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

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

March 31, 2006

Prepared By:
U.S. Army Corps of Engineers
Omaha District
Kansas City District
Summary

The Endangered Species Act (ESA) requires that the Corps of Engineers (Corps), in coordination with the appropriate resource agencies, 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. On November 30, 2000, formal consultation between the U.S. Fish and Wildlife Service (USFWS) 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 (BSNP), and Operation of the Kansas River Reservoir System” (BiOp). The 2000 BiOp concluded that 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 concluded that there would be an incidental take of bald eagles.

On November 2, 2003, the Corps submitted a Biological Assessment (BA) to the USFWS and requested reinitiation of formal consultation with the USFWS on the Operation of the Missouri River Main Stem System, Operation and Maintenance of the Missouri River BSNP, and Operation of the Kansas River Reservoir System. Reasons for submitting a new BA were based on new data on mortality of terns and plovers, the 2002 designation of critical habitat for the piping plover, and new information on Reasonable and Prudent Alternative (RPA) element II (Flow Enhancement). On November 10, 2003, the USFWS accepted the new BA and started formal consultation. In the BA, the Corps accepted most elements from the RPA in the November 30, 2000, BiOp but proposed replacing the element that required spring and summer flows. In addition, the Corps proposed a modified drought conservation plan, Gavins Point Dam summer releases, accelerated construction of shallow water habitat, pallid sturgeon hatchery improvements, accelerated pallid sturgeon brood stock collection, and adaptive management (including research, monitoring and evaluation, and flow tests).

The USFWS reviewed the Corps proposed actions, the new information, and the actions in the 2000 BiOp being implemented by the Corps and prepared an amendment to the 2000 BiOp (December 16, 2003) which concluded formal consultation of the proposed action. After reviewing the new and pertinent information, the USFWS concluded in the 2003 amendment the 2000 BiOp RPA, modified by the omission of flow changes and the addition of the proposed new RPA elements, will continue to avoid jeopardizing the continued survival and recovery of the interior least tern and the piping plover. However, since the proposed actions do not provide the more normalized hydrograph and temperature regime critical to pallid sturgeon, the USFWS concluded the Corps actions would continue to appreciably reduce the likelihood of both survival
and recovery of the species, thus jeopardizing the continued existence of the pallid sturgeon in
the wild.

In the 2003 amended BiOp, the USFWS recommended a new RPA with elements for the pallid
sturgeon, including old RPA elements agreed to by the Corps in their BA, plus the amended
elements and new additional RPA elements, Reasonable and Prudent Measures (RPM) to
minimize take/harm of the least tern, piping plover, and pallid sturgeon, and Conservation
Recommendations (CR) that would benefit the species. In order to be exempt from the
prohibitions of take under Section 9 of the ESA, the Corps must implement the elements of the
new RPA, along with any new actions proposed in the 2003 BA that are not modified by the
2003 amended BiOp and the remaining elements of the 2000 RPA that pertain to the least tern,
piping plover, and pallid sturgeon. This report documents results of Corps conservation
activities and progress in implementation of the elements of the RPA, RPM, and CR in the 2003

Corps conservation activities and progress in implementation of the elements of the RPA, RPM,
and CR in the 2003 amended BiOp for the calendar year 2004 include adaptive management,
unbalanced intrasystem regulation, habitat restoration/creation/acquisition, and species-specific
actions to preclude jeopardy. New elements proposed in the 2003 amendment to the BiOp
include feasibility and flow development, flow modification, Fort Peck temperature control
device feasibility, and habitat development (shallow water and flood plain habitat).

Adaptive management is a process that allows modification of management actions in response
to new information and changing environmental conditions. The Corps adopted the adaptive
element, an Agency Coordination Team (ACT) was established, the Corps continues to develop
a comprehensive threatened and endangered species monitoring plan, and this annual report,
which documents Corps actions to implement the BiOp, has been prepared.

The unbalanced intrasystem 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 3 lakes would have the cycle staggered so no 2
reservoirs were in the same stage of the cycle. This form of regulation benefits species in both
the lakes and the river reaches. The unbalancing of the 3 large upper reservoirs described in the
2004 Annual Operating Plan could not be implemented due to low Missouri River Main Stem
Reservoir System (System) storage.

In compliance with the habitat restoration/creation/acquisition element of the RPA in the 2000
BiOp and the 2003 amended BiOp, the Corps provided sandbar habitat in complexes of various
sizes through artificial or mechanical creation and also created shallow water habitat (SWH)
through modification of the river control structures, excavation, and dredging in 2004.
Approximately 227 acres of emergent sandbar habitat (ESH) were created in 2004. For SWH,
the Corps constructed over 800 modifications to river control structures for a distance of 625
river miles, excavated 6 pilot channels and 3 chutes, and dredged 4 backwater areas from March
through June of 2004. Through qualitative and quantitative assessments, the Corps estimated that a minimum of 1,320 acres of SWH were created from mid March through 30 June 2004.

Species-specific recommendations for the least tern and piping plover include determining the value of the Kansas River to benefit the birds, meeting recruitment goals, and conducting a piping plover foraging ecology study. Pallid sturgeon recommendations include propagation and augmentation support and conducting a pallid sturgeon population assessment on the Missouri River.

In 2004, the Corps contracted with Dr. Roger Boyd, of Baker University, to monitor interior least terns and piping plovers nesting on the Kansas River. Dr. Boyd has conducted the annual nesting season monitoring since 1998. Piping plover fledging success on the Kansas River for all known years averages 1.12 per pair with the last 5year average of 1.17 per pair. During the last 5 years, there have been between 2 to 4 pairs of piping plovers nesting on the Kansas River. Interior least tern fledging success on the Kansas River for all known years averages 0.39 fledglings per pair with an average over the last 5-years of 0.51 per pair. During the last 5 years, there have been between 6 and 19 pairs of interior least terns nesting on the Kansas River. In accordance with the Bi-Op, Kansas River production is included in the overall numbers for the Missouri River basin. Population monitoring data collected since 1998 will be utilized to identify whether the Kansas River provides a source or sink for the interior least terns and piping plovers.

The Corps continued to monitor tern and plover fledge ratios, as has been done for the last 13 years, on the Missouri River and 6 years on the Kansas River. The Missouri River fledge ratio goal for the piping plover was met in 2004 with a running 3-year average of 1.49. The Corps has exceeded the 5-year (2000-2004) fledge ratio 0.94 for least terns with a 5-year fledge ratio of 1.07 fledglings per adult pair.

The Corps Pallid Sturgeon Propagation and Augmentation Program is a partnering effort with state and Federal entities to increase production capabilities to meet the stocking needs of the pallid sturgeon. In 2004, the Pallid Sturgeon Propagation Team prioritized annual operational costs and needs for each facility to determine supplemental support to maximize success of the propagation program. Since the release of the 2000 BiOp, Federal and state hatcheries have been working cooperatively with the Corps to capture, hold, and spawn pallid sturgeon to meet recovery goals in each of the identified priority areas. Support by the Corps in 2004 for pallid sturgeon propagation and augmentation included supplies and materials assistance to Blind Pony State Fish Hatchery, Neosho National Fish Hatchery, the Gavins Point National Fish Hatchery, Garrison Dam National Fish Hatchery, Miles City State Fish Hatchery, and the Bozeman Fish Technology Center.

