pallid sturgeon spawned in FY 2001 will continue to be reared in FY 2002 at which time they may be stocked throughout the Missouri River depending upon iridovirus sampling results, approval of pallid sturgeon workgroups, and the Pallid Sturgeon Recovery Team. For more information concerning the Corps pallid sturgeon propagation and augmentation efforts, contact U.S. Army Corps of Engineers, P.O. Box 710, Yankton, SD 57078.

**Table 2: Propagation Related Projects and Expenditures FY 2001**

<b>Description/Project Title</b>	<b>Cooperator</b>	<b>Expenditure</b>
Spawning, Propagation	Blind Pony State Fish Hatchery	\$13,844.08
Propagation, Infrastructure Improvements	Gavins Point National Fish Hatchery	\$29,561.58
Cryopreservation Facilitation	Garrison Dam National Fish Hatchery	\$19,150.67
Passive Integrated Tags and Accessories	Direct Purchase by Corps	\$44,360.00
<b>Total Propagation Support</b>		<b>\$106,916.33</b>

**VI.B) Conduct pallid sturgeon population assessment including habitat parameters.**

**Implementation date:** 2001

**1) Identify the causes for the lack of reproduction and recruitment, causes for hybridization, and identify restoration actions.**

**Implementation date:** begin 2001

**2) Identify and map spawning habitat.**

**Implementation date:** Implement strategy by 2001 to conduct mapping by 2002.

**3) Channel training structure maintenance.**

**Implementation date:** Coordinate construction activities with the Service and affected State agencies

**4) Prioritize research needs.**

Population assessment activities were funded by the Corps in high priority river segments in 2001. Several state agencies and the USFWS conducted pallid sturgeon population assessment surveys in accordance with the "Pallid Sturgeon Population and Habitat Monitoring Plan for the Missouri and Kansas Rivers" (Draft-2001).

The year 2001 was the first year of data collection for the Fort Peck monitoring plan in support of the mini-test and full test. Data collection consists of using trammel nets and benthic trawls for collection of pallid sturgeon and other benthic fishes, collection of temperature, turbidity, and other water quality parameters, and the telemetry of known-sex pallid sturgeon and paddlefish. A copy of the monitoring plan is available.

The Nebraska Game and Parks Commission began a 3-year study in 2001 involving trawling design and techniques to sample sturgeon species. Success in sampling sturgeon is limited with existing trawl types and existing designs. This study allows for the comparison of similar design with varying mesh sizes of the inner cod. This study is being conducted in Missouri River Segments 8-13. This sampling is conducive to the collection of fish community data that may provide support to ecosystem improvements as habitats are modified via mechanically or through flow enhancement.

Reference Report: Evaluation of the benthic trawl as a means to sample juvenile and adult pallid sturgeon from main channel habitats of the Missouri River.

The Corps funded additional population assessment activities with the Columbia Fishery Resource Office, USFWS. This assessment included spring, summer and fall sampling to assess juvenile pallid sturgeon and fish communities in various habitats. River Segments 14 and 15 were sampled during this assessment. Additional gear was purchased under this contract to expand subsequent years sampling efforts.

*Reference Report: Annual Report for the Lower Missouri River Pallid Sturgeon Monitoring and Population Assessment Project.*

The Corps partially funded the ongoing pallid sturgeon telemetry study in river Segments 8 and 9. Western Area Power Administration (WAPA) and the USFWS also provided funding for this project in FY 2001. This study includes the telemetry of hatchery-reared juveniles as well as post-spawn adults. The project is moving into its final year based on the battery life of the tags. The results of this project may provide valuable information relating to habitat use and preference of both juvenile and adult pallid sturgeon that may be applied to other river segments to facilitate future management decisions.

*Reference Report: Pallid Sturgeon Assessments Recovery Priority Management Area III, Lewis and Clark Lake, South Dakota & Nebraska.*

The Corps provided two replacement omni-directional hydrophones for the USFWS for their telemetry activities of post-spawn pallid sturgeon in Fort Peck reach. This telemetry project is an integral component of the Fort Peck Biological Data Collection Plan and is providing preliminary data for the Fort Peck Flow Modification Plan.

In 2001, the Corps purchased a variety of equipment to facilitate the Missouri Department of Conservation's "winter sampling" of sturgeon species in the winter of 2002. This project is currently ongoing and targets sampling efforts in river segments

13-15. For more information concerning the Corps pallid sturgeon population assessment activities, contact U.S. Army Corps of Engineers, P.O. Box 710, Yankton, SD 57078.

**Table 3: Population Assessment Projects FY 2001**

<b>Description/Project Title</b>	<b>Cooperator</b>
Evaluation of the benthic trawl as a means to sample juvenile and adult pallid sturgeon from main channel habitats of the Missouri River	Nebraska Game and Parks Commission, Lincoln, NE
Annual Report for the Lower Missouri River Pallid Sturgeon Monitoring and Population Assessment Project	U.S. Fish and Wildlife Service, Columbia Fishery Resource Office, Columbia, MO
Pallid Sturgeon Assessments Recovery Priority Management Area III Lewis and Clark Lake, South Dakota & Nebraska	U.S. Fish and Wildlife Service, Great Plains Fish and Wildlife Management Assistance Office, Pierre, SD
Telemetry of Post-Spawn Pallid Sturgeon	U.S. Fish and Wildlife Service, Missouri River Fish and Wildlife Management Assistance Office, Bismarck, ND
Monitoring of Sturgeon Populations in Missouri	Missouri Department of Conservation, Jefferson City, MO

## Reasonable and Prudent Measures to Minimize Take

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### Bald Eagle

#### **Measure 1. Map and evaluate health of cottonwood forests on Missouri River.**

##### ***Terms and Conditions:***

*Complete within 2 years of final Biological Opinion.*

- a. Identify stands with periodic flooding*
- b. Determine baseline mortality and tree vigor*

*Monitor every 2 years for first 4 years, then every 5 years after that.*

A contract was awarded during 2001 to provide color digital ortho aerial mapping of the cottonwood forests (leafed out) within the Missouri National Recreational River boundary of Segment 10. The flight was conducted during 2001; however, the actual maps will not be available for use until March 2002.

Cottonwood health, as described by using a modified Habitat Evaluation Procedure (HEP) to identify habitat units (HU's), was initially done in April 2000 for portions of Segment 10. During 2001, the April 2000 document was provided to HEP experts at the Environmental Research and Development Center (ERDC, formerly WES) for scientific feedback on the methodology. Earlier, the document was also provided to the USFWS (Nebraska, South Dakota, Denver Regional Office) and the National Park Service (NPS - O'Neill, Nebraska), and the state game agencies of Nebraska and South Dakota for feedback. However, none of these offices had any expertise in HEP procedures. Therefore, the Corps organized and funded an interagency HEP workshop in October 2001 in Omaha Nebraska. Representatives from the USFWS and the NPS attended the workshop, during which we learned the computerized HEP methodology.

During March 2001, an annual Missouri National Recreational River public workshop was held. The Corps' cottonwood forest study manager (Segment 10) had a public sign-up sheet for landowners who would allow the Corps to determine cottonwood health using a HEP analysis on their land. About a dozen landowners signed up.

#### **Measure 2. Develop management plan for cottonwood regeneration.**

***Terms and Conditions:*** *Complete & implement within 2 years of completion of measure 1 above.*

A scope of work was developed for initiating cottonwood regeneration within Segment 10. Criteria are being established (e.g. elevation, soil type, etc) to identify potential regeneration sites within the Missouri National Recreational River boundary of Segment 10. This effort has been coordinated with the local landowners at the Missouri River Bank Stabilization Association meeting, January 2001, as well as the annual Missouri National Recreational River public workshop, March 2001. At the workshop, maps were available for landowners to identify their lands, and a "landowner interest" sign up sheet was available for landowners interested in cottonwood regeneration on

their lands. About a dozen landowners signed up, but we will need to determine if those lands are suitable for cottonwood regeneration.

**Measure 3. Implement actions to ensure no more than 10 percent eagle habitat is lost.**

In Segment 10, the greatest recent (last 15 years) threat to mature cottonwood forest is erosion of the "sugar sand" below the root zone. In addition, cottonwood regeneration is very limited, primarily on the islands which need to be free of vegetation for the least terns and the piping plovers. The document "Habitat Erosion Protection Analysis" which was written in April 2000 overlaid areas of high-quality cottonwood habitat (based on USFWS Habitat Evaluation Procedures) with areas of high erosion rates (based on an analysis of bank lines from aerial maps, multiple years). The document concluded that in those overlap areas, bank protection was warranted to protect the likely loss of Habitat Units due to erosion over the next 25 years. One site included the future loss of an eagle nest.

Coordination meetings were held with the USFWS and NPS, and it was agreed to proceed toward an alternatives analysis for three sites with high habitat value; one on the South Dakota side, and two on the Nebraska side. Both traditional and non-traditional methods would be investigated. In exchange for the bank protection, the landowner would be required to enter into an easement to protect the cottonwood trees from clearing.

Scopes of work were begun for the alternatives analysis, which is part of the Definite Project Report (DPR) and Environmental Assessment (EA) that would be incorporated into the DPR. Contracts are expected to be awarded during 2002.

Additionally, a Real Estate Design Memorandum (REDM) was begun during 2001 which would request the authority to purchase conservation easements associated with the bank protection structures, if built. This document would also allow for purchase of conservation easements or fee title lands, with willing sellers, for the purposes of habitat protection or enhancement. This document is expected to be completed in July 2002.

**Terns and Plovers**

**Measure 1. Monitor all tern and plover nesting sites on Missouri and Kansas Rivers.**

*Terms and Conditions: Annually and report in the annual report.*

**Measure 1.1. Population survey information annually.**

- a. Total number of colonies
- b. Total number of birds

**Map nest site locations**

Population Survey Information. The Corps again implemented their standardized least tern and piping plover monitoring program in 2001. Corps of Engineer personnel

conducted an adult census and productivity monitoring on the Fort Peck, Garrison , Fort Randall and Gavins Point river reaches, and on Lake Sakakawea, Lake Oahe, Lake Francis Case, and Lewis and Clark Lake. All activities were conducted in accordance with terms and conditions of applicable state and Federal permits. The USFWS personnel from Charles M. Russell Refuge conducted the adult census and monitored the Fort Peck Lake nesting areas, funded by a Corps contract. Dr. Roger Boyd, Biology Department, Baker University monitored the Kansas River reach under a Corps contract.

Annual training was required for all personnel conducting survey and monitoring activities in 2001. The format for the training was changed in 2001. In an effort to achieve more one-on-one time with personnel in the training, the single 16 hour training course was held at three locations, Yankton and Mobridge, SD and Williston, ND. The field practical portion of the training was replaced with a four hour "in the field" activity with a mentor. A total of 41 seasonal and permanent personnel were trained at the three sessions during May and June. Further enhancing the training course was the development of a Techniques Handbook. This handbook not only serves as a training guide but also is intended to be used as a reference resource to assist field personnel as they conduct their M&E activities. This handbook contains the most up-to-date techniques and protocols for monitoring least tern and piping plover populations and recruitment, developed and refined from nearly 15 years of field notes and data gathering experience. Final publication is expected for the 2002 field season.

*Reference Report: Draft-US Army Corps of Engineers, Threatened and Endangered Species-Techniques Handbook.*

Initial distribution surveys on the Missouri River began in late April and continued until mid-June. Most colony locations were geo-spatially recorded using backpack GPS units running Terrasync software. This information is available as a GIS resource through the Corps web based Threatened and Endangered Species Data Management System (DMS).

Piping plovers began arriving on the Missouri River in mid-April with the first plover observed on April 11, 2002 below Gavins Point Dam. Plovers were observed on Lakes Oahe and Sakakawea in late April and early May. Least terns were first observed on the river May 9 below Gavins Point Dam. The majority of terns arrived on the Missouri in late May and early June. Plover numbers began noticeably declining in the middle of July, assumed to be the advent of fall migration. Nearly all adult and juvenile least terns and piping plovers had left the Missouri River Basin by the end of August.

Piping plovers arrived on the Kansas River in late April with a nest being initiated on April 30 2002. The plovers abandoned the Kansas in June due to high flows. Least terns were first seen on the Kansas River on May 25. Tern nests were not initiated until late June when flows moderated on the river. Adult and juvenile terns were still on the Kansas River as of August 28.

The 2001 adult census was conducted concurrently with the 2001 International Piping Plover Census from the 17-30 June. All potential nesting habitat on the Missouri and Kansas Rivers was surveyed during this time. Results of census are summarized below. Completion of the International Census was vital to the Corps. Census results provide a performance measure of recent management activities and provide important trend data with which to assess population viability. Census information can be used to reevaluate regional and range-wide recovery objectives, species status determinations, and interconnectivity and significance of Missouri River habitat with other regional breeding sites. The Corps provided \$20,145.00 for the coordination of the 2001 International Piping Plover Census.

### **Measure 1.2. Monitoring information**

***Terms and Conditions: Annually***

- a. Total number of nests and nest fates**
- b. Total number of fledged chicks/pair and other chick fates**
- c. Elevation of nests above water level.**

Productivity monitoring of all colony locations was conducted on a 5-10 day cycle. Nests were located, mapped and tracked until the eggs hatched or the nest was otherwise terminated. Chicks were tracked from hatching to fledging. Data collected in the field was uploaded into the DMS. The DMS was accessible via the Internet to appropriate Federal and state personnel. Improvements to the DMS in 2001 included sort capability for the field journal, productivity summary, revamped expectations list and last nest visit reports. An "at-risk-nests" report was added to the DMS. This report tags nests at risk from inundation and brings a higher level of attention to these nests during formulation of water management decisions by Reservoir Control Center. It is the Corps intent to make the DMS the clearinghouse for seasonal and historical least tern and piping plover adult census, nest location, and productivity monitoring information.

Data collection tools and techniques were dramatically changed for the 2001 nesting season. Hand held devices operating Windows™ CE linked with a backpack global positioning system (GPS) form the backbone of a paperless digital data collection system. Field data collection is now done on preloaded digital forms utilizing the pressure sensitive screen on the CE devices. Information is uploaded to the DMS at the end of each day, and the refreshed information is downloaded to the CE device in the morning prior to surveys. This system was tested by personnel at the Williston, Riverdale, Bismarck, Pierre, Fort Randall, and Gavins Point Offices in 2001 and is expected to be fully implemented by 2002. Advantages to using the digital data collection system are two fold:

- 1) Efficiency and data quality in the field is increased.
- 2) Data is recorded in data dictionary eliminating paper forms.
- 3) Nest locations automatically recorded, in real time.
- 4) In field navigation feature eliminates nest relocation problems.
- 5) Repeat feature allows for quick input of similar data.

- 6) Efficiency and data accuracy is increased in the office.
- 7) Data is directly downloaded in the DMS, no data transcription errors.
- 8) No differential correction of GPS location data is required.
- 9) Nest site and location data can be sent directly to Reservoir Control Center in near real time.

Specific nest locations on the Missouri River and reservoirs were geo-spatially recorded using backpack GPS units running Terrasync software. This information is available as a GIS resource through the Corps web based Threatened and Endangered Species Data Management System (DMS).

During site visits, nest elevations were visually estimated as being eighteen inches above or below the water level. Those estimated to be below eighteen inches elevation were tagged in the DMS as an "at-risk-nests. The Threatened and Endangered Section and the Reservoir Control Center closely monitored these nests to prevent loss from flooding.

Results of the 2001 adult census and monitoring efforts are presented in tables below. All 2001 adult census and productivity monitoring information including number of colonies, birds, nests, eggs, nest fates, fledge ratios nest site maps, and at-risk-nest reports can be found in the DMS at [www.nwd-mr.usace.army.mil/rcc/dms/](http://www.nwd-mr.usace.army.mil/rcc/dms/).