In 2004, the Pallid Sturgeon Population Assessment Program, developed by the Pallid Sturgeon Population Assessment Team, was partially implemented with 3 crews conducting assessment activities. The Pallid Sturgeon Population Assessment Team comprises representatives of state and Federal agencies and academia possessing knowledge and expertise of the Missouri River, pallid sturgeon, and statistics. The USFWS Great Plains Fish and Wildlife Management Assistance Office conducted assessment activities in the Fort Randall reach. The Nebraska
Game and Parks Commission sampled the Missouri River from the Platte River to the Kansas River and the USFWS’s Columbia Fishery Resource Office provided coverage from Glasgow, Missouri, to the mouth near St. Louis, Missouri.

Work under the feasibility and flow development and flow modification elements, as described in the 2003 amendment to the BiOp, was not conducted due to lack of adequate storage in the System due to drought. With regard to flow modifications from Fort Peck Dam, the proper National Environmental Policy Act (NEPA) documentation to conduct the “mini” and “full” tests was completed in 2004. These tests are designed to monitor the effects of higher spring releases and warmer water released from the Fort Peck spillway. Drought conditions resulted in lake levels too low to allow spillway releases for the “mini” test in 2004. Preliminary biological data collection is an essential component in determining the responses and effects of the “mini” and “full” tests on pallid sturgeon and the other species that have been selected for this project. The Data Collection Plan was initially implemented in 2001; thus, 2004 represents the fourth year of implementation. Research and monitoring components conducted during 2004 include: 1) quantifying spatial and temporal patterns of water temperature and turbidity at several sites in the Missouri River downstream from Fort Peck Dam in selected tributaries and in off-channel areas; 2) intensively sampling for pallid sturgeon in the Missouri River downstream from Fort Peck Dam; 3) examining flow and temperature-related movements of pallid sturgeon, shovelnose sturgeon, blue suckers, and paddlefish, 4) quantifying the spatial and temporal distribution and abundance of larval fishes; 5) targeted sampling for young-of-year sturgeon to assess reproductive success of pallid sturgeon and shovelnose sturgeon; and 6) examining behavior and drift dynamics of larval sturgeon in natural field settings.

The RPM efforts for the least tern and piping plover in 2004 included the continuation of nesting surveys, captive rearing of terns and plovers, evaluation and implementation of operational changes to avoid take, predator aversion efforts, a revised contingency plan for moving least tern eggs, and a comprehensive public outreach program for both birds.
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<th>Phrase</th>
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<tbody>
<tr>
<td>ACT</td>
<td>Agency Coordination Team</td>
</tr>
<tr>
<td>AOP</td>
<td>Annual Operating Plan for the Missouri River</td>
</tr>
<tr>
<td>BA</td>
<td>Biological Assessment</td>
</tr>
<tr>
<td>BSNP</td>
<td>Missouri River Bank Stabilization and Navigation Project</td>
</tr>
<tr>
<td>cfs</td>
<td>cubic feet per second</td>
</tr>
<tr>
<td>CR</td>
<td>Conservation Recommendations</td>
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<tr>
<td>Corps</td>
<td>U.S. Army Corps of Engineers</td>
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<tr>
<td>Acronym</td>
<td>Full Form</td>
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<tr>
<td>---------</td>
<td>-----------</td>
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<tr>
<td>CWA</td>
<td>Clean Water Act</td>
</tr>
<tr>
<td>CY</td>
<td>Calendar Year</td>
</tr>
<tr>
<td>ESA</td>
<td>Endangered Species Act</td>
</tr>
<tr>
<td>ESH</td>
<td>Emergent Sandbar Habitat</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GIS</td>
<td>Geographic Information System</td>
</tr>
<tr>
<td>MAF</td>
<td>Mean acre feet</td>
</tr>
<tr>
<td>MNRR</td>
<td>Missouri National Recreational River</td>
</tr>
<tr>
<td>MRNRC</td>
<td>Missouri River Natural Resources Committee</td>
</tr>
<tr>
<td>MRRIC</td>
<td>Missouri River Recovery Implementation Committee</td>
</tr>
<tr>
<td>msl</td>
<td>Mean sea level</td>
</tr>
<tr>
<td>MTFWP</td>
<td>Montana Department Fish, Wildlife and Parks</td>
</tr>
<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
</tr>
<tr>
<td>NGPC</td>
<td>Nebraska Game and Parks Commission</td>
</tr>
<tr>
<td>PgMP</td>
<td>Program Management Plan</td>
</tr>
<tr>
<td>RM</td>
<td>River Mile</td>
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<td>RPA</td>
<td>Reasonable and Prudent Alternative</td>
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<td>RPM</td>
<td>Reasonable and Prudent Measures</td>
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<td>SWH</td>
<td>Shallow Water Habitat</td>
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<td>USFWS</td>
<td>U.S. Fish and Wildlife Service</td>
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<tr>
<td>USDA</td>
<td>U.S. Department of Agriculture</td>
</tr>
<tr>
<td>USGS</td>
<td>U.S. Geological Survey</td>
</tr>
</tbody>
</table>
### Biological Opinion Table 24

**Summary of Reasonable and Prudent Alternative, Reasonable and Prudent Measures to Minimize Take, and Conservation Measures**

<table>
<thead>
<tr>
<th>Reasonable and Prudent Alternative</th>
<th>Implementation Objective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Adaptive Management</strong></td>
<td></td>
</tr>
<tr>
<td>A. Establish an Agency Coordination Team (ACT)</td>
<td>March 2001</td>
</tr>
<tr>
<td>1. Coordination Meetings</td>
<td>Twice a year</td>
</tr>
<tr>
<td>B. Develop Endangered Species and Habitat Monitoring Plan</td>
<td>Within 1 year</td>
</tr>
<tr>
<td>C. Annual Report</td>
<td>Annually</td>
</tr>
<tr>
<td><strong>II. Flow Enhancement</strong></td>
<td></td>
</tr>
<tr>
<td>A. Gavins Point Dam:</td>
<td></td>
</tr>
<tr>
<td>1. Spring Rise: 17.5 Kcfs above full service for 30 days between 1 May - 15 Jun</td>
<td>Once every 3 years/start 2003</td>
</tr>
<tr>
<td>Summer Low: flows stepped down to 25 Kcfs by June 21 held until July 15</td>
<td></td>
</tr>
<tr>
<td>July 15 flows stepped down to 21 Kcfs and held until August 15</td>
<td></td>
</tr>
<tr>
<td>August 15 flows stepped up to 25 Kcfs and held until September 1.</td>
<td></td>
</tr>
<tr>
<td>B. Fort Peck Dam</td>
<td></td>
</tr>
<tr>
<td>1. Implement mini-test</td>
<td>2001</td>
</tr>
<tr>
<td>2. Implement full test. Spring release between May and the end of June with:</td>
<td>2002</td>
</tr>
<tr>
<td>Range of flows 20 to 30 Kcfs, temperature(18 degrees C) at</td>
<td></td>
</tr>
<tr>
<td>Frazer, MT for a minimum of 3 weeks.</td>
<td></td>
</tr>
<tr>
<td>3. Implement full enhancement flows, modified based on test</td>
<td>2003, once every 3 years</td>
</tr>
<tr>
<td>C. Other Segments</td>
<td></td>
</tr>
<tr>
<td>Investigate the applicability of flow enhancement at Garrison Dam, implement if applicable</td>
<td>2005</td>
</tr>
</tbody>
</table>
III. Unbalanced Intrasytem Regulation

IV. Habitat Restoration/Creation/Acquisition

A. Restoration of Submerged Shallow Water Habitat (Goal: restoration of 19,565 total acres)
   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
   3. Implement habitat restoration plans and strategies
   4. Continue implementation of habitat restoration plans and strategies
   5. Reached 8% (1,700 acres) shallow-water habitat goal
   6. Reached 10% (2,000 acres) shallow-water habitat goal
   7. Reached 30% (5,870 acres) shallow-water habitat goal
   8. Reached 60% (11,739 acres) shallow-water habitat goal
   9. Reached 100% (19,565 acres) shallow-water habitat goal

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)
         Garrison (50 acres) Fort Randall (20 acres) L&C Lake (80 acres) Gavins Point (80 acres)
   b. Complete baseline habitat evaluations on Fort Peck River (Segment 2)
   c. Meet minimum baseline acres on Fort Peck River (Segment 2)
Introduction

The U.S. Army Corps of Engineers (Corps) prepares an annual report for interested parties in accordance with reporting requirements of the “Biological Opinion (BiOp) on the Operation of the Missouri River Main Stem System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project (BSNP), and Operation of the Kansas River Reservoir System” dated November 30, 2000 and the Amendment thereto dated December 16, 2003.

This annual report documents the Corps threatened and endangered species conservation activities to comply with the provisions of the 2000 BiOp and the 2003 Amendment to the BiOp for the calendar year (CY) 2004. Only those items that are required for CY 2004 or have been accelerated in the BiOp schedule are included. This report is formatted similar to Table 24 of the BiOp for the ease of cross-referencing.

Reasonable and Prudent Alternative

LEAST TERN & PIPING PLOVER (MULTIPLE SPECIES RPA)

I. Adaptive Management

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

I.A.1) Coordination Meetings

Coordination meetings are to be held annually in March and October. One formal ACT meeting was held December 15, 2004 in Fort Snelling, Minnesota. Attendees included U. S. Fish and Wildlife Service (USFWS) and Corps representatives. The purpose of the meeting was to provide an understanding of roles, responsibilities, and resources necessary to advance the ecological restoration of the Missouri River in 2005 and beyond.

Items of discussion at the ACT meeting included Shallow Water Habitat (SWH) and Emergent Sandbar Habitat (ESH) development, 2005 operation of the Missouri River, an overview of 2005 and 2006 priorities and project management schedules, Missouri River Recovery Implementation Committee (MRRIC) development, adaptive management and independent science review, research and monitoring plans, Kansas River 2005 determination, communication with the public, and additional long-term issues.

I.B) Endangered Species and Habitat Monitoring Program

The Corps is responsible for monitoring the biological resources and responses of threatened and endangered species to changes in the Missouri and Kansas Rivers’ operations, maintenance or habitat restoration projects. In its 2003 Amendment to the 2000 BiOp, the USFWS commended the Corps for implementation of a comprehensive least tern and piping plover monitoring program. The monitoring program is part of an
ongoing effort to understand the impact of river operations and the naturally varying flows of the Missouri River and its tributaries on the least tern and piping plover. The monitoring program was initiated in 1993, following the listing of these species as endangered in the mid-1980s. The program monitors least tern and piping plover nests and has documented their successes and failures. Monitoring is conducted by permanent and seasonal employees stationed at 8 Corps project offices along 750-plus miles of the Missouri River and its reservoirs from Fort Peck Lake in eastern Montana to Ponca State Park in northeastern Nebraska.

I.C) Annual Report

An annual report is to be provided to the USFWS by December 31 of each year. This document is for the period of January 1, 2004, through December 31, 2004.

II. Flow Enhancement

II.C) Other Segments

Through utilization of the adaptive management process, the Corps plans to investigate the applicability of flow enhancement at Garrison Project. Flow enhancement methodology will be implemented if it is determined to be beneficial.

III. Unbalanced Intrasytem Regulation


IV. Habitat Restoration/Creation/Acquisition

IV.A) Restoration of Submerged In-Channel Shallow Water Habitat in the Channelized River

See below for reporting on this element under heading “Pallid Sturgeon RPA, III. A, Restoration of Submerged In-Channel Shallow Water Habitat in the Channelized River”.

IV.B) Restoration of Emergent Sandbar Habitat (ESH)

IV.B.2) Reservoir Habitat

Due to increased use of Missouri River reservoirs by piping plovers, the Corps has assessed habitat use and availability to increase our understanding of the effects of management actions and water management on reservoir habitat on Lake Sakakawea, North Dakota. More discussion on reservoir habitat is located in “IV. D) Monitoring of Tern and Plover Nesting Habitat”.

2
IV.B.3) Artificial or Mechanically Created Habitat

Several methods were used to artificially or mechanically create ESH in 2004. Fort Randall Project Office utilized a tractor with a tiller attachment. Oahe Project Office overtopped an existing island with a more desirable surface. Gavins Point Project Office cleared vegetation off of 5 sandbars utilizing a helicopter applying herbicide. Two sandbar complexes were constructed below Gavins Point Dam in the fall of 2004 through late winter of 2005 at river miles 761.4 and 770. Several test plots for the pre-emergent herbicide, “Habitat”, were placed and data was collected. A study of the possibility of utilizing lime to alter the pH of the soil to discourage vegetation growth is also underway at the Gavins Point Project Office. Several test plots were established and data is being collected.

A total of approximately 231 acres of ESH were created in 2004. Approximately 8 acres of sandbar habitat were created at the Fort Randall Project. Two, 4-acre areas of sandbar habitat (depending on lake elevation) were created by the Oahe project. The Gavins Point vegetation removal effort cleared 135 acres of sandbar. The 2 sandbar construction projects below Gavins Point created over 80 acres of ESH (final quantities are not in for the site at RM 770).

Construction activities at Ponca State Park involved the removal of approximately 533,240 cubic yards of material using a hydraulic cutter-head dredge and disposing of the material within the Missouri River to create emergent sandbar habitat. The sandbar creation that occurred as a part of this project resulted in the creation of 3 emergent sandbars with a combined area of 37 acres. Successfully fledged from the constructed emergent sandbar complex were 23 piping plovers and 64 interior least terns. This made the Ponca sandbar complex the most productive interior least tern complex on the Missouri river in 2004.

IV.D) Monitoring of Tern and Plover Nesting Habitat

Reservoir Habitat Assessment

The construction and operation of dams along the Missouri River Main Stem has led to the shift of a significant portion of river habitat into reservoir shoreline. There is much research on riverine, alkali wetland, and coastal habitat characteristics as habitat but little on reservoir shorelines. Due to increased use of Missouri River reservoirs by piping plovers, the Corps has assessed habitat use and availability to increase our understanding of the effects of management actions and water management on the reservoir habitat on Lake Sakakawea, North Dakota. Habitat characteristics, including vegetation, substrate, and slope, were measured at nests to quantify the range of site characteristics. These same characteristics along transects within historic nesting sites were measured to: 1) evaluate habitat conditions in these areas, 2) assess whether these areas qualify as suitable for nesting, and 3) demonstrate the effects of reservoir fluctuation on habitat availability. Nest site characteristics reflected those in the literature having little vegetation, flat slope, and a consolidated mix of substrate particles. Habitat availability in historic areas varied
with elevation, and relatively small proportions of the shoreline possessed suitable slope and substrate. Additionally, vegetation has encroached in areas that have not been recently inundated. Future studies will be conducted to better define nesting habitat characteristics. This will allow refinement of habitat assessment protocols to capture the dynamic nature of habitat along reservoirs.