**Table 4: INTERIOR LEAST TERN (STERNA ANTILLARUM)  
2001 MISSOURI RIVER ADULT CENSUS and PRODUCTIVITY MONITORING**

Reach	Adult Census	Nests Nests	Nests Hatch	Nest(a) Success	Avg. Clutch	Eggs Hatch	Chicks Fledge	Fledge(b) Ratio
Fort Peck Lake	0	0	0	0.0	0.00	0	0	0.00
Below Fort Peck Dam	39	20	13	65.0	2.10	25	20	1.03
Lake Sakakawea	34	19	14	73.7	2.00	25	13	0.76
Below Garrison Dam	125	55	48	87.3	2.62	122	79	1.26
Lake Oahe	94	66	42	63.6	2.35	104	63	1.34
Below Fort Randall Dam	71	58	30	51.7	2.47	80	5	0.14
Lewis and Clark Lake	58	33	17	51.5	2.52	45	34	1.17
Below Gavins Point Dam	232	116	104	89.7	2.66	269	127	1.09
Kansas River	12	7	2	28.6	2.14	5	3	0.50
<b>TOTAL</b>	<b>665</b>	<b>374</b>	<b>270</b>	<b>72.2</b>	<b>2.48</b>	<b>675</b>	<b>344</b>	<b>1.03</b>

a = nest per 100 attempts

b = fledged chicks per pair of adult birds (Does not include collected eggs that fledged)

**Table 5: PIPING PLOVER (CHARADRIUS MELODUS)  
2001 MISSOURI RIVER POPULATION SURVEY & PRODUCTIVITY MONITORING**

Reach	Adult Census	Nests Nests	Nests Hatch	Nest(a) Success	Avg. Clutch	Eggs Hatch	Chicks Fledge	Fledge(b) Ratio
Fort Peck Lake	4	2	1	50.0	3.50	2	2	1.00
Below Fort Peck Dam	3	2	2	100.0	3.50	7	2	1.33
Lake Sakakawea	424	187	169	90.4	3.29	520	265	1.25
Below Garrison Dam	161	89	59	66.3	3.65	223	119	1.48
Lake Oahe	172	111	61	55.0	3.49	211	125	1.45
Below Fort Randall Dam	38	26	11	42.3	3.15	40	14	0.74
Lewis and Clark Lake	34	18	13	72.2	3.61	43	12	0.71
Below Gavins Point Dam	218	114	96	84.2	3.76	358	201	1.84
Kansas River	6	3	0	0.0	3.00	0	0	0.00
<b>TOTAL</b>	<b>1060</b>	<b>552</b>	<b>412</b>	<b>74.6</b>	<b>3.49</b>	<b>1404</b>	<b>740</b>	<b>1.40</b>

a = nest per 100 attempts

b = fledged chicks per pair of adult birds (Does not include collected eggs that fledged)

**Table 6: NEST FATES 2001**

Reach	Nests	Nest Hatch	Nest Coll.	Fld.	Wthr.	Pred.	Hman Dist.	Bank Eros.	Lvstk.	Dest. Unk.	Aban.	Addl.	Fate Unk.
<b>Fort Peck Lake</b>													
Terns	0	0	0	0	0	0	0	0	0	0	0	0	0
Plovers	2	1	0	1	0	0	0	0	0	0	0	0	0
<b>Below Fort Peck Dam</b>													
Terns	20	13	0	1	2	0	0	0	0	1	0	0	3
Plovers	2	2	0	0	0	0	0	0	0	0	0	0	0
<b>Lake Sakakawea</b>													
Terns	19	14	0	0	0	1	0	0	0	0	0	1	3
Plovers	187	169	0	1	3	2	0	0	0	3	3	0	6
<b>Below Garrison Dam</b>													
Terns	55	48	0	1	5	0	0	0	0	0	1	0	0
Plovers	89	59	0	0	20	1	0	1	0	0	2	0	6
<b>Lake Oahe</b>													
Terns	66	42	0	6	4	2	0	0	2	1	2	0	7
Plovers	111	61	13	2	18	1	1	0	0	3	6	1	5
<b>Below Fort Randall Dam</b>													
Terns	58	30	0	3	4	1	0	0	0	12	3	0	5
Plovers	26	11	0	5	4	2	0	0	0	3	0	0	1
<b>Lewis and Clark Lake</b>													
Terns	33	17	9	3	0	0	0	0	0	0	1	1	2
Plovers	18	13	3	2	0	0	0	0	0	0	0	0	0
<b>Below Gavins Point Dam</b>													
Terns	116	104	0	0	0	0	0	0	0	1	3	3	5
Plovers	114	96	0	0	2	0	2	0	0	6	5	0	3
<b>Kansas River</b>													
Terns	7	2	0	3	1	1	0	0	0	0	0	0	0
Plovers	3	0	0	2	0	0	0	0	0	0	0	0	1
<b>TOTAL</b>													
Terns	374	270	9	17	16	5	0	0	2	15	10	5	25
Plovers	552	412	16	13	47	6	3	1	0	15	16	1	22

**Table 7: 2001 Fledge Ratios**  
(calculated from 3-year totals)

	<b>Adult Census</b>	<b>Fledged Chicks</b>	<b>Fledge Ratio</b>
Least Terns			
1999	572	407	1.42
2000	575	350	1.22
2001	653	341	1.04
<b>TOTAL</b>	<b>1800</b>	<b>1089</b>	<b>1.22</b>
Piping Plovers			
1999	535	271	1.01
2000	796	637	1.60
2001	1054	740	1.40
<b>TOTAL</b>	<b>2385</b>	<b>1648</b>	<b>1.38</b>

**Measure 2. Compile and evaluate the previous impacts to take from:**

- a. Daily and hourly release fluctuations below dams**
- b. Changes in releases due to maintenance or other isolated causes**
- c. Changes in releases to prevent downstream flood impacts**

***Terms and Conditions:*** Submit report by January 2002 of the impacts to take resulting from historic operational changes (1986 – 2000). To include protocols to prevent historic cases of take from reoccurring.

This is a major work effort requiring considerable effort including significant data entry, review of past operational scenarios, and significant data analysis. Work will start in 2002 on this effort but no report is anticipated until July 2003.

**Measure 3. The Corps shall continue to evaluate operational changes to avoid take.**

***Terms and Conditions:*** Avoid operational caused flooding and spiked releases. Report all documented incidental take immediately to the USFWS. Coordinate regularly through the ACT to ensure proposed operations will avoid take. If take is unavoidable—take shall be consistent with incidental take statement. The Corps will reconsult with the USFWS if the Corps develops new operational scenarios not considered during initial consultation.

As discussed in the section above, the 2001-2002 Annual Operating Plan includes provisions for unbalancing the Fort Peck, Garrison, and Oahe reservoirs for Upper Quartile and greater runoff scenarios. Unbalancing is intended to benefit threatened and endangered species production in the long term by maintaining and exposing sandbar and shoreline habitat. The unbalancing is also beneficial to reservoir fisheries in the long term by ensuring a periodic rise in reservoir elevation sufficient to provide good spawning conditions and inundating vegetation, thereby increasing young-of-the-year fish survival.

Fort Peck will have a 4,000 cfs reduction in flows during the tern and plover nesting season for Upper Decile runoff and a 5,000 cfs reduction for the Upper Quartile scenario. The resulting stage difference will provide excellent nesting habitat. Median runoff and below will have a constant 8,500 to 9,000 cfs discharge through the nesting season. This release scenario should result in good habitat conditions for nesting terns and plovers.

If flood flows enter the Missouri River below the project during the nesting season, hourly releases will be lowered to no less than 3,000 cfs in order to keep traditional riverine fish rearing areas continuously inundated while helping to lower river stages at downstream nesting sites. April releases should be adequate for trout spawning below the project. A rising pool in the April-to-May sport fish spawning season will be dependent upon the ever changing daily inflow pattern to the reservoir but appears possible with all annual operations plan simulations.

Garrison will have a reduction in flows during the tern and plover nesting season under all runoff scenarios. The reductions will be in the 500 to 1,000 cfs range. Hourly peaking will be limited to no more than 30,000 cfs for 6 hours if the daily average release is lower than 28,000 cfs. This will limit peak stages below the project for nesting birds.

Oahe releases in the spring and summer will back up those from Gavins Point. Oahe's elevation in the spring will be steady or rising given median or higher runoff. Under all annual operations plan simulations, the Oahe pool will fall during the summer.

Fort Randall will be operated to provide for a pool elevation near 1355 during the fish spawn period, and the lake will not be drawn down below elevation 1337.5 feet msl in the fall to ensure adequate supply for water intakes. Hourly releases from Fort Randall, during the 2002 nesting season will be limited to 37,000 cfs. Daily average flows may be increased every third day to preserve the capability of increasing releases later in the summer if conditions turn dry.

Gavins Point. For the Upper Quartile and below scenarios, based on the results of last year's operation, releases will not be increased in May when terns and plovers begin to initiate nesting. The release rate will be based on an assessment of flows needed to support the immediate navigation target. This will result in increased flows during the nesting season. Based on 2001 nesting season results, it is anticipated that sufficient

habitat will be available above the release rates to provide for successful nesting thereby saving water in the upstream reservoirs. A steady release rate will be undertaken for the Upper Decile condition. The release will be set in mid-May at the flow anticipated to be needed to evacuate excess flood storage from the System. The resulting steady release prevents inundation of nests and chicks. Flows during the nesting season will be near or above what they were this past nesting season for all runoff conditions. Cycling releases every third day is not planned during the 2002 nesting season except during downstream flood control operations.

The Gavins Point pool will be operated near 1206.0 feet msl in the spring and early summer with variations day to day due to rainfall runoff. Greater fluctuations occur in the river, increasing the risk of nest inundation in the upper end of the Gavins Point pool. Several factors contribute to the increased risk of nest inundation in the upper end of the Gavins Point pool. First, because there are greater numbers of endangered species nesting below the Gavins Point project that must be preserved, Gavins Point releases are restricted during the nesting season. Second, unexpected rainfall runoff between Fort Randall and Gavins Point can result in sudden pool rises because the Gavins Point project has a smaller storage capacity than the other System reservoirs. Third, the operation of Gavins Point for downstream flood control may necessitate sudden release reductions to prevent downstream bird losses. And finally, high releases required in wet years make nest inundation more likely. When combined, all these factors make it difficult and sometimes impossible to prevent inundation of nests in the upper end of Lewis and Clark Lake. The pool will be increased to elevation 1208.0 feet msl following the nesting season.

**Measure 4. The Corps shall follow the “Contingency Plan for Protection of Least Tern and Piping Plover Nests and Chicks” and the “Captive Rearing Protocol”.**

**Measure 4.1. Continue captive rearing program, coordinate with USFWS**

***Terms and Conditions:*** Any changes to protocol will be coordinated and approved by the USFWS.

The Corps continued to operate the captive rearing facility in 2001. Due to reduced releases from Gavins Point and subsequent increases in Oahe and Lewis and Clark Lakes water levels, 53 plover and 23 tern eggs were collected. All attempts were made to maintain viable nesting sites per the contingency plan. Several improvements were made to the facility and collection equipment in 2001. Anchor cables were added to stabilize the support poles on the outdoor flight pen. This will help prevent pen damage if ice or snow loads up on the mesh. Portable incubators, including revised egg collection protocols and operating instructions will be distributed to each of the main stem project offices. New products are being researched and purchased for disinfection and sanitation purposes. No changes expected in 2002.

**Table 8: CAPTIVE REARING ACTIVITY 2001**

Species	Date Collect	Reach	Site	Eggs	Reason Collected
Piping Plover	May 17, 2001	Lake Oahe	Blue Blanket	11	Rising Lake Level
Piping Plover	May 25, 2001	Lake Oahe	Demery Island	4	Rising Lake Level
Piping Plover	June 1, 2001	Lake Oahe	Blue Blanket	8	Rising Lake Level
Piping Plover	June 1,, 2001	Lake Oahe	Blue Blanket Pump	3	Rising Lake Level
Piping Plover	June 1, 2001	Lake Oahe	Kenel Flats	8	Rising Lake Level
Piping Plover	June 1, 2001	Lake Oahe	Porcupine Island	7	Rising Lake Level
<b>Subtotal</b>		Lake Oahe		41	
Piping Plover	June 29, 2001	Lewis and Clark Lake	RM 841.5	12	Rising Lake Level
<b>Total</b>				<b>53</b>	
Least Tern	June 29, 2001	Lewis and Clark Lake	RM 841.5	18	Rising Lake Level
Least Tern	June 29, 2001	Lewis and Clark Lake	RM 842.2	5	Rising Lake Level
<b>Total</b>				<b>23</b>	

Egg Fates:

Species	Hatching Success	Fledging Success	Number Released
Piping Plover	79 percent	100 percent	42
Least Tern	96 percent	100 percent	20

Note: Eleven piping plover eggs did not hatch, seven were addled, one infertile, one was cracked on arrival and failed to hatch, and two were broken while handling. One least tern egg was addled and failed to hatch.

Release Information:

Species	Birds	Release date	Reach	Site Name
Piping Plover	12	July 12, 2001	Lake Oahe	Blue Blanket
Piping Plover	13	July 12, 2001	Lake Oahe	Fort Manuel
Piping Plover	5	July 30, 2001	Lake Oahe	Beach North of Mission Island
Piping Plover	8	August 6, 2001	Lewis and Clark Lake	RM 834.3
Piping Plover	4	August 15, 2001	Missouri River	RM 795.3
<b>TOTAL</b>	<b>42</b>			
Least Tern	13	August 6, 2001	Lewis and Clark Lake	RM 834.3
Least Tern	7	August 15, 2001	Missouri River	RM 795.3
<b>TOTAL</b>	<b>20</b>			

Two fledged Least Terns disappeared from the outdoor flight pen, fate unknown.

**Measure 4.2. Initiate a peer review on Captive Rearing Protocol.**

**Terms and Conditions:** *Peer review every 5 years start in 2001.*

Peer review process initiated with representatives of the American Zoo and Aquarium Association and the USFWS Madison Wildlife Health Lab and will take place in 2002.

**Measure 4.3. Continue research into the effectiveness of the captive rearing program.**

**Terms and Conditions:** *Report all captive rearing activities in the annual report.*

Following is a summary of the captive reared plovers resighted during 2001.

- One wild reared color marked plover was resighted in Florida, Feb. 2001.
- One captive reared plover was resighted in Alabama, March 2001.

Nine individually color banded plovers released in previous years were resighted on the Missouri River between May 13<sup>th</sup> and July 18<sup>th</sup>. Two of these birds paired with mates and one successfully nested.

- Three captive reared plovers released in 2001 were resighted 5 days later August 20, 2001.

**Measure 5. The Corps shall implement public information and educational programs to increase public awareness and reduce disturbance to nesting sites.**

The Corps is currently working on an informational brochure highlighting all three species. This brochure will replace the tri-fold "Attention" brochure previously printed by the USFWS. This brochure will be provided to Federal, State, and Public organizations with a vested interest in piping plover, least tern, and pallid sturgeon conservation.

Public service announcements continue to run on regional radio stations throughout the nesting season. Additionally, several focused talks were given to professional, scholastic and civic organizations.

Continued funding support was provided during 2001 for the production of the video "One Good Tern Deserves Another." This film, which was completed in February 2002, documents the life history of the interior least tern. The Corps was one of several agencies providing funding support.

The Omaha District, Environmental Section web page has information on the captive rearing program and our monitoring efforts, as well as the Endangered Species coloring book available for public use at <http://www.nwo.usace.army.mil/html/pd-e/planning.html>.

**Professional Presentations:**

South Dakota Chapter of the Wildlife Society Annual Meeting.

An Evaluation of the U.S. Army Corps of Engineers  
Piping Plover Captive-rearing Program

The 2001 Missouri River Natural Resource Commission Tern and Plover Team Meeting

Summary of the 2001 Field Season  
Habitat Conservation and Recovery Plan  
Captive Rearing Program 1995-2001 a Review

Iowa Department of Natural Resources

Threatened and Endangered Species Program

Missouri River Round Table

Threatened and Endangered Species Program Tour

## **Scholastic Presentations:**

### Yankton High School

Taught three environmental science classes

### South Dakota State University, Wildlife and Fisheries Sciences

Avifauna of the Missouri River

Human Dimensions in Missouri River Management

## **Civic Group Presentations:**

### Clay County Democrats

2000 Biological Opinion

### Sierra Club

2000 Biological Opinion

### PEO

Update on Missouri River Happenings

### Sertoma Club

Captive Rearing at Gavins Point Dam

### Bald Eagle Days at Lewis and Clark Visitor Center

Manned Tern and Plover display

### Fort Peck Project

One interpretive threatened and endangered program presented at campground. Spoke with recreationists on numerous occasions while conducting monitoring surveys.

### Garrison Project

Several articles on endangered species work were printed in local newspaper. A noon show segment on endangered species was done with the local television station.

Another outreach activity conducted by the Corps includes reducing human disturbance at nesting sites. Following is a summary of the measures taken in 2001:

Lake Sakakawea: Temporary fences with endangered species restriction signs were erected to protect nesting sites located south of the Van Hook Recreation Area, on a peninsula in Steinke Bay and the south Causeway area. The fences and signs were put up to prevent off road vehicles from accessing the area. Restriction signs but not fences were put in the West Totten Island Complex. Repair work was done on a previously constructed fence near the Little Egypt Recreation Area.

Missouri River below Garrison Dam: Restriction signs were placed around nesting sites on sandbars at River Miles 1341.6, 1319.5 and 1310.4.

Lake Oahe: Restriction signs were placed around nesting sites on Dredge Island, Porcupine Island and Mission Island. A fence and signs were placed to prevent access to nesting sites on Mission Point. Nest sites at the Okobojo Creek Recreation Area were fenced and signed and parts of the recreation area were closed to the public.

Missouri River below Gavins Point Dam: Restriction signs and orange twine fencing were placed around nesting sites on sandbars at River Miles 801.5, 799.0, 795.3, 788.5, 781.7, 781.5, 777.7, 762.0, 757.2, and 756.7.

There were two instances of nests destroyed by humans in 2001 and one case where human disturbance was suspected. A four-egg plover nest was destroyed near the Cow Creek Recreation Area on Lake Oahe. Motorcycle tracks and human footprints were found around the nest. The predator enclosure had been removed from the cage and the eggs were destroyed. The USFWS special agent in Pierre, SD was notified and investigated the incident.

A four-egg plover nest was destroyed on a sandbar at River Mile 801.5 below Gavins Point Dam. Low releases out of the dam made the sandbar assessable by off road vehicles. Sometime during the July 4<sup>th</sup> holiday vehicles drove through a posted restricted area on the sandbar and ran over the nest. The USFWS special agent in Sioux Falls, SD was notified and investigated the incident. The special agent made contact with individuals who may be responsible for the nest destruction. The investigation is ongoing.