Elements Applicable to Specific Species

V. Least Tern & Piping Plover

V.A) Operate the Kansas River

Since 1998, the Kansas City District, in cooperation with the USFWS (Kansas Field Office), Kansas Water Office, and Kansas Department of Wildlife and Parks has conducted monitoring and management activities associated with nesting populations of federally listed endangered interior least terns and threatened piping plovers on the Kansas River. The Corps Kansas River Bi-Op Compliance Project Delivery Team (PDT) works within the overall framework of, and in consultation with, the Bi-Op Agency Coordination Team (ACT). The Bi-Op ACT is led by Mr. Jeff Towner, Field Supervisor of the USFWS Bismarck, North Dakota Office, and Mr. Larry Cieslik, Chief of the Reservoir Control Center, Northwestern Division. The first documented nesting of a piping plover in the state of Kansas occurred in 1996 on the Kansas River. The first documented nesting of an interior least tern on the Kansas River occurred in 1995. The previous year, 1994, an interior least tern pair was documented nesting approximately 7 miles north of the Kansas River on flyash piles at the Jeffrey Energy Center, a coal-fired power plant. In accordance with the 2000 Bi-Op, as amended, the Kansas River (Segment 16) is operated by the Corps to provide overall benefit to the conservation of interior least terns and piping plovers.

In 2004, the Corps contracted with Dr. Roger Boyd, of Baker University to monitor interior least terns and piping plovers nesting on the Kansas River. Dr. Boyd has conducted the annual nesting season monitoring since 1998. Beginning in late April, Dr. Boyd and his field assistant visited nesting colony sites used in previous years. In addition, in order to locate birds outside the established nesting sites, the Corps conducted routine airboat surveys along the 175-mile-long river throughout the nesting season. Efforts were concentrated on the Manhattan to Topeka reach. While 9 different locations in the Kansas River basin have been used since 1995, only the Belvue Colony on the Kansas River and the Jeffrey Energy Center, located approximately 7 miles north of the river, were active in 2004. No new nesting locations were identified during the 2004 season.

Two pair of piping plovers nested on the Kansas River in 2004 at the Belvue Colony. These birds had 3 nests containing a total of 10 eggs, 8 of which hatched, with 3 surviving to fledge. The remaining 5 chicks were lost to unknown causes. The other 2 eggs were likely predated by a raccoon. One banded piping plover adult was observed at the Belvue Colony. This bird was not captured but was believed to be the bird observed

There were 17 pairs of interior least terns nesting on the Kansas River basin in 2004, 16 pairs at the Belvue Colony and 1 pair at the Jeffrey Energy Center. These birds had 32 nests containing a total of 77 eggs, 6 of which hatched, with none surviving to fledge. Uncontrolled flows/storms resulted in the loss of 53 eggs and 2 chicks. Rodent predation likely destroyed 3 eggs, 15 eggs were abandoned/infertile, and 4 chicks were lost to unknown causes. Two previously banded interior least terns were captured, both males. One had originally been banded as an adult at the Belvue Colony in July 1998 and not recaptured since. The other had originally been banded as a juvenile at the Jeffrey Energy Center in June 2000 and had been recaptured at the Belvue Colony in June of 2003. Two other adult females were captured and banded. A pair of previously banded terns were observed at Jeffrey Energy Center but not captured. Their 2 chicks were both captured and banded but later succumbed to a heavy storm.

Coordination with the BiOp ACT occurred through weekly conference calls during the nesting season. In addition, Kansas City District participated in twice weekly calls during the nesting season with the Northwestern Division Reservoir Control Center and the Omaha District Endangered Species Section.

The Kansas City District Water Management Section, in consultation with Northwestern Division Reservoir Control Center, utilized weather information along with lake/stream gage information to regulate flows from Corps lakes in order to minimize and/or avoid adverse impacts to interior least terns and piping plovers. Releases from Corps lakes are reduced, delayed or terminated to avoid adverse impacts to nesting interior least terns and piping plovers on the Kansas River. In addition, releases are used to encourage use of the highest elevation nesting habitat. Several strong storms occurred during the 2004 nesting season resulting in high inflow on the unregulated tributaries and subsequently on the Kansas River. The most severe losses occurred on June 16 when the flows near Belvue Gage showed an increase in river stage from 7.8 ft. to 11.5 ft. This increase resulted in the loss of all active interior least tern nests which contained a total of 47 eggs. There was no “take” of interior least terns or piping plovers from flood control or navigation releases from the Corps Kansas River reservoir system in 2004.

Predator exclosures and elevation of low nests were used during the 2004 season to minimize losses of interior least tern and piping plover eggs and chicks. The only losses attributed to predators were 3 interior least tern eggs in a nest with an exclosure, possibly to rodents, and 2 piping plover eggs in a nest without an exclosure to a raccoon. Restrictive signs were used at the Belvue Colony to caution recreational users on the presence of the nesting birds and penalties associated with their disturbance or destruction. Public education efforts completed by the Operations Division Wildlife Biologist during 2004 included the development of a free standing interpretive display documenting the life history of interior least terns and piping plovers and monitoring and management activities on the Kansas River. In addition, a similar permanent interpretive display was established at the Corps Tuttle Creek Lake Visitor Center.
Piping plover fledging success on the Kansas River for all known years averages 1.12 per pair with the last five-year average of 1.17 per pair. During the last 5 years, there have been between 2 and 4 pairs of piping plovers nesting on the Kansas River. Interior least tern fledging success on the Kansas River for all known years averages 0.39 fledglings per pair with the last five-year average of 0.51 per pair. During the last 5 years, there have been between 6 and 19 pairs of interior least terns nesting on the Kansas River. These figures do not include numbers from the Jeffrey Energy Center. In accordance with the Bi-Op, Kansas River production is included in the overall numbers for the Missouri River basin.

Population monitoring data collected since 1998 will be utilized to identify whether the Kansas River provides a source or sink for the interior least terns and piping plovers.

*Applicable to Piping Plover*

V.B) Fledge Ratio Goal (1.13 for Piping Plovers)

Table 1 shows the Corps has exceeded the 3-year (2002-2004) fledge ratio goal of 1.13 for piping plovers with a 3-year fledge ratio of 1.49.

<table>
<thead>
<tr>
<th></th>
<th>Adult Census</th>
<th>Fledged Juveniles</th>
<th>Fledge Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>796</td>
<td>637</td>
<td>1.60</td>
</tr>
<tr>
<td>2003</td>
<td>1054</td>
<td>740</td>
<td>1.40</td>
</tr>
<tr>
<td>2004</td>
<td>1587</td>
<td>1179</td>
<td>1.49</td>
</tr>
<tr>
<td>3 Yr. Total (2002-2004)</td>
<td>3437</td>
<td>2556</td>
<td>1.49</td>
</tr>
</tbody>
</table>

New Reasonable and Prudent Alternative Elements from the Corps 2003 Biological Assessment

Alternative to 2000 BiOp Reasonable and Prudent Alternative at Gavins Point (RPA II.A)

I. System Operations

I.B) Unbalancing of Upper Three Lakes

The unbalancing of the three large upper reservoirs described in the 2004 Annual Operating Plan could not be implemented due to low Missouri River Main Stem Reservoir System (System) storage. Table 2 is the unbalancing schedule to be used once the System has sufficient levels under which unbalancing is recommended by the USFWS. Table 3 shows the lake elevations proposed by the Missouri River Natural
Resources Committee (MRNRC) at which the unbalancing would be terminated. Table 3 indicated that no reservoir unbalancing should occur for any of the three runoff scenarios in 2004.

### TABLE 2
2004 RESERVOIR UNBALANCING SCHEDULE

<table>
<thead>
<tr>
<th>Year</th>
<th>Fort Peck</th>
<th>Garrison</th>
<th>Oahe</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>March 1</td>
<td>March 1</td>
<td>March 1</td>
</tr>
<tr>
<td></td>
<td>Rest of Year</td>
<td>Rest of Year</td>
<td>Rest of Year</td>
</tr>
<tr>
<td>1</td>
<td>High</td>
<td>Low</td>
<td>Raise &amp; hold during spawn</td>
</tr>
<tr>
<td></td>
<td>Float</td>
<td>Hold peak</td>
<td>Float</td>
</tr>
<tr>
<td>2</td>
<td>Raise &amp; hold during spawn</td>
<td>Float</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Float</td>
<td>Hold peak</td>
<td>Hold peak</td>
</tr>
<tr>
<td>3</td>
<td>Low</td>
<td>Raise &amp; hold during spawn</td>
<td>Float</td>
</tr>
<tr>
<td></td>
<td>Hold peak</td>
<td>High</td>
<td>Float</td>
</tr>
</tbody>
</table>

**Notes (Table 2):**
- **Float year:** Normal operation, then unbalance 1 foot during low pool years or 3 feet when System storage is near 57.1 mean acre feet (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.

### TABLE 3
MRNRC RECOMMENDED RESERVOIR ELEVATION GUIDELINES FOR UNBALANCING

<table>
<thead>
<tr>
<th>Scheduling Criteria</th>
<th>Fort Peck</th>
<th>Garrison</th>
<th>Oahe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implement unbalancing if the March 1 reservoir elevation is above this level.</td>
<td>2234 feet mean sea level (m.s.l.)</td>
<td>1837.5 feet m.s.l.</td>
<td>1607.5 feet m.s.l.</td>
</tr>
<tr>
<td>Implement unbalancing if March 1 reservoir elevation is in this range and the pool is expected to raise more than 3 feet after March 1.</td>
<td>2227-2234 feet m.s.l.</td>
<td>1827-1837.5 feet m.s.l.</td>
<td>1600-1607.5 feet m.s.l.</td>
</tr>
<tr>
<td>Avoid lake level decline during spawn period which ranged from April 15 – May 30</td>
<td>Schedule after spawn period of April 20 – May 20</td>
<td>Schedule after spawn period of April 8 – May 15</td>
<td></td>
</tr>
</tbody>
</table>
II. Research, Monitoring and Evaluation

II.C) Flow Tests

The Gavins Point Reach Fall Test, Fort Randall Reach Fall Rise, and Gavins Point Spring Sandbar Habitat Conditioning were not conducted due to lack of adequate storage in the system due to drought.

Pallid Sturgeon

I. Adaptive Management

I.B) Endangered Species and Habitat Monitoring Program

The pallid sturgeon monitoring program was partially implemented in 2004. Since 1997, multi-state and Federal agencies have made efforts to capture pallid sturgeon in the lower Missouri River. Current monitoring efforts reflect a collaborative effort by scientific stakeholders to put forth a sound sampling design broad enough to evaluate stocking efforts, habitat use, and long-term recovery of the pallid sturgeon.

Since 2003, Corps funding has enabled a three-fold increase in sampling effort. With about 3,000 pallid sturgeon samples taking place annually, only about 20 wild and 60 stocked fish were seen in 2004 (increase in 2004 wild fish numbers may represent optional set-line efforts). Considerably fewer wild fish were seen in 2003 and 2002, suggesting that despite increasing effort, relatively few wild fish can be expected to be captured using random sampling techniques. Young of the Year (YOY) sturgeon have successfully been captured in the lower Missouri on an annual basis. However, efficiency of the sampling gear or numbers of available small sturgeon still remains in question. New trawl gear is being developed to provide sampling confidence for this size of fish. Sampling gear appears to be effective at capturing newly stocked pallid sturgeon. More of these fish are expected as sampling gear and techniques are refined along with the increase in stocked fish. Adaptive monitoring enables this program to use new information to refine sampling methods to better target the pallid sturgeon.

In subsequent years, an extensive data analysis will be done on three years of data to better guide decisions and help this program target its methods of capture for the pallid sturgeon.

III. Habitat Restoration/Creation/Acquisition

III.A) Restoration of Submerged In-Channel Shallow Water Habitat in the Channelized River
III.A.1) Ensure no-net-loss of existing shallow water habitat from operations and maintenance in lower river

As part of the BSNP maintenance program, no net loss of habitat was accomplished by incorporating notches where appropriate and by deferring maintenance in areas where the risk to the navigation channel was minimal. 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.

III.A.2) Develop and Implement Habitat Restoration Plans and Strategies in River Segments 10 through 16

Ponca State Park is located within the 59-mile segment of the Missouri National Recreational River (MNRR), which is within Segment 10. During the spring of 2004, prairie, wet meadows, backwaters, wetlands, and emergent sandbar habitat were restored on 295 acres of bottomland recently acquired by the Nebraska Game and Parks Commission (NGPC) at Ponca State Park. The newly acquired land consisted of a series of side channels, a backwater, and farmed wetlands that had degraded as a result of land use practices and hydrology and sediment transport changes that have occurred in the Missouri River primarily due to the construction of Gavins Point Dam. The project originated as an ecosystem restoration project with the goal of restoring these degraded habitats in a manner that would maximize their benefits to fish and wildlife. Plans and specifications for the project were completed in March of 2004. All major excavation work was completed by the end of June 2004. Construction involved the removal of approximately 533,240 cubic yards of material using a hydraulic cutter-head dredge and disposing of the material within the Missouri River to create emergent sandbar habitat. The completed project resulted in the creation of 29 acres of backwater habitat, 17.5 acres of wetland, 3 emergent sandbars with a combined acreage of 37 acres, and 36 acres of tall grass prairie. Immediately after construction, the backwaters were utilized by waterfowl, shorebirds, five species of turtles, and a variety of other wildlife. In addition, over 3,900 fish representing 36 different species were collected from the backwaters during a 2004 summer and fall sampling effort conducted by the NGPC.

For Segments 11 through 15, a Program Management Plan (PMP) was produced in 2003 for development of SWH. The PMP outlines work per reach, cost estimates, available programs, and accounting metrics for a comprehensive program. This report was to be updated annually to provide a history of work completed, assessment of effectiveness of the measures in providing the intended physical environment, and to convey lessons learned. However, due to the amendment of the BiOp, the report was not updated for CY 2004. The SWH plan to create habitat in Segments 11 through 15 was attached as Appendix B in the 2003 Annual Report for the BiOp.
III. A.3) Reach Aquatic Shallow Water Habitat Goal

The Corps created SWH through modification of the river control structures, excavation, and dredging in 2004. The Corps constructed over 800 modifications to river control structures for a distance of 625 river miles, excavated 6 pilot channels and 3 chutes, and dredged 4 backwater areas from March through June of 2004. The construction plan and the associated monitoring efforts were coordinated with the USFWS and the States of Iowa, Kansas, Missouri, and Nebraska. A verification report was prepared and sent to the USFWS in June 2004. A supplement to the verification report was provided to the USFWS in December 2004. The following website contains the report for the Missouri River Shallow Water Habitat Report prepared in 2004:

Through qualitative and quantitative assessments, the Corps estimated that a minimum of 1,320 acres of SWH were created from mid March through 30 June 2004. Refer to Table 4 below for the SWH creation summary.

<table>
<thead>
<tr>
<th>Structure Type</th>
<th>Number of Units</th>
<th>Estimated Acres June 2004</th>
<th>Min.</th>
<th>Max.</th>
<th>Minimum Acres in Sept 2004</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bank Notches</td>
<td>75 Notches</td>
<td>300</td>
<td>450</td>
<td>450</td>
<td></td>
</tr>
<tr>
<td>Dike Notches</td>
<td>427 Notches</td>
<td>492</td>
<td>492</td>
<td>492</td>
<td></td>
</tr>
<tr>
<td>Revetment Notches</td>
<td>91 Notches</td>
<td>118</td>
<td>118</td>
<td>118</td>
<td></td>
</tr>
<tr>
<td>Type-B Notches</td>
<td>124 Notches</td>
<td>124</td>
<td>248</td>
<td>248</td>
<td></td>
</tr>
<tr>
<td>Dredging</td>
<td>4 Sites</td>
<td>135</td>
<td>135</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Pilot Channels</td>
<td>10,900 Feet</td>
<td>43</td>
<td>43</td>
<td>43</td>
<td></td>
</tr>
<tr>
<td>Chutes</td>
<td>3 Sites</td>
<td>78</td>
<td>78</td>
<td>78</td>
<td></td>
</tr>
<tr>
<td>Major Dike Modifications</td>
<td>16.1 Miles</td>
<td>130</td>
<td>246</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td></td>
<td>1420</td>
<td>1810</td>
<td>1320</td>
<td></td>
</tr>
</tbody>
</table>

Specific notes on creation strategies are as follows.