A four-egg plover nest was destroyed on a sandbar at Rive Mile 765.0 below Gavins Point Dam. Persons unknown came onto the sandbar and set up a "golf course". The plover nest was in the middle of the golf course. The eggs were out of the nest and destroyed. No human footprints were found around the nest. The sandbar had not been posted with restriction signs.

**Measure 6. The Corps shall implement aversive action to reduce predation on least tern.**

Predator enclosures were again placed over piping plover nests in 2001 to reduce losses from predation. Nest enclosure cages are placed on nests with historic or chronic nest predation problems. Nests that are near hatching or are located near recreation areas where a cage may increase human presence at the nest are not caged.

**Table 9: PIPING PLOVER NESTS UNCAGED /CAGED 2001**

Reach	Nests	Nest Hatch	Nest Success	Nest Coll.	Fld.	Pred.	Hman Dist.	Wthr.	Bank Eros.	Dest. Unk.	Fate Unk.	Aban.	Addl.
Fort Peck Lake	2/0	1/0	50/-	0/0	1/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Below Fort Peck Dam	2/0	2/0	100/-	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0	0/0
Lake Sakakawea	143/44	129/40	90.2/90.9	0/0	1/0	2/0	0/0	2/1	0/0	3/0	5/1	1/2	0/0
Below Garrison Dam	82/7	56/3	68.3/42.9	0/0	0/0	1/0	0/0	16/4	1/0	0/0	6/0	2/0	0/0
Lake Oahe	79/32	37/24	46.8/75	11/2	2/0	1/0	0/1	16/2	0/0	2/1	5/0	4/2	1/0
Below Fort Randall Dam	25/1	10/1	40.0/100	0/0	5/0	2/0	0/0	4/0	0/0	3/0	1/0	0/0	0/0
Lewis and Clark Lake	17/1	12/1	70.6/100	3/0	2/0	0/0	0/0	0/2	0/0	0/0	0/0	0/0	0/0
Below Gavins Point Dam	45/69	35/61	77.8/88.4	0/0	0/0	0/0	2/0	0/2	0/0	5/1	0/3	3/2	0/0
Kansas River	3/0	0/0	0.0/-	0/0	2/0	0/0	0/0	0/0	0/0	0/0	1/0	0/0	0/0
<b>TOTAL</b>	<b>398/154</b>	<b>282/130</b>	<b>70.9/84.4</b>	<b>14/2</b>	<b>13/0</b>	<b>6/0</b>	<b>2/1</b>	<b>38/9</b>	<b>1/0</b>	<b>13/2</b>	<b>18/4</b>	<b>10/6</b>	<b>1/0</b>

## Pallid Sturgeon

**Measure 1. The Corps shall evaluate and modify operational changes and maintenance activities to avoid take.**

**Terms and Conditions:** *Avoid operational changes that may affect spawning. Report all documented incidental take immediately to USFWS. Coordinate regularly through the ACT to ensure proposed operations will avoid take. The Corps will re consult with the USFWS if the Corps develops new operational scenarios not considered during initial consultation.*

Operational changes that would impact sturgeon are primarily associated with flows. These flow changes are being evaluated as part of the Master Manual EIS process and will be part of the final EIS.

**Measure 2. The Corps shall increase awareness of the pallid sturgeon on the Missouri River and develop support for recovery and conservation measures.**

**Terms and Conditions:** *Produce and distribute public service announcements for use in states bordering the Missouri River. Project Offices shall incorporate pallid sturgeon conservation into public education efforts.*

*Within 1 year of the final Biological Opinion, develop and implement an outreach program for pallid sturgeon.*

*Implement workshops every 3 years starting in 2001 to educate researchers and continue developing of handling Protocols.*

In 2001, the Corps provided an infrastructure upgrade to the Gavins Point Aquarium (Gavins Point National Fish Hatchery) for enhanced viewing of pallid sturgeon in their facility. Additional informational venues are planned with the Gavins Point Aquarium for increasing public awareness and knowledge of endangered species in 2002. Acrylic plastimounts of pallid sturgeon were purchased and distributed to all of the Corps' project offices in the Omaha District in 2001. These mounts serve to facilitate knowledge of the project office staff and inform their visitors of the endangered pallid sturgeon.

Hatchery-spawned pallid sturgeon are available for viewing in the 100-gallon tank in Planning. Although the opportunity for public outreach is currently limited due to security measures, we still get children from the daycare and from "bring your child to work day" viewing the fish, as well as visitors to Planning and other Corps employees.

The web page for the Environmental Section of Planning provides public access to pallid sturgeon spawning information, pallid sturgeon in our aquarium, the stocking of hatchery pallid sturgeon in the Platte River, as well as the opportunity to download the Endangered Species Coloring Book at <http://www.nwo.usace.army.mil/html/pd-e/planning.html>.

## Conservation Recommendations

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### Recommendations Applicable to Single Species

#### Bald Eagle

##### **Conduct or participate in wintering and nesting bald eagle surveys.**

In segment 10, eagle nests identified from previous years were entered into a GIS database using the GPS coordinates for the nests.

##### **Protect and manage habitat.**

A cottonwood management plan for segment was initiated. A Real Estate Design Memorandum including conservation easements to protect high quality cottonwood habitat was initiated.

##### **Conduct public outreach on the value of river habitat to the bald eagles.**

The cottonwood habitat / bald eagle management and regeneration projects were discussed at the Missouri River Bank Stabilization Association meeting in January 2001, as well as the annual Missouri National Recreational River public workshop in March 2001. At the workshop, maps were available for landowners to identify their lands, and a "landowner interest" sign up sheet was available for landowners interested in cottonwood regeneration on their lands. Many landowners within segment 10 are interested in supporting habitat preservation for eagles, and would be willing to enter into easements with the Corps or other agency to do so.

#### Least Tern and Piping Plover

##### **Research connectivity or interchange between Missouri River piping plovers and plovers nesting in the Northern Great Plains.**

The Corps initiated a Piping Plover Color band Database in 2001. This database currently serves to coordinate color banding information among North American regions (Atlantic Coast, Great Lakes, Northern Great Plains, Gulf Coast and Atlantic Coast wintering ranges). The Corps intends to develop an interactive web application that will allow researchers from around North America to coordinate their banding activities to insure the maximum information possible is gained from their banding activities. This color band database and web based interface will serve to 1) provide a single stop for banded bird observers to report their sighting and get feedback on the birds history, 2) serve as clearinghouse for assignment of bands and band combinations to banders, 3) and provide reports to banders on bird observations. Target date January 2003.

#### Pallid Sturgeon

##### **Complete a feasibility study to identify and evaluate the effects of tributary dams and other structures on spawning migrations.**

The Corps received congressionally added funding ("General Investigations") to assist the Bureau of Reclamation in the development of a fish passage design for the intake dam structure on the Yellowstone River in Montana. During 2001, Omaha District staff attended 4 coordination meetings for this project, and developed a draft alternatives analysis report with conceptual designs and construction cost estimates.

In parallel with the above effort, the Corps also funded a sturgeon swim study using Missouri National Recreational River and Operations and Maintenance funding. The study, which was begun in 2001 and completed in February 2002, determined swim capabilities of wild Yellowstone River shovelnose sturgeon in a range of velocities, over a range of substrates. The study also used baffles to determine sturgeon swim capabilities in turbulent velocities. In addition, the study tested the ability of wild sturgeon to navigate slotted fishways and a model rock ramp fishway.

Operation and Maintenance funding was also used to fund a comparison of pallid and shovelnose sturgeon swimming abilities, using hatchery fish. The study was begun during 2001 and a draft was completed in February 2002.

**Implement Basin-wide education and outreach programs for anglers.**

The Corps has laminated and paper posters ("Attention Fishermen") available for use at bait shops and boat ramps, as well as for other agency use and distribution. Posters were provided to state agencies as requested after the first annual middle basin pallid sturgeon workgroup meeting. The North Dakota office requested a copy of outreach materials for their awareness, which was sent during 2001.

**Evaluate the cumulative effects of bank stabilization.**

The Corps contracted the first year of the multi-year cumulative effects Environmental Impact Statement (EIS) for the Section 33 bank stabilization program. The scope of the EIS extends from Fort Peck Dam to Ponca, Nebraska. This study is funded using Missouri National Recreational River and Section 33 money, and will include an analysis of the effects of past, present and future Section 33, Missouri National Recreational River, private, and public stabilization projects.

A geomorphological study was completed by the Omaha District and the Engineer Research and Development Center (ERDC) in December 2001. The report, entitled "Missouri River - Fort Peck Dam to Ponca State Park Geomorphological Assessment Related to Bank Stabilization," was funded using Section 33 and Missouri National Recreational River money. This report provides the physical effects of bank stabilization, whereas the cumulative EIS will determine the biological effects of bank stabilization.

**Participate as a partner in regional pallid sturgeon recovery work groups.**

The Corps hired a fisheries biologist in 2001 for the purpose of implementing the sturgeon program. The Corps' Fisheries Biologists are regular and active participants in the Upper and Middle Basin Pallid Sturgeon Workgroups. Through these workgroups, working subgroups have been identified to facilitate the development of sampling

protocols for pallid sturgeon population assessment on the lower Missouri and Kansas Rivers. As a result of these partnerships, additional pallid sturgeon population assessment and propagation activities were accomplished in 2001 and are continuing in 2002.

**Assist the USFWS and other partners with fish health issues as they relate to pallid sturgeon.**

Funding was provided to the USFWS for the collection, sampling and analysis of wild shovelnose sturgeon below Gavins Point Dam. The intentions of this study were to determine if the iridovirus is naturally occurring in the Missouri River basin.

**Assist the USFWS and other partners with cyropreservation banking of pallid sturgeon sperm.**

There was \$19,150.67 was expended by the Corps to purchase a variety of cryopreservation equipment. These purchases were complimented with additional equipment totaling \$5,000 purchased by WAPA. The primary equipment is housed and maintained at the Garrison Dam National Fish Hatchery with backup storage units located at the Bozeman Fish Technology Center and the Gavins Point National Fish Hatchery. Cryopreserved milt collected in 2001 is stored at all three locations in the event of catastrophic loss at one of the facilities to ensure that the genetic material will not be lost.

# Missouri River Streambank Stabilization and Navigation Project Action Plan For Creating 2000 acres of Shallow Water Habitat by 2005

March 20, 2002

1. Introduction: The plan outlined below describes a process by which the Corps will modify the existing Missouri River Streambank Stabilization and Navigation Project (BSNP) in an attempt to meet the Missouri River Biological Opinion goal of 2000 acres of shallow water habitat by the year 2005. The plan also includes M&E so that knowledge gained through this initial effort can be applied toward the long-range vision of a more diverse and dynamic river environment that includes 20-30 acres of SWH per mile from Sioux City, Iowa to the mouth. The plan also describes assumptions, constraints and investment requirements necessary to meet future goals of the Biological Opinion. Further, it must be understood that there will be a lag time between modification of the river structures and development of habitat.

2. Objective: The objective of the shallow water development outlined below is to create the required habitat acreage, and develop the design tools necessary to continue habitat development into the future while maintaining the authorized project purposes. Goals of the habitat creation are to allow for more dynamic alluvial processes and increased depth/velocity distribution within the wider top width.

3. Assumptions and Definitions:

3.a. Effective Discharge. Habitat parameters (depth and velocity) are a function of discharge. In order to measure the effectiveness of the proposed project modifications; an effective or design discharge must be defined. For the purposes of assessing habitat creation, it was decided to use the 50 percent exceedance discharge from the August flow duration curve(s) as the effective discharge. Although the accounting system will be based on the effective discharge, data will be gathered and analyzed for a range of flows. These data will be used to develop habitat (duration) availability curves at representative sites, as shown in Figure 1 below.

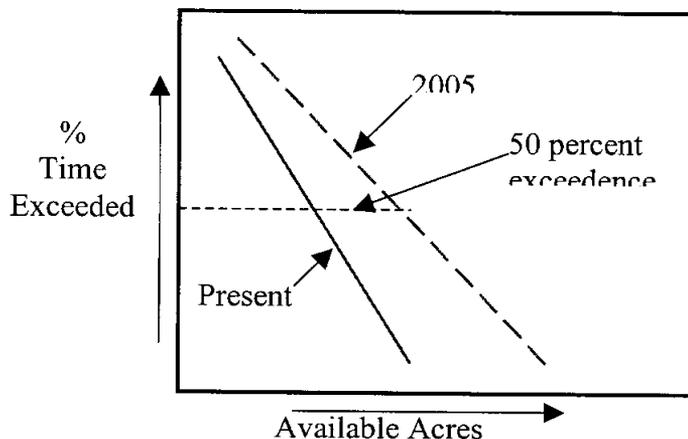


Figure 1. Conceptual Habitat Availability Curves.

3.b. Habitat Parameters. The habitat parameters defined in the Biological Opinion will be used. These are depths less than 5 feet (1.5M) and velocities less than 2 fps (0.6 m/s).

3.c. Depth Diversity. Although the Biological Opinion calls for a finite number of acres of shallow water habitat, biologist for the USFWS and state agencies have expressed a need for a more diverse depth distribution within the main channel of the river. Creation of shallow water habitat will increase the depth diversity; however, no one has expressed a desire to eliminate any particular depth class. Designer must keep this in mind when developing modification plans.

3.d. Maintenance of Existing Project Purposes. All authorized project purposes must be maintained. The authorized 300-foot wide by 9-foot deep navigation channel must be maintained along a reliable sailing line. The authorized streambank stabilization function must be maintained to the point that general channel meandering and channel avulsions are prevented.

3.e. Private Property. No modifications will be placed so that erosion of, or damage to private property will result. All modification will be placed adjacent to Corps owned land, land owned by the USFWS or state owned land. Memorandums of Agreement may need to be obtained from the USFWS and states before any modifications are placed adjacent to these properties.

3.f. Flood Control. No modifications will be implemented that will result in diminished capacity of, or damage to existing flood control projects. This may require levee setbacks and/or purchasing of easements.

4. Modifications: Following is a brief description of the types of modifications that are planned as part of shallow water habitat development.

4.a. Chutes and Backwater Areas. These types of modifications consist of rehabilitation of historic side channels and re-connection of backwaters that were cut-off from the main channel as a result of construction of the BSNP. Review of the Project Management Plan (PMP) for Implementation of the Biological Opinion indicates that approximately 400 acres will be created using these techniques by 2005. This habitat will be created by the existing Missouri River Mitigation Project and by Section 1135 projects that are at least in the feasibility stage.

4.b. Dike Lowering/Notching/Removal. Dikes adjacent to publicly owned land will be targeted for modification in an attempt the increase the top width of the main channel of the Missouri River. By increasing the top width, the river is more free to erode and deposit sediments in response to changes in the hydrograph. The length of dike to be modified will vary depending on the location. However, in general, dikes in the lower river will have the potential for longer modification lengths. Model studies and field observations indicate that an increase in top width does not necessarily lead to a

corresponding increase in shallow water habitat. Based on these studies and observations, for the purposes of this report, it is assumed that a minimum of 100 linear feet of dike would have to be modified to produce a substantial change in depth distribution and that only 50 percent of the modified length would actually produce acceptable shallow water habitat. In addition, modification lengths and elevations will vary through a bend to produce a more dynamic river response.

4.c. Placement of New Structures. As stated 4.b., simple dike modifications will likely not be sufficient to create the required amount of habitat, while remaining within the assumptions stated in Section 3. The width of the main channel varies from 600 feet at Sioux City, Iowa to approximately 1100 feet at the mouth. The navigation channel occupies 300 feet of this width. Most of the remainder of the main channel is generally deep (well over 9 feet) and fast (>5 fps). The area outside the navigation channel provides a factor of safety for commercial navigators and is used by recreational boaters; however, there is no evidence that this area is at all productive from a biological point of view. For this plan the portion of the main channel outside the authorized navigation channel will be referred to as the Under Utilized Zone (UUZ). New structures will be placed in the UUZ to promote the deposition of sediments at a higher elevation than is presently happening. These structures may include chevrons, vane dikes, rootless dikes, etc. and will be constructed to varying elevations and locations within the UUZ to provide for a more dynamic river response. A conceptual plan view of the dike modifications/new structure placement is shown in Plate 1.

4.d. Combination Dike Modification and New Structures. The most likely scenario to produce the required acres of habitat will be a combination of dike modifications and new structures. The short term goal is to develop a situation where, on average, 200 feet of the cross section width is considered shallow water habitat while maintaining all authorized project purposes. This width may produce up to approximately 24 acres per river mile of shallow water habitat. To produce the remaining 1600 acres needed to meet the 2000 acre goal, a total of 66 river miles will need to be modified.

5. Location: Initially dike modifications will be concentrated at existing mitigation sites, state, and USFWS property.

6. Monitoring: The monitoring plan described below consists of data collection and analysis aimed at determining; (1) the quantity and quality of various modification schemes, (2) impacts of the modification schemes on authorized project purposes, and (3) development of the design tools necessary to extend habitat creation beyond the short-range goal. This monitoring does not specifically include any biological monitoring. Biological monitoring plans are being developed under a separate task. However, all monitoring efforts will be fully coordinated, and wherever possible, coincidental with other monitoring efforts.