- Nearly 90 percent of the new SWH was created indirectly by the modification of the river control structures (notches). This allowed for increased top width and greater alluvial dynamics which has lead to greater depth and velocity diversity in the vicinity of the modified structures.
- The modification of the river structures will allow for continued development of SWH for some time into the future.
- The increased alluvial dynamics will allow for the SWH to change more dramatically in response to flood events (erode and reform).
- The modifications allow for increased depth and velocity distributions over a wider range of flows.
- Initial indications are that notching has coarsened the substrate in the immediate vicinity of the notch.
- Pilot channels and chutes provided immediate increases in habitat and depth and velocity diversity and continued habitat increases over a period of time.
- Bank notches provided immediate increases in habitat and depth and velocity diversity and continued habitat increases over a period of time.
- Backwater areas produced immediate measurable habitat. This habitat is considerably less dynamic than the other habitats.

Lessons Learned:

- Transitions into notches should be gradual.
- Spoil placement can limit effectiveness.
- Type B notches in shorter dikes have caused less erosion of the high bank and fewer changes in depth diversity.
- Pilot channel design should avoid shorter narrower channels and intermediate notches are not advised. Also, larger diversion notches appear to produce better results.
- Chutes with short lengths and tight radius of curvature appear to be less successful. Bottom widths greater than 75 feet have increased success.

IV. Pallid Sturgeon Propagation and Augmentation

The Corps Pallid Sturgeon Propagation and Augmentation Program is a partnering effort with state and Federal entities to increase production capabilities to meet the stocking needs of the species. In 2004, the Pallid Sturgeon Propagation Team prioritized annual operational costs/needs for each facility to determine supplemental support to maximize success of the propagation program.

Since the release of the 2000 BiOp, federal and state hatcheries have been working cooperatively with the Corps to capture, hold, and spawn pallid sturgeon to meet recovery goals in each of the identified priority areas. Progeny have been released at several locations within the priority areas and at different life stages to provide insight for refinement of stocking strategies. Careful consideration is given to provide genetically fit progeny through pedigreed mating utilizing microsatellite analysis from the DNA of the adults. Advances in cryopreservation technology have enabled hatcheries to archive milt samples for later use to interject new genetic material into the pallid sturgeon population. Considering the adult pallid population in the Missouri River’s upper basin will likely be gone by the year 2018, maintaining a genetically sound broodstock program at the Gavins Point National Fish Hatchery provides security and refuge for future augmentation efforts. The Corps plans to maintain augmentations levels at or above the minimal levels for each priority area as provided in the stocking plans and to continue to build on the genetic fitness of the population through broodstock development and the milt cryopreservation repository.
The Bozeman Fish Technology Center (Bozeman FTC) and Fish Health Center conduct the propagation research for the USFWS in the Missouri River. Research covers the fields of fish culture, health, and physiology. The goal of the research is to solve fish cultural problems in order to produce quality fish in a consistent manner. Research findings are: 1) a juvenile fish diet has been developed for pallid sturgeon and is effective; 2) diet studies will continue for all life stages as available; 3) rearing densities of one pound per square foot or more resulted in reduced growth; 4) increasing dietary fat from 8 to 26 percent increased growth and zonal liver fat, but not total liver fat, and did not result in liver pathology; 5) fin curl starts in very young fish in well water sources and may tie to nutrition; 6) iridovirus causes mortality and affects mucous and sensory cells; 7) endocrine tests can be used to identify the sex of adults and stages of sexual maturity; and 8) tools have been developed and are being further developed for physiological analysis of state of health. These tools include steroid endocrinology, determination of egg and sperm quality, and blood plasma indicators of fish health.

The Corps will fully consider implementing the following recommendations for the propagation effort including: 1) continue the propagation program and facility upgrades to increase production of healthy fish; 2) develop fish cultural techniques, fish health information, and methods for preservation of genetic material (breeding plans, genetic analysis, cryopreservation of gametes); 3) continue research and implementation of propagation research results in fish culture, fish health, and stress and reproductive biology; and 4) continue to pursue research needs recommendations of panels of experts including those listed in the Recovery Plan, “Research and Assessment Needs for Pallid Sturgeon Recovery in the Missouri River,” and the American Fisheries Review for the Upper Basin.

A portion of the facility improvement/expansion projects outlined in the 2003 Biological Assessment began in 2004. Construction of the new building at the Gavins Point National Fish Hatchery was completed. The new facility provides the ability to spawn wild pallid sturgeon collected throughout the Missouri River basin and provides additional space to hold “future captive broodstock” and more than doubles the production capabilities.

The Gavins Point National Fish Hatchery (Gavins Point NFH) was designated as the lead facility for the culture and stocking of the endangered pallid sturgeon. Various sturgeon experts were consulted in an effort to design and execute a plan for proper capture, reproduction, rearing, tagging, and stocking. This included facility modifications and new construction, rearing equipment and tanks, capture techniques, genetics, chemical treatments, antibiotics, disease diagnosis and monitoring, egg staging capabilities, spawning induction using hormones, egg incubation techniques, tagging and marking, crosses and family formations (identity), future broodstock, and nutrition. Low density rearing parameters and proper temperatures for all phases of culture were developed. Various tagging methods were tried and accepted in order to maintain family identity and assist with the later monitoring and evaluation aspects of the program.
More recently, 3 of the hatchery culture facilities have undergone improvements that continue to be funded by the Corps. These include a building expansion and a new pallid sturgeon culture building at the Neosho National Fish Hatchery; deepening and silt removal at Blind Pony Lake, along with a new water source pipeline and a new building at Blind Pony State Fish Hatchery; and a new advanced rearing and broodstock holding facility at the Gavins Point National Fish Hatchery. These and other hatchery improvements will allow stocking of pallid sturgeon fingerlings to increase from the approximately 6,000 fish in 1992 to over 60,000 9-inch fish in the future.

V. Pallid Sturgeon Population Assessment

The Pallid Sturgeon Population Assessment Program has been developed by the Pallid Sturgeon Population Assessment Team (Team). This team is comprised of representatives of state and Federal agencies and academia possessing knowledge and expertise of the Missouri River, pallid sturgeon, and statistics.

In 2004, the program was partially implemented with three crews conducting assessment activities. The USFWS Great Plains Fish and Wildlife Management Assistance Office conducted assessment activities in the Fort Randall reach. The Nebraska Game and Parks Commission sampled the Missouri River from the Platte River to the Kansas River and the USFWS Columbia Fishery Resource Office provided coverage from Glasgow, Missouri, to the mouth near St. Louis, Missouri.

An Independent Science Review of the program was conducted by the Sustainable Ecosystems Institute (SEI). The review was conducted by a panel assembled by the SEI. The panel reviewed the guiding document for the program and conducted power analysis on the data collected the previous two years. The SEI met with the Team to review, learn, and ask questions regarding the strategies and justifications for the various approaches. The SEI provided a summary report with written recommendations back to the Team with their findings. The Team has addressed the recommendations provided by the SEI.

The Corps plans to fully implement the program on the Missouri River from the confluence of the Yellowstone and Missouri Rivers in North Dakota downstream (excluding the main stem reservoirs) to the confluence of the Missouri and Mississippi Rivers in Missouri (Segments 4-14). The Corps will continue moving forward with an adaptive monitoring approach to the program while using the SEI's recommendations as appropriate.

New Reasonable and Prudent Alternative Elements of the 2003 Biological Opinion

VI. Feasibility, Flow Development, and Adaptive Management

Flow modification was not conducted due to lack of adequate storage in the system because of drought.
VII. Flow Modification

VII.2) Flow Enhancement Below Fort Peck Dam

The 2000 BiOp included release changes from Fort Peck Dam as a component of the RPA. Prior to full implementation of this release change, the RPA included two tests, the “mini-test” and the “full-test”. These tests were designed to monitor the effects of higher spring releases and warmer water released from the Fort Peck spillway. The proper National Environmental Policy Act documentation to perform the tests was completed in 2004.

Preliminary biological data collection is an essential component in determining the responses and effects of the “mini” and “full” tests on pallid sturgeon and the other species that have been selected for this project. The multiple components of this data collection will provide science critical to recovering fish populations throughout the Missouri River basin. The 2 tests are planned to determine the potential effects of warmer water releases at a rate higher than normal on the integrity of the Fort Peck Dam spillway, downstream river reach (bank and bed erosion, cultural resource exposure, etc.), and (based on the main purpose of a warmer water spring rise) on native river fish. The Fort Peck “mini-test” was not implemented in 2004 due to low system storage. When the system storage recovers sufficiently, the Corps anticipates this test will be implemented.

The Fort Peck Flow Modification Biological Data Collection Plan is a multi-year, multifaceted research and monitoring program designed to evaluate the influence of proposed discharge and water temperature modifications from Fort Peck Dam on physical habitat and biological response of pallid sturgeon and other native fishes. The Data Collection Plan is jointly conducted by the Montana Department of Fish, Wildlife, and Parks and the U. S. Geological Survey, Columbia Environmental Research Center. The Data Collection Plan was initially implemented in 2001. Therefore, 2004 represents the fourth year of implementation. Research and monitoring components conducted during 2004 include: 1) quantifying spatial and temporal patterns of water temperature and turbidity at several sites in the Missouri River downstream from Fort Peck Dam in selected tributaries and in off-channel areas; 2) intensively sampling for pallid sturgeon in the Missouri River downstream from Fort Peck Dam; 3) examining flow and temperature related movements of pallid sturgeon, shovelnose sturgeon, blue suckers, and paddlefish; 4) Quantifying the spatial and temporal distribution and abundance of larval fishes; 5) targeted sampling for young-of-year sturgeon to assess reproductive success of pallid sturgeon and shovelnose sturgeon; and 6) examining behavior and drift dynamics of larval sturgeon in natural field settings.

Similar to previous years of the project, proposed flow and water temperature enhancements from the Fort Peck Dam spillway were not implemented during 2004 due to inadequate reservoir levels and the inability to release water over the spillway. The following is information on the progress of the preliminary data collection.
Research component 1 (water temperature and turbidity). Water temperature did not reach 18.0°C at Frazer Rapids under normal operations of the dam. The BiOp recommended that spillway releases (when implemented) enhance water temperature to 18.0°C at Frazer Rapids. Continuous recording of turbidity indicated that turbidity increased progressively downstream from Fort Peck Dam.

Research component 2 (intensive sampling for pallid sturgeon). Intensive sampling (650 trammel net drifts in a variety of habitat types) for pallid sturgeon in relatively “unexplored” areas of the Missouri River resulted in the collection of 2 adult pallid sturgeon. These results suggest that pallid sturgeon do inhabit reaches of the Missouri River below Fort Peck Dam. However, use is limited under existing discharge and water temperature regimes. In addition to adult pallid sturgeon, 14 hatchery-raised and released juvenile pallid sturgeon were collected during these efforts.

Research component 3 (telemetry movement studies of native fishes). Relocations and movement characteristics of fishes in the Missouri River and Yellowstone River were ascertained at weekly intervals from April through July and bi-weekly intervals from August through October. A total of 10,930 river kilometers were tracked, resulting in 2,601 manual relocations of fishes (241 relocations of pallid sturgeon, 889 relocations of blue sucker, 1,184 relocations of shovelnose sturgeon, and 287 relocations of paddlefish). Data collected during 2004 will be combined with data from previous and subsequent years to statistically quantify river use and movement patterns of the four species over spatial and temporal scales and environmental conditions.

Research component 4 (larval fish sampling). A total of 2,072 samples of larval fish were obtained between late May and early August from 6 sites in the Missouri River below Fort Peck Dam, tributaries, and off-channel areas. Sampling resulted in the collection of more than 11,500 larvae. Sturgeon larvae (Scaphirhynchus spp.) were sampled at two sites in the Missouri River downstream from Fort Peck Dam (N = 16) and in the Yellowstone River (N = 12). These results, when combined with data collected in previous years of the project, are being used to ascertain and predict sturgeon spawn dates as a function of discharge, water temperature, and other environmental factors.

Research component 5 (young-of-year sturgeon sampling). Intensive sampling of the Yellowstone River and Missouri River upstream and downstream of the Yellowstone River during 2004 resulted in the collection of 77 young-of-year sturgeon. These results, corroborating the larval fish sampling results, indicate that successful spawning by sturgeon occurred during 2004. To date, the young-of-year sturgeons have not been identified as to species. Therefore, it is unknown if the specimens sampled were pallid sturgeon or shovelnose sturgeon. Sampling in past years (2002 and 2003) resulted in the first-documented accounts of pallid sturgeon reproduction in the upper Missouri River basin. In addition, data collected from this research component are being used to examine food habits, habitat use characteristics, and growth of young-of-year sturgeon. Prior to this study, no information was available for the young-of-year life stages of sturgeon. A noteworthy finding from this research component is that young-of-year sturgeons are rarely found where water depth is less than 1.9 meters deep. Rather,
relative abundance of young-of-year sturgeons in this section of the upper Missouri River increases with increasing depths greater than 1.9 meters.

Research component 6 (drift dynamics of larval sturgeon). The drift dynamics and behavior of larval shovelnose sturgeon (ages 1, 2, 6, and 10-days old) and larval pallid sturgeon (ages 1, 2, 5, 9, 11, and 17-days old) were examined in a natural side channel of the Missouri River during 2004. Behaviorally, both species drifted primarily near the river bed in the lower 0.5-meter of the water column. Specifically, for pallid sturgeon, the larvae drifted with the current at drift rates very similar to mean water column velocity. However, 17-day old pallid sturgeon exhibited a strong tendency to settle to the river bed and were not passive drifters. Simulations for pallid sturgeon suggest that the total drift distance of larvae may exceed 340 km during the initial 11 days of life.

The Fort Peck Data Collection Plan will continue in 2005 and subsequent years. In addition to establishing baseline information that is necessary for evaluating physical and biological responses to the Fort Peck Dam flow modifications, this project is yielding critical life history information for pallid sturgeon and shovelnose sturgeon. For example, the existing 4 years of data from several research components are being used to ascertain discharge, temperature, and other relevant environmental factors as determinants of spawning for pallid sturgeon and shovelnose sturgeon. Quantitative outputs from these analyses, although specific to the upper Missouri River, may provide inferences to populations of pallid sturgeon and shovelnose sturgeon in other portions of the Missouri River.