6.a. Data. The data collection effort will include both a velocity and geometry component. Channel geometry data will be collected using standard hydrographic and land survey techniques. Velocity data will be collected using an Acoustic Doppler

Current Profiler (ADCP). The ADCP will provide 3-dimensional velocity profiles that will be useful in assessment in the macro changes (impacts to the existing project) as well as micro changes (habitat values). All data will be referenced to a common spatial coordinate system and stored in a GIS format. The coordinate system and GIS format will be compatible with other data collection efforts (i.e. biological and water quality data).

6.b. Data Collection. The collection and processing of the data will be accomplished primarily through contracts. Government hired labor forces will be used for small short-suspense work efforts, interim/reconnaissance data collection, and QA/QC of contract efforts. Project engineers and scientists will work with both Kansas City District and Omaha GIS/survey personnel and the contractor to develop the protocol, data layer schemes, etc. This work will also be coordinated with other data collection efforts along the river. This includes U.S. Geological Survey and state agencies engaged in river research.

6.c. Data Analysis. To create the required 2000 acres of habitat by the year 2005, nearly 66 miles of river will have to be modified over the next 3 years. It is not practical, from a cost or logistical point of view, to conduct detailed data collection over the entire 66 miles of the river. Therefore, it is proposed to conduct detailed data collection at selected sites in order to determine the average number of habitat acres created by each type of modification. Detailed data collection sites will be classified by type of modification, relative size of modification, and river reach. Enough sites within each classification will be monitored to establish both habitat creation trends as well as project impacts. The detailed data collection process will also identify indicator parameters that will be measured at the remaining sites. The indicator parameters will be used to total the number of acres created as well as track project impacts.

7. Costs: The costs listed below are based on the schedule outlined in the Implementation Plan PMP, construction history, and recent contract cost for data collection. These costs are for the 1600 acres needed beyond those planned for construction through the Missouri River Mitigation Project and the CAP programs. A breakdown of the costs per river reach and fiscal year is shown in Table 1.

Table 1 Design, Construction and Monitoring Costs Estimate For Development of 2000 Acres of SWH by 2005						
River Reach	Estimated Developable SWH <sup>1</sup> (acres)	Required Funding (\$000)				Total Funds Required
		FY 02	FY 03	FY 04	FY 05	
Sioux City to Omaha	100-220	0	400	1000	1000	2400
Omaha to Neb City	50-120	0	400	500	500	1400
Neb City to Rulo	185-440	20	1850	1000	1000	3870
Rulo to Kansas City	180-325	200	350	350	150	1050
Kansas City to the Osage River	570-740	855	750	500	250	2455
Osage River to the Mouth	250-325	445	400	150	100	1095
Total Est. Number of Acres <sup>4</sup>	1335-2170					
Total Estimated Const. Cost		1520	4150	3500	3000	12170
Monitoring Costs <sup>2</sup>		120	480	710	875	2185
Engineering and Design/Const. Admin. Cost <sup>3</sup>		305	600	500 <sup>5</sup>	450 <sup>5</sup>	1855 <sup>5</sup>
Total Cost Per Year		1945	5230	4710	4325	16210

Notes:

Estimated developable SWH acres are based on publicly owned land that has been offered to the Corps by the owner for creation of shallow water habitat.

The monitoring costs are for measuring the change in the physical environment (channel geometry, velocity, etc.), not for biological monitoring, which is being developed under a separate plan. The details of the plan are being developed through coordination with the USFWS, Corps Biologist, etc. These costs may change as the plan is finalized.

These costs include development of the plans and specifications for the current and proceeding year, construction contract administration costs, and development and application of design tools.

Additional acres, if any, to be applied toward the long-range goal of 20-30 acres per mile.

To meet the long-range goal, additional investment will be necessary in this area.

8. Unresolved Issues/Stumbling Blocks/Logistical Considerations: The following are issues that need to be addressed.

8.a. Reconciliation of habitat development with requirements in the Biological Opinion. The plan outlined above includes development of habitat in the lower river where the current habitat approaches 20 acres per mile. This work may result in habitat in excess of 30 acres per mile. The Corps and the USFWS need to reach an agreement as to the credits given in areas where habitat exceeds the Biological Opinion requirements

8.b. Coordination of physical and biological monitoring. The above plan does not include any specific biological monitoring, however, the physical monitoring must be coordinated with biological monitoring to ensure that all data is accessible to all users, consistent protocols are followed, and effort are not duplicated. The PDT will ensure that this coordination is taking place.

8.c. Real Estate limitations beyond 2005. There does not appear to be a real estate limitation on the short-term goal of 2000 acres by year 2005, provided the Corps and USFWS can reach an agreement on crediting acres (see issue 8a). However, real estate will become a limiting factor after 2005 if additional right-of-way is not secured. The Corps should prioritize real estate efforts to ensure continued opportunities. This may require innovative real estate instruments such as sloughing/conservation easements, collaborating with NRCS/Nature Conservancy, etc. This is a critical path element for the long-term goal.

8.d. Impacts on infrastructure (flood control). Development of the shallow water habitat has the potential to affect other infrastructure, primarily private levees. The Corps should develop a clear and consistent approach to addressing these issues. The SEIS should go a long way in addressing this issue, but additional clarification would increase the likelihood of success in securing the needed real estate.

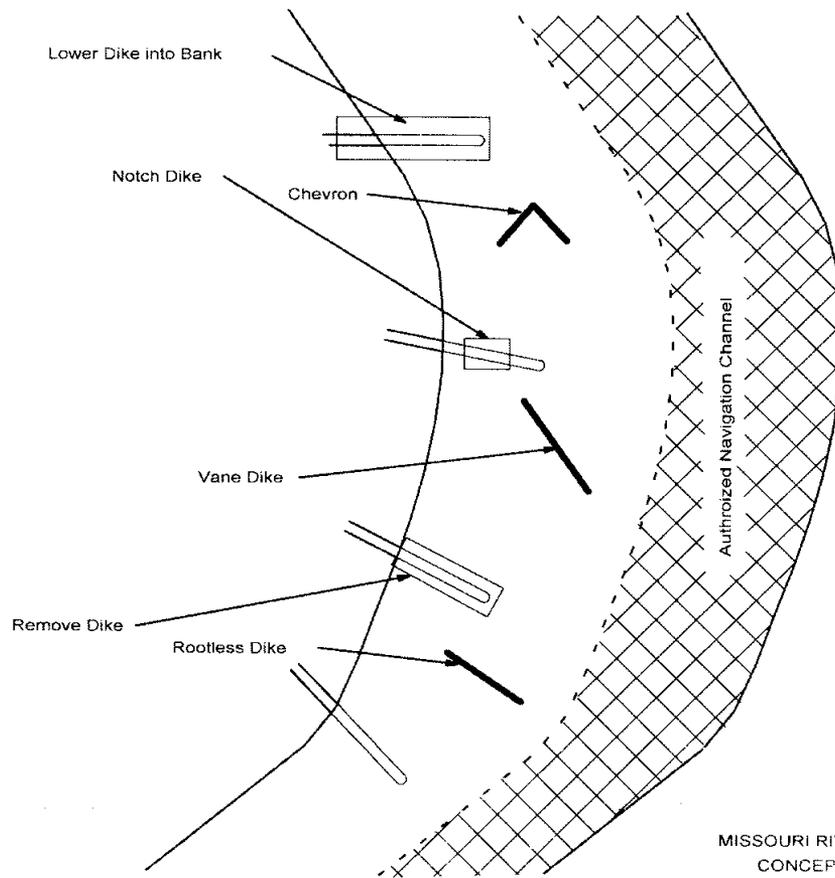
8.e. Long-term maintenance and Operation and Maintenance logistics. Construction of these features will be relatively straightforward. Standard floating plant and excavating equipment are all that is needed. However, once the shallow water habitat has been created, maintenance of the project will be more difficult and costly. Land access and/or shallower draft floating plant may be required. All efforts will be made to minimize maintenance requirements, but is it safe to say that Operation and Maintenance Standard Office Procedures will change.

8.f. Long-term viability. Although the Corps will monitor the development areas and develop models to project future conditions, this technology can not predict habitat value or usage. This biological information must be developed in parallel with the river monitoring/models to ensure sustained value.

9. FY 2002 Work Plan. Both the Omaha and Kansas City District have developed plans to begin the habitat development process. Funds have been provided for pre-construction monitoring, development of models, and design efforts (see Table 1). In addition, both Districts are proceeding with construction activities using operations and maintenance funds. The Omaha District is in the process of obtaining Section 10/404 permits for modification of a 13 mile reach of the river in the Nebraska City the Rulo reach, and will begin a modest construction effort in FY 2002 using hired labor forces. The Kansas City District's FY 2002 work plan is far more robust and is outlined in Attachment A.

10. FY 2003 Work Plan. Both District's plan to continue design, construction, M&E effort in FY 2003 as outlined in Table 1. This is subject to available funding and will require close coordination with the USFWS and researcher.

11. QA/QC Plan. Most of this work is cutting edge and will require extensive oversight from senior level engineers/scientist and technical specialist in order to maintain an acceptable level of risk to the existing project, ensure that state of the art tools are being used/developed, to verify that lessons learned have been incorporated, and to verify that the long-term objectives are being met in terms of biological response. Further, these technical experts, and senior level engineers and scientist will provide input and oversight for development of data collection protocol, monitoring plans and data base development. Table 2 provides a list of key personnel as well as their area of expertise and responsibilities. Annual QA/QC plans will be developed that outline specific tasks, roles and responsibilities.



MISSOURI RIVER - SIOUX CITY TO THE MOUTH  
CONCEPTUAL DIKE MODIFICATION PLAN

Plate 1

Table 2 Key Personnel		
Name	Expertise	Responsibilities
Allen Tool- CENWK-EC-HH	Senior Hydraulic Engineer: Sediment Transport, Numeric Modeling, Alluvial Geomorphology	SWH development program over sight, Technical Review Of Project Design, Technical Over Sight of Modeling QA/QC
Mike Chapman – CENWK-EC-HH	Senior Operations Engineer: River Operations, Structure Design/Modification, Channel Design	Technical Project Designs, Design Coordination, Scope Preparation, Contract Admin
Ken Stark- CENWK-EC-HH	Senior Hydraulic Engineer: Sedimentation Transport, Numerical Modeling, Stream Rehabilitation Design	Conducting and Technical Over Sight of Numeric Model Design, Technical Project Design
Dereck Wansing- CENWK-EC-HH	Engineering Technician: Data Base Development, Data Collection,	Data base development and design, data collection method and protocol
John Remus – CENWO-ED-HF	Senior Hydraulic Engineer: Sedimentation Transport, Alluvial Geomorphology, Channel Restoration Design.	SWH development program over sight, development of monitoring plan and protocols, technical review of project designs, scope preparation and contract administration, QA/QC.
Dan Pridal - CENWO-ED-HD	Hydraulic Engineer Technical Specialist: Numerical Modeling, Channel Design, Data Base Development.	Conducting and technical over sight of multi-dimensional numerical modeling, data base design, monitoring plan and protocol development.
Jon Kragt - CENWO-IM-P	GIS Expert: Development of Data Bases and Development/ Application of Geo-spatial Analysis Techniques.	Development and Maintenance of Data Bases.

Table 2 (continued) Key Personnel		
Name	Expertise	Responsibilities
Doug Latka – CENWD- CM-W-M	Fisheries Biologist CENWD Missouri River	Regional over sight of biological monitoring and interface with USFWS
Mike George – CENWO- PM-C	Project Manager for the Biological Opinion Implementation	Over sight of the implementation plan for the Biological Opinion
Mike Barnes – CENWO- PM-C	Study Manager for the Missouri River Mitigation Project – Omaha District	Project Management activities for the Missouri River Mitigation Project in the States of Iowa and Nebraska
Kelly Ryan – CENWK-PM- CJ	Project Manger for the Missouri Mitigation Project.	Project Management activities for the Missouri River Mitigation Project

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**APPENDIX B**

Missouri River Bank Stabilization and Navigation Project Fish and Wildlife Mitigation  
Project  
Annual Implementation Report  
January 2002

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US Army Corps  
of Engineers ®

## Missouri River Bank Stabilization and Navigation Project, Fish and Wildlife Mitigation Project

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*View of the new levee and control structure, seasonal wetland and shallow backwater nursery, Eagle Bluffs Conservation Area Mitigation Site*

### Annual Implementation Report January 2002

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## INTRODUCTION

### AUTHORITY

This report presents the current status and future plans for implementation of the Missouri River Fish and Wildlife Mitigation Project, Iowa, Nebraska, Kansas, and Missouri, hereinafter referred to as the "Project". Congress first authorized construction of the Project in Section 601(a) of the Water Resources Development Act of 1986 (Public Law 99-662). The authorization included acquisition and development of 29,000 acres of land, and habitat development on an additional 18,200 acres of existing public land in the States of Iowa, Nebraska, Kansas and Missouri. The total amount of land authorized for mitigation was 48,100 acres.

In 1999, Congress passed another WRDA bill. Section 334(a) of the Water Resources Development Act of 1999 included modifying the Project by increasing the amount of acreage to be acquired and/or restored by 118,650 acres. Thus the new total amount of land authorized for mitigation is currently 166,750 acres.

### BACKGROUND

The original authorization for the Project was based upon a report of the US Army Corps of Engineers, Chief of Engineers, dated April 24, 1984, entitled Missouri River Bank Stabilization and Navigation Project Final Feasibility Report and Final EIS for the Fish and Wildlife Mitigation Plan (Ref 1). The authority to prepare the Feasibility Report was the 1958 Fish and Wildlife Coordination Act (P.L. 85-624). The Final Feasibility Report described the fish and wildlife and habitat losses that have, and will, occur due to the Missouri River Bank Stabilization and Navigation Project. Also described in the Report are various measures to mitigate for these losses, and recommended a plan to restore, preserve, or develop 48,100 acres of habitat.

Preconstruction Engineering and Design (PED) for the Project was initiated in December 1989. As a part of PED work, a "Reaffirmation Report" for implementation of the Project was approved by the Corps of Engineers' Missouri River Division in August 1990 (Ref 2). The purpose of the Reaffirmation Report was to confirm that the plan recommended in the 1984 Feasibility Report and Final EIS was still viable. PED was completed in September 1991 and this Project has been in a "Construction" status since that time. The Reaffirmation Report explains the various aspects of the Project such as the approval process, funding levels, costs, schedules, documentation and involvement of other State and Federal agencies. In accordance with the Reaffirmation Report, Annual Implementation Plans are required to be created.

A "Real Estate Design Memorandum No. 1" for land acquisition activities for the Project was completed by the Kansas City District in March 1990 (Ref 3). This report was endorsed by the Corps of Engineers' Missouri River Division in July 1990, and approved by Corps of Engineers' Headquarters in May 1991. This report established the real estate requirements for the acquisition in fee or easement of 29,900 acres of privately owned lands and for any real estate requirements for development of 18,200 acres of existing public lands within the four affected States.

This project is 100 percent Federally funded for real estate, design, construction, and operation and maintenance. However, even though there is not a cost share sponsor, the U.S. Fish and Wildlife Service and the four affected States (Iowa, Nebraska, Kansas, and Missouri) participate in the Project. The agency participation is through a Coordination Team that was developed to formulate and decide upon the various acquisition and development sites.

Approximately 60 percent of the original project is within the Kansas City District (CENWK) and 40 percent within the Omaha District (CENWO). For ease of dealing with the affected states, CENWK is working on sites in Missouri and Kansas, while CENWO is responsible for all Nebraska and Iowa sites.

In November 2000, the US Fish and Wildlife Service issued a Biological Opinion (Bi-Op) against the Corps of Engineers (Ref 4). The Bi-Op stated that the Corps had severely altered, and continue to alter, the natural hydrology and shallow water habitat on the Missouri River within the Project area. The Bi-Op stated that the Corps has to perform "Reasonable and Prudent Alternative" actions to restore, enhance and conserve shallow water habitat in the amount of 20-30 acres per mile for the 735 mile Project area.

## **REPORT PURPOSE AND FORMAT**

Programmatic updates of the Reaffirmation Report are accomplished through Annual Implementation Reports. This document is the eighth such report. The purpose of the Annual Implementation Reports is to create an administrative record of mitigation efforts that have already occurred, complete a status of the mitigation efforts that are underway, and outline a plan for continued mitigation in the future.

There are four main elements of the Project: Real Estate, Habitat Development, Operation and Maintenance, and Monitoring and Evaluation. Thus, each section of this report is divided into four parts to explain the past activities, current status, and future activities for each element.

**PAST MITIGATION EFFORTS  
FOR FY01 AND PRIOR**

**REAL ESTATE (FY01 and Prior)**

**Non-Public Lands.**

As stated previously, the original authorized Project allowed for acquisition of 29,900 acres of privately held land. During the Feasibility effort, it was clear that each State had been affected by the Bank Stabilization and Navigation Project (BSNP). Through coordination with the four affected States and the U.S. Fish and Wildlife Service, the 29,900 acres was divided up between the States proportional to the amount of fish and wildlife losses attributed to each State. An additional effort was completed in order to distribute the lands between habitat types. However, now that the project has been underway, shifting of some of the lands between the States to accommodate timing of willing sellers, availability of public lands, etc. was necessary. The current approved plan for the 29,900 acres is indicated in Table 1.