VIII. Fort Peck Temperature Control Device Feasibility

For 2004, no work was completed on a study for the Temperature Control Device. There was, however, team discussion about what level of detail would be required in a study of this type. The team has started looking at other locations where this type of work has been done, for example, Cougar Dam in Oregon.

IX. Habitat Development, Shallow Water and Floodplain Habitat

The Corps constructed over 800 modifications to the river control structure for a distance of 625 river miles, excavated 6 pilot channels and 3 chutes, and dredged 4 backwater areas from March through June of 2004. Refer to III. A above for more information.

Reasonable and Prudent Measures to Minimize Take

Bald Eagle

Measure 1: Map cottonwood forests

The following pertains to work along the Missouri National Recreational River, the 59-mile stretch of the river between Yankton, South Dakota, and Ponca State Park, Nebraska.
Mapping and evaluation of the current health of cottonwood forests that could provide habitat for bald eagles has started with a 5-mile test reach between River Miles 777 and 782 along the Missouri National Recreation River between Yankton, South Dakota, and Ponca State Park, Nebraska. The strategy is to outline areas (polygons) of forest into what appear to be different land uses and age classes of cottonwood forests. A field check would be applied to these polygons to see if the mapping is accurate to use for mapping the forests in that stretch. From those maps, an overlay of eroding areas and bald eagle use will be prepared using Geographic Information Systems techniques to analyze trends in bald eagle use for both nesting and roosting sites. Then the information can be incorporated in a model to use along the entire stretch of the Missouri River.

**Measure 2:** Develop a management plan to allow for natural regeneration, periodic seed germination, and seedling establishment so that regeneration is maintaining pace with or exceeding mortality.

The Corps has created a draft cottonwood restoration report to address this RPM. The report summarizes the basic biological criteria for selecting restoration sites, methods for restoring cottonwoods, and management techniques for cottonwood seedlings. Its basis is both the scientific literature and discussions with land managers who have experience with cottonwood restoration on the Missouri and other rivers. In 2004, this report was distributed to the Cottonwood Restoration Team. The team consists of members from various federal and state government agencies, tribes, universities, and non-profit organizations. This report may be found at the following website: http://www.nwo.usace.army.mil/html/pd-e/cottonwood2.html.

**Measure 3:** Ensure that no more than 10 percent of cottonwood forest habitat that is suitable bald eagle habitat is lost during the project life.

This measure will be addressed when the first 2 measures have been further developed.

**Least Terns**

The Corps has exceeded the 5-year (2000-2004) fledge ratio 0.94 for the least terns with a 5-year fledge ratio of 1.07 fledglings per adult pair.

**Measure 1:** Survey and Monitor Least Terns, Mortality, and Incidental Take

Surveys were conducted from April 2004 through the end of the nesting season in late August 2004. Results show 722 least tern adults counted on the Missouri River in 2004, the fourth highest recorded for the river since census began in 1986 and the third consecutive year adult numbers were above 700. However, the 722 adults represent a slight (2.6%) decrease over the 2003 adult census of 741 least terns. Productivity was up 7% in 2004 with 344 least tern chicks fledging off of the Missouri River.
Four least tern adults and 8 least tern chick specimens were collected off the Missouri River in 2004. One adult and 3 chicks were sent to the National Wildlife Health Center for further analysis.

**Measure 2:** Monitor, Evaluate, and Adjust Operations to Minimize Take of Least Terns

No least tern eggs, neither chicks nor adults, were known to have been lost due to the operation of the dams on the Missouri River in 2004.

**Measure 4:** Monitor, Evaluate, and Modify Created and Rehabilitated Sandbars

Least terns nested on 1 created sandbar complex (RM 755.0 & RM 754.5 – the Ponca Complex) on the Gavins Point Segment and on 1 rehabilitated sandbar (vegetation removal at River Mile 867.0) on the Fort Randall Segment. Least terns were very successful at the Ponca Complex with 84 adults and 64 fledglings for a fledge ratio of 1.52 fledglings per adult pair. The terns were unsuccessful at River Mile 867.0 with all 5 nests being lost to predation.

**Measure 5:** Evaluate Effective Measures to Reduce Least Tern Predation

Least tern predator enclosures used on the Kansas River were evaluated for possible use on the Missouri River. They were determined to be too large and, therefore, impractical to install in the large tern colonies. The Corps will continue to explore measures to reduce least tern predation. The terns were unsuccessful at River Mile 867.0 with all 5 nests being lost to predation.

**Measure 6:** Reduce Human Disturbances of Least Terns and Conduct Outreach and Education

In 2004 no least tern nests were known to have been lost due to human disturbance and no adult or chick losses could be attributed to human disturbance. The Corps will continue restricting access to least tern nesting sites, coordinate surveillance activities with law enforcement officers, and continue outreach programs.

**Measure 7:** Revise Contingency Plan for Moving Eggs

A revised contingency plan for moving least tern eggs was developed in 2004 and submitted to the USFWS. In 2004, 2 least tern nests were moved. One subsequently had a successful hatching while the other nest was abandoned.

**PIPING PLOVERS**

**Measure 1:** Survey and Monitor Piping Plovers

With 1,587 adult piping plovers counted, 2004 marked the fifth consecutive year of record numbers of plovers on the Missouri River and the eighth consecutive annual
increase in adult piping plover numbers. The 1,587 plovers represent a 19 percent increase over 1,338 birds in 2003. Piping plover productivity set a record in 2004 with 1,179 fledglings. This was an 18 percent (1179/1000) increase over 2003. The fledge ratio for the Missouri River in 2004 was 1.49 fledglings per adult pair which matches the 1.49 fledge ratio for 2003. There were 187 nests and 700 eggs associated with those nests that were lost in 2004.

**Measure 2:** Monitor, Evaluate, and Provide Information to Minimize Take of Piping Plovers

Three adult and 20 chick carcasses were found in 2004. Of these, 8 of the plover chicks were forwarded to the health center for analysis.

**Measure 3:** Coordinate System Monitoring and Evaluation

One piping plover nest containing 1 egg was lost due to Corps reservoir operations in 2004. The Corps and the USFWS conducted weekly conference calls throughout the 2004 nesting season to coordinate water releases and nesting activities.

**Measure 4:** Contingency Plan for Moving Eggs

A revised contingency plan for moving piping plover eggs was developed in 2004 and submitted to the USFWS. In 2004, there was 1 piping plover nest moved. This nest subsequently had a successful hatching.

**Measure 5:** Reduce Human Disturbances of Least Terns and Conduct Outreach and Education

In 2004, there were 2 piping plover nests lost due to human disturbance. No adult or chick losses could be attributed to human disturbance. The Corps will continue restricting access to piping plover nesting sites, coordinate surveillance activities with law enforcement officers, and continue outreach programs.

**Measure 6:** Evaluate Effective Measures to Reduce Least Tern Predation

In 2004, there were 196 piping plover nests that were caged as a predator deterrence measure. Of these caged nests, 158 hatched for a nest success of 81.4 percent. There were 531 plover nests that were not caged and 380 of these nests hatched for a nest success of 71.6 percent.

**Measure 7:** Design, Construct, and Manage Created Sandbar Habitat

In 2004, piping plovers nested on 1 created sandbar complex (River Mile 755.0 and River Mile 754.5 – the Ponca Complex) on the Gavins Point Segment and on 1 rehabilitated sandbar (vegetation removal at River Mile 867.0) on the Fort Randall Segment. The piping plovers were successful at the Ponca Complex with 18 adults and 23 fledglings for
a fledge ratio of 2.56 fledglings per adult pair. At River Mile 867.0, there were 6 plover adults with 3 nests. Only 1 of these nests was successful, but none of the chicks fledged.