**TABLE 1  
ACQUISITION OF NON-PUBLIC LANDS  
TOTAL AUTHORIZED BY WRDA86**

State	Preserve Existing Aquatic Habitat (ac)	Acquire & Develop New Aquatic Habitat (ac)	Acquire & Develop New Terrestrial Habitat (ac)	Total (ac)	Percentage
Missouri	--	1,150	12,050	13,200	44
Kansas	--	100	2,250	2,350	8
Iowa	200	200	6,800	7,200	24
Nebraska	--	250	6,900	7,150	24
<b>TOTAL</b>	<b>200</b>	<b>1,700</b>	<b>28,000</b>	<b>29,900</b>	<b>100</b>

During the public involvement process for the EIS and Feasibility Report for the Project, a policy

of obtaining lands only from willing sellers was established. The Corps of Engineers maintains their authority for condemnation, however, it has been agreed that this authority will not be used on the Project so as to minimize the impacts of acquisition. Other real estate criteria have been developed to guide the acquisition process to insure the best possible results. These are discussed in detail in the referenced reports.

Each of the four affected States has furnished a list of priority acquisition sites that have potential for wildlife mitigation. With the priority in hand, the Corps of Engineers completed a survey of willing sellers near the priority areas. These planning efforts identified sufficient real estate lands to accomplish the original authorized project. As of 30 Sep 01, 24,915 acres of non-public land has been acquired for the Project. This is 83 percent of the 29,900 acres originally authorized. The status of the acquisition of non-public lands as of September 30, 2001 (FY01 and prior) is displayed in Table 2.

**TABLE 2**  
**ACQUISITION OF NON-PUBLIC LANDS**  
**TOTAL ACQUIRED BY STATE**  
**(AS OF 30 SEP 01)**

State	Authorized WRDA 86 (ac)	Total Aquired as of 30 Sep 01 (ac)	Percentage of Authorized Amount	Amount Remaining to be Aquired to meet WRDA 86 (ac)
Missouri	13,200	12,498	95	702
Kansas	2,350	2,111	90	239
Iowa	7,200	3,291	46	3,909
Nebraska	7,150	7,015	98	135
<b>TOTAL</b>	<b>29,900</b>	<b>24,915</b>	<b>83</b>	<b>4,985</b>

To date, a total of nineteen mitigation sites have been established at areas along the river that were formerly non-public lands. These lands were obtained in Fee Title where the ownership is now held by the Corps of Engineers. Eight of the mitigation sites are within the State of Missouri, one is in Kansas, five are in Iowa, and five are in Nebraska. A breakdown by site of the amount of non-public land acquired for mitigation for the States of Missouri, Kansas, Iowa, and Nebraska are given in Tables 3, 4, 5 and 6, respectively. Locations of these sites are given in the Location Maps as a part of Appendix 1.

**TABLE 3**  
**ACQUISITION OF NON-PUBLIC LANDS**  
**TOTAL ACQUIRED WITHIN STATE OF MISSOURI**  
**(AS OF 30 SEP 01)**

<b>Missouri Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired (ac)</b>
Berger Bend	Franklin County	93 – 90	L	414*
Hemmes Bend/Corning Site	Holt County	514 – 512	L	967*
Lower Hamburg Bend	Atchison County	553 – 550	L	2,265
Nishnabotna	Atchison County	544 – 541	L	1,283
Overton Bottoms	Cooper County	187 – 183	R	4,986
Rush Bottom Bend	Holt County	502 – 499	L	811*
Tate Island	Gallaway County	113 – 110	L	423
Thurnau	Holt County	503 – 502	L	1,349*
<b>TOTAL</b>				<b>12,498</b>

\* NOTE: Acquisitions are still underway at this site

**TABLE 4**

**ACQUISITION OF NON-PUBLIC LANDS  
TOTAL ACQUIRED WITHIN STATE OF KANSAS  
(AS OF 30 SEP 01)**

<b>Kansas Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired (ac)</b>
Benedictine Bottoms	Atchison County	429 – 424	R	2111
<b>TOTAL</b>				<b>2,111</b>

**TABLE 5**

**ACQUISITION OF NON-PUBLIC LANDS  
TOTAL ACQUIRED WITHIN STATE OF IOWA  
(AS OF 30 SEP 01)**

<b>Iowa Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired (ac)</b>
Auldon Bend	Harrison County	580 – 577	L	588
Blackbird-Tieville- Decatur Bends	Monona County	698 – 686	L	315*
Copeland Bend	Fremont County	571 – 565	L	1,069*
Louisville Bend	Monona County	685 – 682	L	84
Noddleman Island	Mills County	587 – 583	L	1,235
<b>TOTAL</b>				<b>3,291</b>

\*NOTE: Acquisitions are still underway at this site

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**TABLE 6**

**ACQUISITION OF NON-PUBLIC LANDS  
TOTAL ACQUIRED WITHIN STATE OF NEBRASKA  
(AS OF 30 SEP 01)**

<b>Nebraska Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired* (ac)</b>
Blackbird-Tieville- Decatur Bend	Thurston, Burt Counties	698 – 686	L	1,890*
Hamburg Bend	Otoe County	556 – 552	R	1,544*
Kansas Bend	Nemaha County	547 – 544	R	1,056
Langdon Bend	Nemaha County	532 - 528	R	921
Tobacco Bend	Cass County	589 – 586	L	1,604*
<b>TOTAL</b>				<b>7,015</b>

\*NOTE: Acquisitions are still underway at this site

**Existing Public Lands.**

In addition to the acquisition of mitigation sites on non-public lands, the WRDA86 authorization allowed for restoration and development of mitigation sites on 18,200 acres of existing public land. For habitat development on existing public lands, "no cost" easements are being obtained to allow the Corps of Engineers to construct project features on land not owned by the Corps.

Through coordination with the four affected States and the U.S. Fish and Wildlife Service, the amount of public land was distributed by State and between habitat types. However, shifting of some of the Public lands between the States was necessary to accommodate availability of public lands, etc. The current approved plan for the 18,200 acres of existing public land is indicated in Table 7.

**TABLE 7**

**EXISTING PUBLIC LANDS  
TOTAL AUTHORIZED TO BE RESTORED/DEVELOPED UNDER WRDA 86**

<b>State</b>	<b>Preserve Existing Aquatic Habitat (ac)</b>	<b>Acquire &amp; Develop New Aquatic Habitat (ac)</b>	<b>Acquire &amp; Develop New Terrestrial Habitat (ac)</b>	<b>Total (ac)</b>	<b>Percentage</b>
Missouri	0	550	15,200	15,750	87
Kansas	0	0	0	0	0
Iowa	500	200	1,700	2,400	13
Nebraska	0	50	0	50	0
<b>TOTAL</b>	<b>500</b>	<b>800</b>	<b>16,900</b>	<b>18,200</b>	<b>100</b>

Currently, there is a lack of public land within the Project Area in the States of Kansas and Nebraska. However, through the Project coordination effort with the four affected States and the US Fish and Wildlife Service, existing public lands were studied for potential development. A list of priority for mitigation was completed and included into the decisions of funding and scheduling of development.

As of September 30, 2001, easements and/or licenses have been obtained on 5,779 acres of existing public land for the Project. This is 32 percent of the 18,200 acres originally authorized. The status of obtaining easements and/or licenses on existing public lands as of September 30, 2001 (FY01 and prior) is displayed in Table 8.

**TABLE 8**  
**EXISTING PUBLIC LANDS**  
**TOTAL EASEMENTS/LICENSES ACQUIRED BY STATE**  
**(AS 30 SEP 01)**

State	Authorized WRDA 86 (ac)	Total Aquired as of 30 Sep 01 (ac)	Percentage of WRDA86	Amount Remaining to be Aquired to meet WRDA 86 (ac)
Missouri	15,750	3,331	21	12,419
Kansas	0	1.4	100	-1.4
Iowa	2,400	2,396	100	4
Nebraska	50	50	100	0
<b>TOTAL</b>	<b>18,200</b>	<b>5,778</b>	<b>32</b>	<b>12,422</b>

To date, a total of fourteen mitigation sites have been established at areas along the river which are located on public lands owned by Federal and State agencies other than the Corps of Engineers. Nine sites are within the State of Missouri, four sites are in Iowa, and one site is in Nebraska. There are no mitigation sites established to date on existing public lands in the State of Kansas (a 1.4 acre easement was taken at the Benedictine Bottoms site). A breakdown by site of the amount of mitigation restored or developed on existing public land in the States of Missouri, Iowa, and Nebraska are given in Tables 9, 10 and 11, respectively.

**TABLE 9**

**EXISTING PUBLIC LANDS  
TOTAL EASEMENTS/LICENSES ACQUIRED WITHIN STATE OF MISSOURI  
(AS OF 30 SEP 01)**

<b>Missouri Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired* (ac)</b>
Berger Bend	Franklin County	93 - 90	L	60
Columbia Bottom	St. Louis County	5 - 0	R	0*
Deroin Bend	Holt County	520 - 517	L	1,082
Eagle Bluffs	Boone County	174 - 170	L	571
Grand Pass	Saline County	273 - 266	R	5
Hemmes Bend/Corning Site	Holt County	514 - 512	L	695
Overton Bottoms	Cooper County	187 - 183	R	332
Nishnabotna	Atchison County	544 - 541	L	1.34
Worthwine Island	Andrew County	460 - 456	L	585
<b>TOTAL</b>				<b>3,331</b>

\*NOTE: Acquisitions are still underway at this site

**TABLE 10**  
**EXISTING PUBLIC LANDS**  
**TOTAL EASEMENTS/LICENSES ACQUIRED WITHIN STATE OF IOWA**  
**(AS OF 30 SEP 01)**

<b>Iowa Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired (ac)</b>
Blackbird-Tieville-Decatur Bends	Monona County	698 - 686	L	964
California Bend	Harrison County	652 - 649	L	420
Louisville Bend	Monona County	685 - 682	L	1,012
Winnebago Bend	Woodbury County	711 - 708	L	0*
<b>TOTAL</b>				<b>2,396</b>

\*NOTE: Winnebago Bend was an existing 1,200 acre Corps owned property. No additional acquisitions were obtained at this site.

**TABLE 11**  
**ACQUISITION OF NON-PUBLIC LANDS**  
**TOTAL ACQUIRED WITHIN STATE OF NEBRASKA**  
**(AS OF 30 SEP 01)**

<b>Nebraska Sites</b>	<b>Location</b>	<b>Approx. River Mile</b>	<b>Descending Bank</b>	<b>Total Aquired (ac)</b>
Blackbird-Tieville-Decatur Bends	Thurston, Burt Counties	698 - 686	R	50
<b>TOTAL</b>				<b>50</b>

## **HABITAT DEVELOPMENT (FY01 and Prior)**

The intent of this Project is to restore and/or preserve fish and wildlife habitats that were native to the Missouri River floodplain. This, of course, covers an entire array of different habitat types. The Project has completed mitigation of many different habitat types. The variety and implementation of habitats into different areas of the floodplain is part of the development process of the Project. To date, no one species nor one habitat type has been focused upon for restoration. The habitat development has been of an "ecosystem" approach where all habitat types are considered into development decisions.

Restoration of shallow water aquatic habitat has emphasized restoring filled-in chute and completing in-river improvements. This was accomplished primarily by dike notching, river structure modifications, excavation and dredging. Several mitigation sites had levees that were close to the river channel. In some cases, the levee can be moved back landward of the river channel creating additional opportunities for creation of shallow water habitat. Through 30 Sep 01, shallow water habitats have been created, or work has been started, at the Grand Pass, Plowboy Bend, Overton Bottoms, North Hamburg Bend, Langdon Bend, Tobacco Island and California Bend mitigation sites. Levees have been relocated, or work started, at Eagle Bluffs, Columbia Bottom, and Overton Bottom South mitigation sites.

In addition to the shallow water habitat, migratory waterfowl have benefited from the creation of constructed wetlands at several mitigation sites. Restoration of migratory waterfowl habitat has been accomplished by construction of low dikes, berms, wells, pumps, water delivery systems, and construction of drainage control structures. Through 30 Sep 01, migratory waterfowl habitats have been created, or work has been started, at the Eagle Bluffs, Benedictine Bottoms, Louisville Bend and Winnebago Bend mitigation sites.

Development of terrestrial habitat such as Bottomland Hardwood and Prairie Grassland habitats has been a key to the restoration of the River's ecosystem. Terrestrial habitats support food plot establishment, nesting cover, insect production, and a whole array of necessary biological functions to keep the ecosystem alive and functioning. Development of terrestrial habitat has been dependent upon the type of existing land use and management objectives. The pre-existing land use at many of the new mitigation sites was agricultural production. The terrestrial habitat development to date has included vegetative plantings, timber thinning, and tree plantings. Through 30 Sep 01, terrestrial habitat has been developed at the Benedictine Bottoms, Overton North, Tate Island, Hamburg Bend, Langdon Bend, Tobacco Island and Winnebago Bend mitigation sites.

The following is a summary of the habitat development efforts at specific mitigation sites. Location maps for all of the mitigation sites can be found in Appendix 1.

### Columbia Bottom, Missouri

This mitigation site is located on the Columbia Bottom Conservation Area (CBCA). The CBCA is existing public land owned and operated by the Missouri Department of Conservation (MDC). CBCA is approximately 4,300 acres in size. The site is on the right descending bank of the Missouri River, at the confluence with the Mississippi River. The land at the Columbia Bottom mitigation site was previously farmed. The area is being improved so that wetlands, native grasses, and bottomland hardwood forest habitats can be restored to the area. Due to the size of the site, the mitigation will occur in several phases.



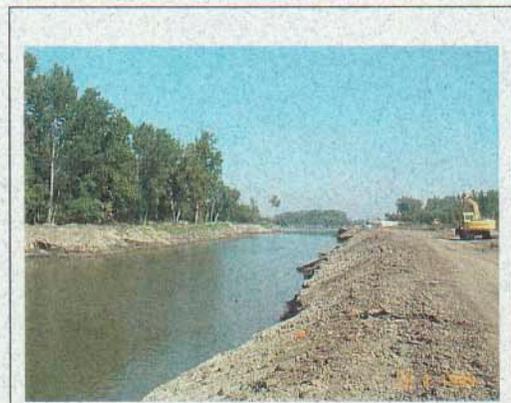
**Columbia Bottom, MO**  
*View looking south at the land now on the riverside of newly constructed levee setback.*

Phase I is currently under construction. Phase I consists of an 8000 linear foot setback of an existing agricultural levee. The setback will move the existing levee approx. 800 feet from the Mississippi River bank to create an additional 145 acres of land on the riverside of the levee. In the future, this riverward area will be planted with bottomland hardwood trees and shore area may be evaluated for shallow water habitat potential. Construction of Phase I is scheduled to be complete Spring 2002. Phase II of the mitigation is development of approx. 800 acres of constructed wetlands. The work will include construction of 15 low dikes, a pump station, and a water delivery system. Once completed, Phase II will allow development of high quality migratory waterfowl habitat. Phase II is currently under design. Construction of Phase II is scheduled to start Fall 2002.

### Deroin Bend, Missouri

This mitigation site is located at river mile 516 to 520, on the left descending bank of the river. The site contains 1,082 acres of state of Missouri land.

The construction is nearly complete and includes restoration of a side channel plus planting of several hundred trees. The three mile channel has a 70 foot bottom width. Upon completion, the Missouri Department of Conservation will manage the site.



*View looking downstream of the restored chute, Deroin Bend, MO*

### Eagle Bluffs, Missouri

This mitigation site is located adjacent to on the Eagle Bluffs Conservation Area (EBCA) near Columbia Missouri. The EBCA is existing public lands owned and operated by the Missouri Department of Conservation (MDC). The area is bounded by the Missouri River to the west and Perche Creek to the East.



#### **Eagle Bluffs, MO**

*View looking south at the new backwater outlet area and fish friendly structure.*

The mitigation at this site is 592 acres in size. The area has been historically used for row crop production. The planned mitigation at this site will include converting the farmed lands to additional seasonally flooded wetlands, and provide a backwater fish nursery. The project scope includes two wetland pools and additional riparian area by constructing new levees and berms and new water control structures.

There will be two "fish friendly" structures constructed which were specifically designed to allow fish to spawn within the wetland area and effectively reach Perche creek and the Missouri River. The additional wetlands and backwater nursery area are currently under construction. The project should be completed January 2002.

### Grand Pass, Missouri

This mitigation site was located at the Grand Pass Conservation Area (GPCA) on land owned by MDC. The area is adjacent to the right descending bank of the Missouri River, at river miles 263 to 266.

The Grand Pass chute was closed in conjunction with the Missouri River Bank Stabilization and Navigation Project. Work associated with the chute closure began in 1934 and was completed by the early 1960s. The main project element for the mitigation at the GPCA site was restoration of the historic chute.

Restoration of the chute was completed in 1991. The work included modification of existing river structures, excavation and dredging of the chute, installation of submerged brush piles, and construction of rock hard points. The restored chute is now approximately 50 feet wide and has restored 130 acres of high quality shallow water habitat.



*View looking upstream of the restored chute at Grand Pass, MO*

### Overton Bottoms North, Missouri

Overton Bottoms is approximately 5,000 acres of land purchased by the Corps of Engineers. The area is adjacent to the right descending bank of the Missouri River at river miles 181 to 189. Interstate 70 cuts the bottoms into two sites, Overton Bottoms South (OBS), and Overton Bottoms North (OBN).



*View looking at the inlet to the constructed river chute at Overton Bottoms North, MO*

Until these lands were purchased for the Missouri River Fish and Wildlife Mitigation project, the area was heavily used for agricultural purposes. With implementation of the mitigation at this site, the agricultural lands have been taken out of production and native grasses and trees have been planted.

In 2000, the Corps designed and constructed a river chute at the OBN site. The 3000 foot long chute is currently 40 feet wide. The chute has created opportunities for new aquatic habitat. The chute was constructed at higher elevations so that it is only inundated on a seasonal basis. It is anticipated that the chute will continue to widen during periods of flood flow and will eventually scour itself out to a full 150 foot width.

Since completion of chute construction, the area has been turned over to the US Fish and Wildlife Service to manage as part of their "Big Muddy Wildlife Conservation Area". The USFWS has implemented low maintenance operation plans for the area and plans to let the land recover to pre-agricultural conditions on its own. The Corps and USFWS will continue monitoring the chute development and make necessary adjustments to assure it's future development.

### Overton Bottoms South, Missouri

The OBS site is located just to the south of I-70 from the OBN site described above. Together these sites make up about 5,000 acres. The main project element for the planned mitigation at the OBS site is setback of an existing levee. The levee setback will create opportunities on the additional land on the river side of the levee in which future shallow water and/or bottomland hardwood forest habitats can be restored. The borrow area for the construction of the new levee is being constructed so as to allow opportunistic wetlands to form.

Upon completion of construction, the Missouri Department of Conservation will assume operation and management of the constructed features. The construction of the levee setback at OBS is currently 35% complete and is scheduled to be completed by April 2002.

The OBS site contains about 500 acres of existing bottomland hardwood trees that will be preserved along the river corridor. Additional opportunities will be created when an existing levee will be relocated back from the river creating opportunities on the additional land on the river side in which future shallow water and/or bottomland hardwood forest habitats can be restored.



**Overton Bottoms South, MO**  
*View looking at the borrow site for the levee setback project*



*View looking at the diverse and shallow water habitat created within river by structure modification, Plowboy Bend, MO*

### **Plowboy Bend, Missouri**

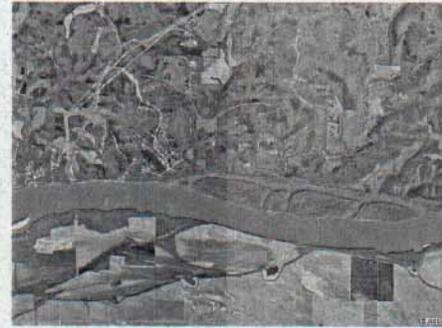
The Plowboy Bend mitigation site is one of several efforts to complete within river structural changes for fish habitat improvements. This site is located adjacent to the Plowboy Bend Conservation Area which is owned and operated by the Missouri Department of Conservation. The work at this site included notching an existing dike in several locations and reversing the direction of a second existing dike.

The structural modifications were used to direct the natural force of the river against the adjacent riverbank. The eroded riverbank and area within the dike field created an area of diverse shallow and deep water fish habitat. The diversity created at this site is essential to Pallid Sturgeon recovery.

### **Tate Island, Missouri**

This mitigation site is located at river miles 110 to 113 on the left descending bank of the river near the Morrison Bend.

The site contains 422 acres, but is situated in the middle of the river. Access to the site is limited only to boat. The site is located two miles east of Portland, MO. No construction is planned for the site at this time, however opportunities to complete shoreline and/or within river improvements to increase and diversify the shallow water habitat at this site may be undertaken in the future.



*Aerial view of Tate Island, MO*



*View looking across the constructed wetland habitat at Benedictine Bottoms, KS*

### **Benedictine Bottoms, Kansas**

This mitigation site is 2,111 acres in size and is located just north of Atchison Kansas. The site is at river miles 425 to 429 on the right descending bank at Rushville Bend of the river.

At this site, the Corps has completed installation of seasonal wetlands, planting of native hardwood trees and prairie grasses. Benedictine Bottoms has been turned over to the Kansas Department of Wildlife and Parks for their management as a wildlife refuge.

### **Auldon Bar, Iowa**

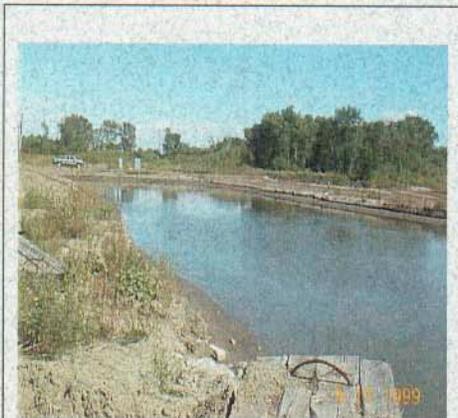
This site is at river miles 577 to 580 on the left descending bank. Currently 588 acres have been purchased at this site. 1,028 acres is desired prior to restoration of habitat at this location. There are apparently no additional willing sellers at this time. No plans to improve this site have been prepared yet. The Iowa Department of natural Resources is managing the 588 acres of land as a wildlife area.

### **California Bend, Iowa**

The California Bend mitigation site is 420 acres in size and is located at river miles 649 to 652 on the left descending bank. This project included opening up a historic side channel which has restored connectivity to the river and created shallow water aquatic habitat. The site is owned and managed by the Iowa Department of Natural Resources.

### **Copeland Bend, Iowa**

The Copeland Bend site is at river miles 565 to 571 on the left descending bank. Land is still being acquired at this site, as it becomes available. Currently, 1,069 acres have been purchased but are scattered throughout the 2,306-acre site. No plans to improve this site have been prepared yet. The Iowa Department of natural Resources is managing the 1,069 acres of land currently purchased as a wildlife area.



*View of the inlet of the restored side channel at Louisville Bend*

### **Louisville Bend, Iowa**

Louisville Bend is at river miles 682 to 685 on the left descending bank. This site was developed primarily as a water fowl area. Of the total area of 1,096 acres, 270 acres are open water.

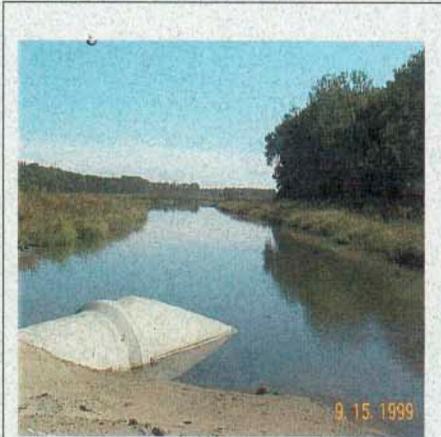
This site was completed in 1995 and consists of controlled opening at the inlet and outlet, plus a pump at the inlet. Water is pumped into the area as needed and the outflow is regulated to maintain the water surface elevation. The Iowa Department of Natural Resources manages this site.

### **Noddleman Island, Iowa**

The Noddleman Island mitigation site is located at river miles 583 to 587 on the left descending bank. Currently, 1,235 acres of the 2,542 acres desired for this site have been purchased. It appears that there are no additional willing sellers time at this time. No plans to improve this site have been prepared yet. The Iowa Department of Natural Resources is managing the 1,235 acres of land currently purchased as a wildlife area.

### Tieville-Decatur Bends, Iowa and Nebraska

This mitigation site consists of 3,148 acres and is located at river miles 686 to 694 on the left descending bank. Although these bends are on the Iowa side of the river, some of the land actually belongs to Nebraska. Construction at this site will begin about March 2002. The mitigation at this site includes opening several side channels and interconnected backwater areas. Also pumps are included to maintain a waterfowl area on part of the site.



*View of the restored side channel at Winnebago Bend, IA*

### Winnebago Bend, Iowa

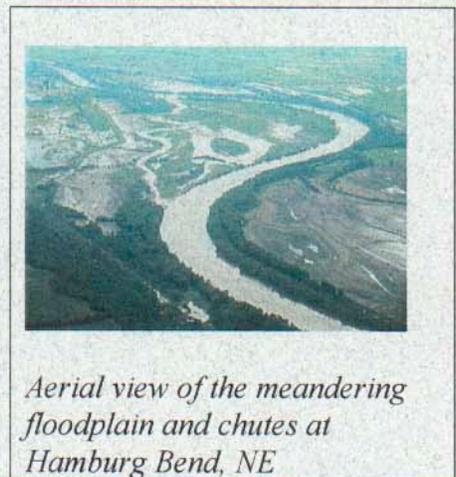
Construction of the Winnebago Bend site was completed in 2001. The site consists of 1,300 acres on the left descending bank at river miles 708 to 713.

This site features a reopened side channel with control structures at the inlet, outlet and middle of the site. Due to the current configuration of the river, it was necessary to install a pump at the upstream end to maintain water flowing through the site. The Iowa Department of Natural Resources manages this area.

### Hamburg Bend, Nebraska

The Hamburg Bend mitigation site is located at river miles 552 to 556 on the right descending bank, just south of Nebraska City, Nebraska. The site consists of 1,544 acres of side channels and backwater areas that mimics the historic meander belt of the floodplain. The increase in numbers and variety of fish at this location shows that excellent habitat has been created at this site.

The mitigation at Hamburg Bend was completed in 1996. The site is managed by the Nebraska Games and Parks.



*Aerial view of the meandering floodplain and chutes at Hamburg Bend, NE*

### **Kansas Bend, Nebraska**

Kansas Bend consists of 1,056 acres in two separated areas on the right descending bank at river miles 544 to 547. It is located near Peru, Nebraska. The plans and specifications for the construction contract are being prepared. It is anticipated the construction will start at this site in late summer 2002.

### **Langdon Bend, Nebraska**

The Langdon Bend mitigation site is located at river miles 520 to 532 on the right descending bank near the town of Brownsville, Nebraska. The site consists of 921 acres of former agricultural land. At this site, a 10-foot bottom width pilot channel and backwater area was constructed. The channel is connected to the river at the outlet, but stops before meeting the river at the upstream end. Flow into this area will occur by water backing up the channel and will allow overland flow at the times when the Missouri River is at high water.



### **Tobacco Island, Nebraska**

Tobacco Island is located south of Plattsmouth, Nebraska at river miles 586 to 590 on the right descending bank of the river. The site consists of 1,604 acres of former agricultural land.

The mitigation at this site included reopening an old side channel and reconnecting it with the river. The mitigation has created additional shallow water aquatic habitat. The channel is three miles long with a 10-foot bottom width. Construction of the site has just been completed.

## **OPERATION AND MAINTENANCE (FY01 and Prior)**

The Corps of Engineers will fund the operation and maintenance (O&M) of the mitigation features acquired and developed under this Project. The O&M will continue for the life of the project. For the mitigation which has occurred on properties not owned by the Corps of Engineers, O&M will only be conducted on those portions of the property in which mitigation occurred. In most instances, the funds are forwarded to the land owner to fund the effort by their existing crews.

The fish and wildlife agencies of the four affected States have expressed an interest in administering the areas that are acquired and developed. Responsibilities and the degree of operation and maintenance will be documented through an agreement with each State for each site. Funding for operation and maintenance will be requested annually through the normal budget process, as part of the Missouri River Bank Stabilization and Navigation Project. The estimated total cost for operation and maintenance of the original mitigation project (WRDA 86 authorization) was \$625,000, with \$374,000 in CENWK and \$251,000 in CENWO.

An operation and maintenance agreement will be developed during the construction phase for each site. Eventually these operation and maintenance agreements may be consolidated into one operation and maintenance manual for each affected State. The operation and maintenance agreements (manuals) will define the entity that will do the maintenance, the degree of CENWK and CENWO responsibility, operation and maintenance requirements and schedules, procedures for operation and maintenance, funding levels, and any additional requirements. Any funding provided to the States or the USFWS from the Corps will be requested on an annual basis via an Annual Management Plan.

As of September 30, 2001, there were 27 mitigation sites that have been established. 10 of these sites have not had any O&M performed on them to date. There are seven sites which have had habitat developed or preserved and are now considered to be in an O&M phase. In addition, there are 10 sites that have not been placed into an "O&M" status, but there are O&M responsibilities on the property, such as weed control, etc. Typically, these sites are either waiting for funds or additional lands to be purchased prior to habitat development. The status of the O&M of all mitigation sites are described in Table 12, 13, 14, and 15 for the States of Missouri, Kansas, Iowa and Nebraska, respectively.

**TABLE 12**

**OPERATION AND MAINTENANCE FOR  
MITIGATION SITES WITHIN THE STATE OF MISSOURI**

Site	Current Funding	Description of O&M	Responsible Party
Berger Bend	CG	Habitat preservation	COE
Columbia Bottom	CG	None (to be started in FY04)	MDC
Deroin Bend	CG	None (to be started in FY03)	MDC
Eagle Bluffs	CG	None (to be started in FY03)	MDC
Grand Pass	O&M	Management and surveillance of the constructed chute (no cost to date due to ag leasing program)	MDC
Hemmes Bend/Corning Site	CG	None (to be started in FY06)	COE
Lower Hamburg	CG	Land management, tree planting, existing habitat preservation	MDC
Nishnabotna	CG	Land management, existing habitat preservation	MDC
Overton Bottoms North	CG	Native grass and tree plantings, weed control, surveillance of constructed chute, signage	USFWS
Overton Bottoms South	CG	Basic land management (no cost to date, ag leasing program)	MDC
Rush Bottom Bend	CG	None (to be started FY06)	MDC
Tate Island	O&M	Habitat preservation, signage	MDC
Thurnau	CG	Land management, weed control	MDC
Worthwine Island	CG	None (to be started FY04)	MDC

**TABLE 13**

**OPERATION AND MAINTENANCE FOR  
MITIGATION SITES WITHIN THE STATE OF KANSAS**

Site	Current Funding	Description of O&M	Responsible Party
Benedictine Bottoms	O&M	Wetland management, infiltration control, tree planting, weed control	KDWP

**TABLE 14**

**OPERATION AND MAINTENANCE FOR  
MITIGATION SITES WITHIN THE STATE OF IOWA**

Site	Current Funding	Description of O&M	Responsible Party
Auldon Bar	CG	Land management and habitat preservation	Iowa DNR
Blackbird-Tieville-Decatur Bend	CG	None (to be started in FY04)	COE
California Bend	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation.	Iowa DNR
Copeland Bend	CG	Land management and habitat preservation.	Iowa DNR
Louisville Bend	O&M	Maintain all structures, fences, signs and roadways. Provide law enforcement. Land management and habitat preservation. Pump maintenance.	Iowa DNR
Noddleman Island	CG	Land management and habitat preservation.	Iowa DNR
Winnebago Bend	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation. Pump maintenance.	Iowa DNR

TABLE 15

OPERATION AND MAINTENANCE FOR  
MITIGATION SITES WITHIN THE STATE OF NEBRASKA

Site	Current Funding	Description of O&M	Responsible Party
Blackbird-Tieville-Decatur Bends	CG	None (to be started in FY04)	COE
Hamburg Bend	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation.	Ne G&P
Kansas Bend	CG	None (to be started in FY04)	COE
Langdon Bend	CG	Maintain all structures, fences, signs and roadways. Land management and habitat preservation.	COE
Tobacco Island	CG	None (to be started in FY04)	COE

## **MONITORING AND EVALUATION (FY01 and Prior)**

Because many of the mitigation features of this project will be constructed as opposed to created naturally over time, it is important to complete monitoring and evaluation (M&E). During the design phase, specific goals and objectives will be determined for each site and monitoring criteria for meeting these objectives will be established. After construction, M&E will be conducted on the various aspects of each site in order to assess the degree of success of the habitat development.

The originally authorized project envisioned monitoring and evaluation to be a low cost effort. \$300,000 was included in the budget for baseline evaluations and monitoring.

Some of the monitoring criteria will utilize habitat-based procedures such as Missouri's Wildlife Habitat Appraisal Guide (WHAG) or Aquatic Habitat Appraisal Guide (AHAG). These procedures can be customized for each state's specific habitat, as needed, and may be complimented by additional monitoring procedures. For example, if one of the objectives of a development site is to increase migratory waterfowl habitat, monitoring may best be done by WHAG and complimented by photographs. Other objectives may be too specific for use of WHAG or AHAG and may require other monitoring procedures. These will be determined on a case-by-case basis.

Monitoring by WHAG will be done by utilizing team with representatives from the Corps, State, and FWS. Other monitoring activities will be coordinated as needed. Monitoring results will be reported annually on some sites and after several years on others, depending on the objectives of the development site. Project performance will be reported in future Annual Implementation Reports.

### FUNDING (FY01 and Prior)

As of 30 Sep 01, the only funds budgeted for this project were based upon the WRDA86 authorized 48,100 acres. It is required that the proper NEPA and decision documentation be completed prior to the Corps being able to budget for and request funds on the modified project. Therefore, the funding amounts for FY01 and Prior are based upon the original authorized WRDA86 project only.

The original WRDA86 authorized project divided the funding up into broad categories: Land Acquisition; Planning, Engineering and Design; Habitat Development; Construction Management; and O&M During Construction costs. Construction, General funds began to be provided in Fiscal Year 1992. From FY92 through FY01, the Corps has spent a total amount of \$62,295,000 on the mitigation efforts to date. Table 16 gives a breakdown of costs expended by category.

**TABLE 16**  
**BREAKDOWN OF TOTAL COSTS TO DATE**  
**(AS OF 30 SEP 01)**

Cost	CENWK	CENWO	TOTAL	% of Total Cost
Land Acquisition	\$18,308	\$11,760	\$30,068	48
Planning, Engineering, and Design	6,554	4,539	11,093	18
Habitat Development	7,061	10,917	17,978	29
Construction Management	974	1,130	2,104	3
O&M During Construction	428	624	1,052	2
<b>TOTAL</b>	<b>\$33,325</b>	<b>\$28,970</b>	<b>\$62,295</b>	<b>100</b>

NOTE: Amounts shown are in 1,000s

## CURRENT MITIGATION EFFORTS FY02

### REAL ESTATE (FY02)

As of September 30, 2001, there remains a total of 4,985 acres of non-public land authorized for purchase under WRDA86. During FY02, the Corps will undertake several efforts to purchase additional land from non-public owners. This includes 702 acres in Missouri, 239 acres in Kansas, 3,909 acres in Iowa, and 135 acres in Nebraska. In the Kansas City District, efforts to purchase non-public lands will concentrate on Monkey Mountain and Hemmes Bend/Corning Site in Missouri. If acquisitions fail at these two locations, then efforts will be shifted to the Teteseau Lake site adjacent to Grand Pass Conservation Area in Missouri. Additional acquisitions are desired at Berger Bend, Rush Bottom Bend, and Thurnau, but efforts are currently held up pending willing sellers. In the Omaha District, real estate efforts will focus on purchasing additional non-public lands at the Hamburg Bend and Tobacco Island sites in Nebraska and at Copeland Bend in Iowa.

As of September 30, 2001, all easements, etc. on public lands for habitat development have been completed in Kansas, Iowa, and Nebraska. In Missouri, there remains an amount of 12,419 acres of existing public land authorized for habitat development under WRDA86. In FY02, easements will be sought on 4,369 acres of existing public lands owned by Missouri Department of Conservation. These easements will allow habitat development efforts to continue at the Columbia Bottom and Rocheport Cave sites. Additionally, an easement will continue to be pursued with the tribe at Blackbird Bend.

WRDA99 increased the authorized acres to be purchased for this project by 118,650 acres. However, prior to completing any acquisitions under this authorization, a Supplemental Environmental Impact statement must be completed. The Supplemental EIS will be completed in early FY03. In advance of issuing the Record of Decision for the Supplemental EIS, the Corps intends to begin willing seller surveys for the additional land authorized. Two separate efforts will be started in FY02, one in Omaha District and one in Kansas City District. The willing seller effort will be coordinated with the affected States in order to update areas of priority. Surveys will then concentrate on priority areas and those believed to be the best chance of success.

In FY02, the Corps has budgeted \$2,250,000 for real estate activities.

## **HABITAT DEVELOPMENT (FY02)**

In FY02, the Corps of Engineers has \$7,984,000 budgeted for habitat development. This includes \$1,000,000 for engineering and management activities and \$6,984,000 for construction. The following is a summary of habitat development activities to be completed by site.

**Columbia Bottom, MO** – Phase II design to complete wetland development at the site is underway. The design and plans and specifications will be completed in FY02. A value engineering study will be completed and a construction contract will be awarded in FY02. The construction will extend into FY03. The current working estimate for Phase II of the project is \$6M. Also at this site, the construction contract for Phase I, levee setback project, will be completed in the spring of FY02.

**Deroin Bend, MO** – A construction contract was awarded in FY01 to complete re-opening the closed side channel at this mitigation site. The contract will finish in FY02. The Corps will be looking to turn this project over to the Missouri Department of Conservation for their O&M starting in FY03.

**Eagle Bluffs, MO** – A construction contract for this site was awarded in FY01 and will be completed in FY02. The site is will be made operational this year and turned over to MDC for O&M beginning in FY04. The current working estimate for this project is \$2.4M.

**Lower Hamburg, MO** - Plans and Specifications for construction of a chute are completed. The project is scheduled for FY04 Construction, but may move forward into FY03. The boundary of the mitigation site is currently being surveyed and marked. The boundary survey is scheduled to be completed in FY02. The current working estimate for the project is \$3.5M.

**Overton Bottoms North, MO** – The Corps will continue to monitor the chute development at this site. Coordination with USFWS and MDC will continue to allow access to the MDC property around Taylor's landing. Deeping the chute to accommodate shallow water habitat may be completed as funding and weather permit during FY02.

**Overton Bottoms South, MO** – A construction contract for this site was awarded in FY01 and will be completed in FY02. The site will be made operational this year and turned over to MDC for O&M beginning in FY03. The current working estimate for this project is \$930K. Also at this site, the Corps of Engineers will begin efforts to fund and construct a maintenance building.

**Rocheport Cave, MO** – The mitigation at this site is scheduled for contracting in Jan 02. Construction is being targeted for summer 02, after nesting season for endangered bats. The design will be completed by Corps of Engineers and MDC personnel. The current working estimate is \$75K.

**Worthwine Island, MO** –\*The design to re-open a historic chute is currently underway. The design contract to URS will be completed in FY02. Time and funds permitting, the plans and specifications for this project may be started in FY02. The current working estimate for the project is \$3.5M.

**Blackbird-Tieville-Decatur Bends, IA and NE** – Plans and specifications are scheduled to be completed on the Tieville-Decatur bends portion of this site. A construction contract will be advertised and awarded in FY02 for the work to start. The contract will extend into FY03.

**Louisville Bend, IA** – This site is completed, but we have to modify the inlet structure and build the middle dike. Our planned modification of the inlet and middle dike will be awarded in Jan 02.

**Langdon Bend, NE** – The plans for the improved access road and parking area are complete. This project will be completed as funding and weather permit during FY02.

**Kansas Bend, NE** – Plans and specifications are scheduled to be completed at the Kansas Bend mitigation site in FY02. A construction contract will be advertised and awarded in FY02 for the work to start. The construction will extend into FY03.

## **OPERATION AND MAINTENANCE (FY02)**

In FY02, the Corps of Engineers has budgeted \$510,000 of Construction, General (CG) funds for O&M activities during construction. These funds will be spent primarily on basic land management, habitat preservation, tree plantings, weed control, and signage at the following mitigation sites: Berger Bend, MO; Lower Hamburg, MO; Nishnabotna, MO; Overton Bottoms North, MO; Overton Bottoms South, MO; Thurnau, MO; Auldon Bar, IA; Copeland Bend, IA; Noddleman Island, IA; and Langdon Bend, NE.

O&M funds for several mitigation sites that are complete and in an "O&M phase are not included in the amount shown above. This includes maintaining constructed structures, pumps, fences, signs and roadways. Also covered are land management activities such as habitat preservation, wetland and infiltration control, habitat preservation, tree planting, and weed control. This effort will continue during FY02 at the Grand Pass, MO; Tate Island, MO; Benedictine Bottoms, KS; California Bend, IA; Louisville Bend, IA; Winnebago Bend, IA; and Hamburg Bend, NE.

## **MONITORING AND EVALUATION (FY02)**

Because many of the mitigation features of this project will be constructed as opposed to created naturally over time, it is important to complete monitoring and evaluation (M&E). During the design phase, specific goals and objectives will be determined for each site and monitoring criteria for meeting these objectives will be established. After construction, M&E will be conducted on the various aspects of each site in order to assess the degree of success of the habitat development.

Specific M&E efforts will be conducted at several mitigation sites during FY02. A three-year fisheries study performed under contract with the State of Nebraska will be completed in FY02. Project reviews will be performed at the Grand Pass, Benedictine Bottoms, and Overton Bottoms mitigation sites. USFWS studies on song birds and turtles will be funded at the Overton North site. Additionally, M&E efforts for shallow water habitat will be organized and proposed to the USFWS during FY02.

## **SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (FY02)**

An Environmental Impact Statement for the Fish and Wildlife Mitigation project was filed with US EPA on December 23, 1982. This effort was completed for the original 48,100 acres authorized under WRDA86. In the Water Resources Development Act of 1999, the Missouri River Fish and Wildlife Mitigation Project was reauthorized to include an additional 118,650 acres of land to be purchased from willing sellers on which to develop, restore or enhance fish and wildlife mitigation sites. A Draft Supplemental Environmental Impact Statement (DSEIS) will be completed prior to project purchase or habitat development on the additional acres.

A public scoping effort is scheduled to be completed during FY02. The purpose of the public scoping process was to request ideas and comments on how the 188,650 additional acres will be acquired and developed for the project. Comments are being sought from Native American tribes, the general public, organizations, and government agencies. There are nine public scoping meetings planned. They are to be held at different locations along the Missouri River to allow interested parties the maximum chance to attend in person. All meetings are to be held in an open house format to encourage one on one dialogue.

A pre-draft SEIS document will be produced for agency coordination team review prior to issuing the draft document for public comment. The pre-draft should be available in March, 2002. The draft SEIS is scheduled to go to public comment in April, 2002. The final SEIS is scheduled to be out for public comment in September, 2002, and the final Record of Decision is scheduled to be issued in early FY03. The Corps of Engineers is utilizing an AE firm to complete the SEIS effort.

## FUNDING (FY02)

The Fish and Wildlife Mitigation project received an amount of \$10,744,000 in FY02. The Corps has funded \$M through FY02 for the project. A breakdown of funding for FY02 activities is presented in Table 17. The total amount of funds provided to through FY02, broken down by task, is given in Table 18.

**TABLE 17**  
**BREAKDOWN OF FUNDING FOR FY02 ACTIVITIES**

Task	CENWK	CENWO	TOTAL
Land Acquisition	\$1,500	\$750	\$2,250
Planning, Engineering, and Design	1,000	0	1,000
Habitat Development	2,595	3,689	6,284
Construction Management	200	500	700
O&M During Construction	250	260	510
<b>TOTAL</b>	<b>\$5,545</b>	<b>\$5,199</b>	<b>\$10,744</b>

NOTE: Amounts shown are in 1,000s

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## **FUTURE MITIGATION EFFORTS FY03 TO COMPLETION**

### **REAL ESTATE (FY03 to completion)**

At the conclusion of FY02, the amount of non-public land purchased in Missouri, Kansas, and Nebraska will be at or very near the amount authorized under WRDA86. There will be a significant portion of land still authorized under WRDA86 for purchase in Iowa. It is hoped that a concerted effort to inform the public of the project and the update of the willing seller surveys may produce additional willing sellers in the State of Iowa. As willing sellers in Iowa come forward, acquisitions of their properties will be of top priority.

At the conclusion of FY02, the amount of habitat developed on existing public lands in Kansas, Iowa, and Nebraska will be at or very near the amount authorized under WRDA86. There will be a significant portion of existing public land authorized under WRDA86 for habitat development in the State of Missouri. During FY03 and beyond, the Corps will continue to work with Missouri Department of Conservation and the USFWS to identify existing public lands in Missouri in which mitigation projects can be implemented.

WRDA99 increased the authorized acres to be purchased for this project by 118,650 acres. During FY03, approval to commence acquisitions under this authorization is expected. The Corps of Engineers will be working with the States on completing any final willing seller survey actions and begin negotiating with new sellers. If funds are provided, it is anticipated that the acquisition effort will last for many years.

### **HABITAT DEVELOPMENT (FY03 to completion)**

If funds are provided in FY03, the habitat development that had been started in FY02 will continue to completion. This will be at the Columbia Bottom, MO; Kansas Bend, NE; and Blackbird-Tieville-Decatur Bends, IA & NE mitigation sites. The Corps should continue to adaptively manage the constructed chute at Overton Bottoms North. Additionally, it is anticipated that funds will be provided to begin habitat development at Lower Hamburg, MO; and Worthwine Island, MO mitigation sites. Finally, due to increased pressure from resource agencies, there should be a significant amount of within river structural modifications to create shallow water habitat as directed by the Biological Opinion.

In FY03, it is anticipated that the Corps of Engineers will complete the SEIS and decision documents necessary to begin acquisition and development of the additional 118,650 acres

authorized under WRDA99. However, until the SEIS has been completed, the method of habitat development may change from that which is currently occurring. For instance, there may be a priority placed upon habitats for endangered species over all other habitats. It is currently too early in the SEIS process to predict where or how habitat development will be achieved in FY03 and beyond. The Corps will comply with the SEIS document and future Annual Implementation Plans will address future plans for habitat development.

#### **OPERATION AND MAINTENANCE (FY03 to completion)**

If funds are provided in FY03 to completion of the project, the Corps of Engineers will be establishing many new mitigation sites. As is current practice, the States will be asked to provide annual management plans in order to receive Federal funds for maintenance of constructed features of this project. O&M of the mitigation sites will remain 100% Federal funded.

#### **MONITORING AND EVALUATION (FY03 to completion)**

It is anticipated that the SEIS will call for a detailed Monitoring and Evaluation (M&E) effort to be funded by the modified mitigation project. The M&E effort will be used to support adaptive management of established mitigation sites. If funds are provided in FY03, it is anticipated that an M&E plan will be started. Participation of the States and USFWS is considered essential to understanding and agreeing upon adaptive management needed to keep established mitigation sites healthy and productive. Provided future funds are provided to the project, the M&E program will be established and maintained to assure our collective best effort is made to creating the correct habitats in the correct places.

#### **SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT (FY03 to completion)**

If funds are provided in FY03, the SEIS process should finish in November, 2002. This should clear the way for additional acquisitions and habitat development for the additional 118,650 acres authorized by WRDA99. As is current practice, each mitigation site will need to have a site specific Environmental Assessment completed prior to habitat development.

#### **FUNDING (FY03 to completion)**

In Spring of 2001, the Corps began forwarding a Cost Report to the US Congress. The Cost Report gave a cost estimate of the amount of funds needed to complete mitigation of 118,650 acres. As of this writing, this report has not reached Congress. The report is at the Office of Management and Budget (OMB) for review. Therefore, this report is not public yet. Future Annual Implementation plans will reflect future cost levels approved for the project.

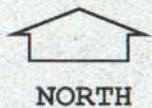
**APPENDIX 1  
SITE LOCATION MAPS**

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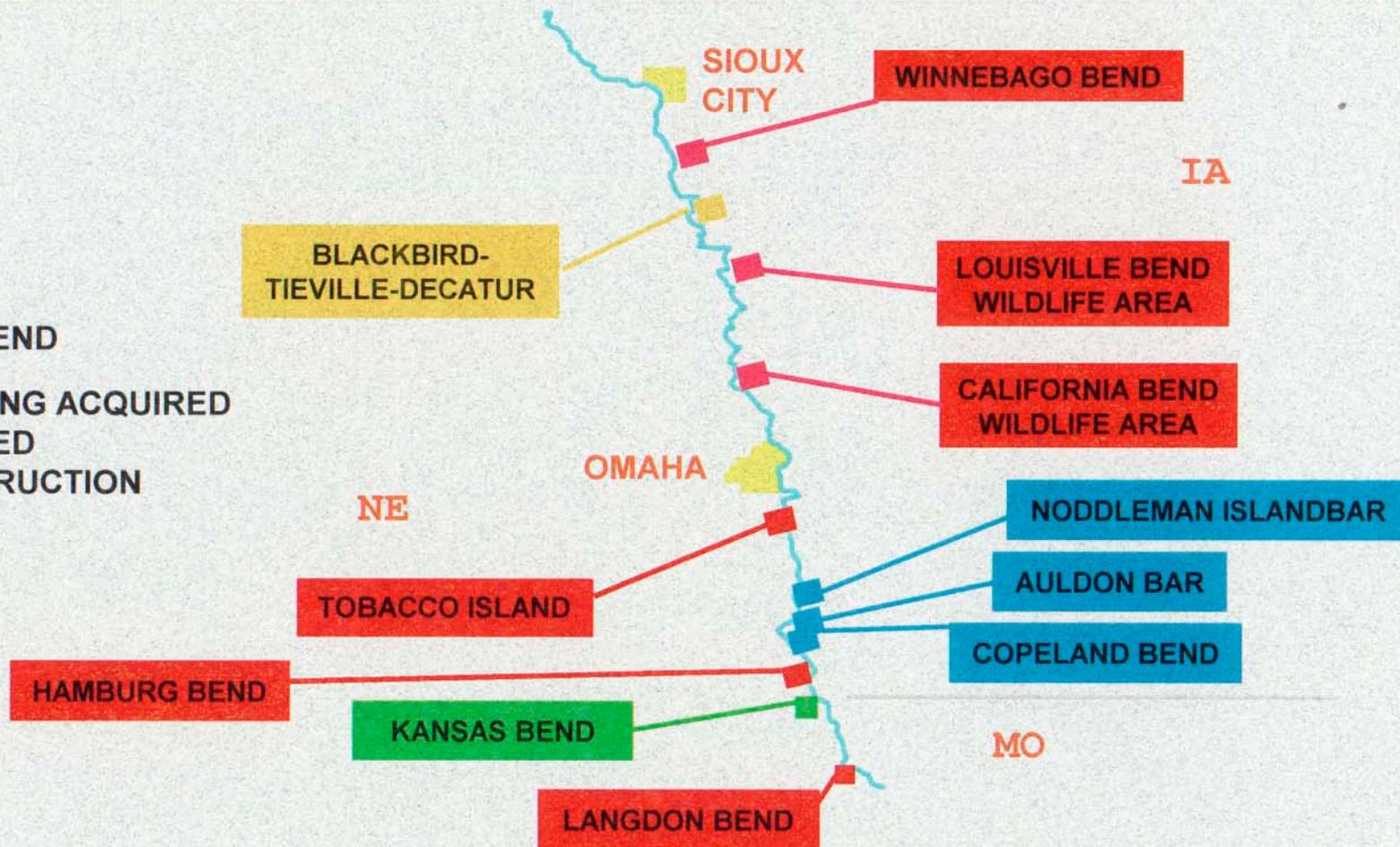
# Missouri River Fish & Wildlife Mitigation

IA & NE SITES



## SITE LEGEND

- ACQUIRED, BEING ACQUIRED
- BEING DESIGNED
- UNDER CONSTRUCTION
- COMPLETED

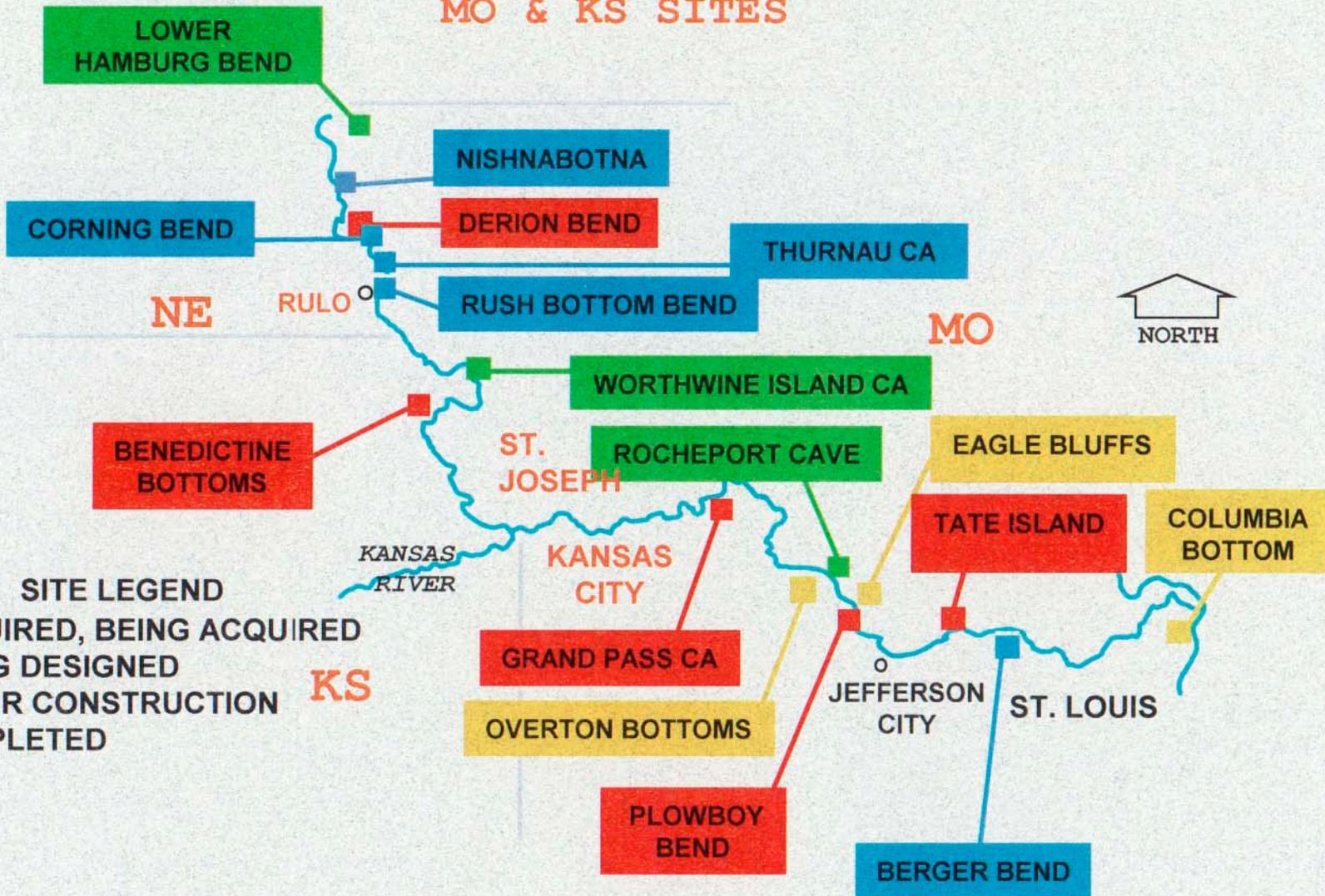


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# Missouri River Fish & Wildlife Mitigation

MO & KS SITES



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US Army Corps  
of Engineers <sup>®</sup>

**US Army Corps of Engineers**  
**Kansas City District**  
**601 East 12<sup>th</sup> Street**  
**Kansas City, Missouri 64106**  
**816-983-3324, Fax: 816-426-6356**

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## **APPENDIX C**

List of Requirements from the Biological Opinion  
(Table 24: Summary of Reasonable and Prudent Alternative, Reasonable and Prudent Measure to Minimize Take, and Conservation Measures)

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## **Reasonable and Prudent Alternative**

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### **Actions Applicable for Multiple Listed Species in Ecosystem**

#### **I. Adaptive Management**

##### **I.A) Establish an Agency Coordination Team (ACT)**

**Implementation Date:** March 2001

##### **I.A.1) Coordination Meetings**

**Implementation Date:** Twice a year

##### **I.B) Develop Endangered Species Monitoring Plan**

**Implementation Date:** Within 1 Year

##### **I.C) Annual Report**

**Implementation Date:** Annually

#### **II. Flow Enhancement**

##### **II.A) Gavins Point Dam:**

**Implementation Date:** Once every 3 years/start 2003

**II.A.1) Spring Rise: 17.5 Kcfs above full service for 30 days between  
1 May – 15 June**

**Summer Low: flows stepped down to 25 Kcfs by June 21 held until  
July 15**

**July 15 flows stepped down to 21 Kcfs and held until August 15**

**August 15 flows stepped up to 25 Kcfs and held until September 1.**

##### **II.B) Fort Peck Dam**

**Implementation Date:** 2001

**1) Implement mini-test**

**2) Implement full test**

**Implementation Date:** 2002

**3) Implement full enhancement flows, modified based on test**

**Implementation Date:** 2003, once every 3 years

## **II.C) Other Segments**

**Implementation Date:** 2005

Investigate the applicability of flow enhancement at Garrison Dam, implement if applicable

## **III. Unbalanced Intrasystem Regulation**

**Implementation Date:** 2001

## **IV. Habitat Restoration/Creation/Acquisition**

### **IV.A) Restoration of Submerged Shallow Water Habitat (restoration of 19,565 total acres)**

**Implementation Date:**

- 1) Ensure no-net-loss of existing shallow water habitat from O&M in lower river.
- 2) Develop habitat restoration plans and strategies in segments 10 through 16  
2001
- 3) Implement habitat restoration plans and strategies  
2002
- 4) Continue implementation of habitat restoration plans and strategies  
2003
- 4) Reached 8% (1,700 acres) aquatic shallow water habitat goal  
2004
- 5) Reached 10% (2,000 acres) aquatic shallow water habitat goal  
2005
- 6) Reached 30% (5,870 acres) aquatic shallow water habitat goal  
2010
- 7) Reached 60% (11,739 acres) aquatic shallow water habitat goal  
2015
- 8) Reached 100% (19,565 acres) aquatic shallow water habitat goal  
2020

### **IV.B) Restoration of Emergent Sandbar Habitat**

**1) Provide natural sandbar habitat complexes.**

**a) Minimum emergent interchannel sandbar habitat acres per river mile:**

Garrison (25 acres) Fort Randall (10 acres) L&C Lake (40 acres) Gavins Point (40 acres) **Implementation Date:** 2005

Point (80 acres) Garrison (50 acres) Fort Randall (20 acres) L&C Lake (80 acres) Gavins Point (80 acres) **Implementation Date:** 2015

**b) Complete 1998 baseline habitat evaluations on Fort Peck River (Segment 2)**

**Implementation Date:** 2003

**c) Meet minimum baseline acres on Fort Peck River (Segment 2)**  
**Implementation Date: 2015**

**2) Provide Reservoir beach and island habitat.**

**a) Maintain reservoir habitats through intra-system regulation**  
**Implementation Date: 2001**

**b) Identify all potential habitat enhancement on reservoir segments  
(Segments 1,3, 5)**  
**Implementation Date: 2005**

**c) Complete 25% of reservoir projects identified above**  
**Implementation Date: 2010**

**d) Complete 50% of reservoir projects identified above**  
**Implementation Date: 2015**

**e) Complete 100% of reservoir projects identified above**  
**Implementation Date: 2020**

**3) Artificial or Mechanically Created Habitat**

**a) Provide created sandbar habitat on Segments 2, 4, 8, 9, 10 to  
supplement B1 above.**  
**Implementation Date: 2001, continuing**

**b) Initiate studies of the lack of sediment transport and impacts on  
habitat regeneration and turbidity**  
**Implementation Date: 2003**

**c) Monitoring of tern and plover nesting habitat**  
**Implementation Date: Once every 3 years**

**Elements Applicable to Specific Species**

**V. Least Tern and Piping Plover**

**V.A) Operate the Kansas river to provide overall benefits to conservation of least  
terns and piping plovers**  
**Implementation Date: 2001**

**1) Develop a Study Plan**  
**Implementation Date: 2002**

**2) Gather data and evaluate whether Kansas River provides source or sink. Implementation Date: 2005**

**B) Provide habitat to meet or exceed fledge ratio goals of 0.70 for least terns and 1.13 for piping plovers**

**Implementation Date: 2001 (3 year average)**

**C) Initiate and conduct a piping plover foraging ecology study on the Missouri River.**

**Implementation Date: 2005**

## **VI. Pallid Sturgeon**

**A) Support, assist, and increase pallid sturgeon propagation and augmentation efforts.**

**Implementation date: 2001 - 2011**

- 1) Collect and spawn female broodstock
- 2) Goal – produce 4,700 juvenile to 1 – year olds (Corps responsibility 2,973)
- 3) Production, rearing and release of juvenile fish
- 4) Monitor stocked juvenile pallid sturgeon
- 5) Meet annually through ACT

**B) Conduct pallid sturgeon population assessment including habitat parameters.**

**Implementation date: 2001**

**1) Identify the causes for the lack of reproduction and recruitment, causes for hybridization, and identify restoration actions.**

**Implementation date: begin 2001**

**2) Identify and map spawning habitat.**

**Implementation date: Implement strategy by 2001 to conduct mapping by 2002.**

**3) Channel training structure maintenance.**

**Implementation date: Coordinate construction activities with the Service and affected State agencies**

**4) Prioritize research needs.**

## Reasonable and Prudent Measures to Minimize Take

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### Bald Eagle

**Measure 1:** Map and evaluate current health of cottonwood forests on Missouri River.

Terms and Conditions:

Complete within 2 years of final BO.

- a. Identify stands with periodic flooding
- b. Determine baseline mortality and tree vigor
- c. Monitor every 2 years for first 4 years, then every 5 years after that.

**Measure 2:** Develop management plan for cottonwood regeneration.

Terms and Conditions: Complete & implement within 2 years of completion of measure 1 above.

**Measure 3:** Implement actions to ensure no more than 10% eagle habitat is lost.

### Terns and Plovers

**Measure 1:** Monitor all tern and plover nesting sites on Missouri and Kansas Rivers

Terms and Conditions: Annually and report in the annual report

Measure 1.2. Monitoring information

Terms and Conditions: Annually

**Measure 2:** Compile and evaluate the previous impacts to take from:

1. Daily and hourly release fluctuations below dams
2. Changes in releases due to maintenance or other isolated causes
3. Changes in releases to prevent downstream flood impacts

Terms and Conditions: Submit report by January 2002 of the impacts to take resulting from historic operational changes (1986 – 2000). To include protocols to prevent historic cases of take from reoccurring.

**Measure 3:** The Corps shall continue to evaluate operational changes to avoid take.

Terms and Conditions: Avoid operational caused flooding and spiked releases.

Report all documented incidental take immediately to the Service.

Coordinate regularly through the ACT to ensure proposed operations will avoid take. If take is unavoidable—take shall be consistent with incidental take statement.

The Corps will reconsult with the Service if the Corps develops new operational scenarios not considered during initial consultation.

**Measure 4:** The Corps shall follow the "Contingency Plan for Protection of Least Tern and Piping Plover Nests and Chicks" and the "Captive Rearing Protocol".

Measure 4.1. Continue captive rearing program, coordinate with Service  
Terms and Conditions: Any changes to protocol will be coordinated and approved by the Service.

Measure 4.2. Initiate a peer review on Captive Rearing Protocol.  
Terms and Conditions: Peer review every 5 years start in 2001.

Measure 4.3. Continue research into the effectiveness of the captive rearing program.  
Terms and Conditions: Report all captive rearing activities in the annual report.

**Measure 5:** The Corps shall implement public information and educational programs to increase public awareness and reduce disturbance to nesting sites.

**Measure 6:** The Corps shall implement aversive action to reduce predation on least tern.

### **Pallid Sturgeon**

**Measure 1:** The Corps shall evaluate and modify operational changes and maintenance activities to avoid take.

Terms and Conditions: Avoid operational changes that may affect spawning.

Report all documented incidental take immediately to Service.

Coordinate regularly through the ACT to ensure proposed operations will avoid take.

The Corps will reconsult with the Service if the Corps develops new operational scenarios not considered during initial consultation.

**Measure 2:** The Corps shall increase awareness of the pallid sturgeon on the Missouri River and develop support for recovery and conservation measures.

Terms and Conditions: Produce and distribute public service announcements for use in states bordering the Missouri River.

Project Offices shall incorporate pallid sturgeon conservation into public education efforts.

Within 1 year of the final BO, develop and implement an outreach program for pallid sturgeon.

Implement workshops every 3 years starting in 2001 to educate researchers and continue developing of handling Protocols.

## **Conservation Recommendations**

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### **Recommendations Applicable to Multiple Species**

- a. Develop a Recovery and Implementation Program.
- b. Document current and future water depletions.

### **Recommendations Applicable to Single Species**

#### **Bald Eagle**

1. Pursue the recovery tasks assigned in the implementation schedules.
2. Conduct or participate in wintering and nesting bald eagle surveys.
3. Determine population dynamic characteristics of wintering and nesting birds.
4. Protect and manage habitat.
5. Conduct public outreach on the value of river habitat to the bald eagles.
6. Protect, maintain and enhance riparian forest usable by bald eagles through the Section 10/404 permit authorities.

#### **Least Tern and Piping Plover**

1. Research connectivity or interchange between Missouri River least terns and least terns nesting on tributaries and other rivers.
2. Research connectivity or interchange between Missouri River piping plovers and plovers nesting in the Northern Great Plains.
3. Investigate the response of invertebrate production to operations as it applies to tern and plover survival, growth, and energetics.
4. Modify/eliminate development activities that negatively impact reproductive success or lead to habitat destruction.
5. Assess the feasibility of intensively managing a limited number of tern and plover breeding areas for high reproductive output.
6. Develop a population model of terns and plovers on the Missouri that predicts survival and long term population trends.
7. Investigate the role of sandbar complexes to migration, staging, and pre-wintering conditioning of terns and plovers.

8. Work with the Service and other partners to research and examine what impacts wintering ground activities have on long term survival.

### **Pallid Sturgeon**

8. Complete a feasibility study to identify and evaluate the effects of tributary dams and other structures on spawning migrations .
9. Implement Basin wide education and outreach programs for anglers.
10. Assist the Service and State with identifying impacts and extent of commercial harvest in the basin on pallid sturgeon.
11. Provide funding to continue development and conduct sturgeon genetic techniques to ensure genetic variation.
12. Provide funding to conduct Population Viability Analysis to determine appropriate recovery numbers.
13. Evaluate standard recommendations on placement and design of municipal and industrial intakes.
14. Evaluate standard recommendations on practices for channel dredging and sand and gravel mining.
15. Evaluate the cumulative effects of bank stabilization.
16. Evaluate capability and practicality of increasing water temperature in priority reaches during critical periods for native warm-water fish.
17. Participate as a partner in regional pallid sturgeon recovery work groups.
18. Provide funding to develop and validate a sturgeon aging technique.
19. Evaluate effects of severe rapid flow reductions or complete flow reductions on native fish below Ft Randall Dam.
20. Assist the Service and other partners with fish health issues as they relate to pallid sturgeon.
21. Assist the Service and other partners with cyropreservation banking of pallid sturgeon sperm.