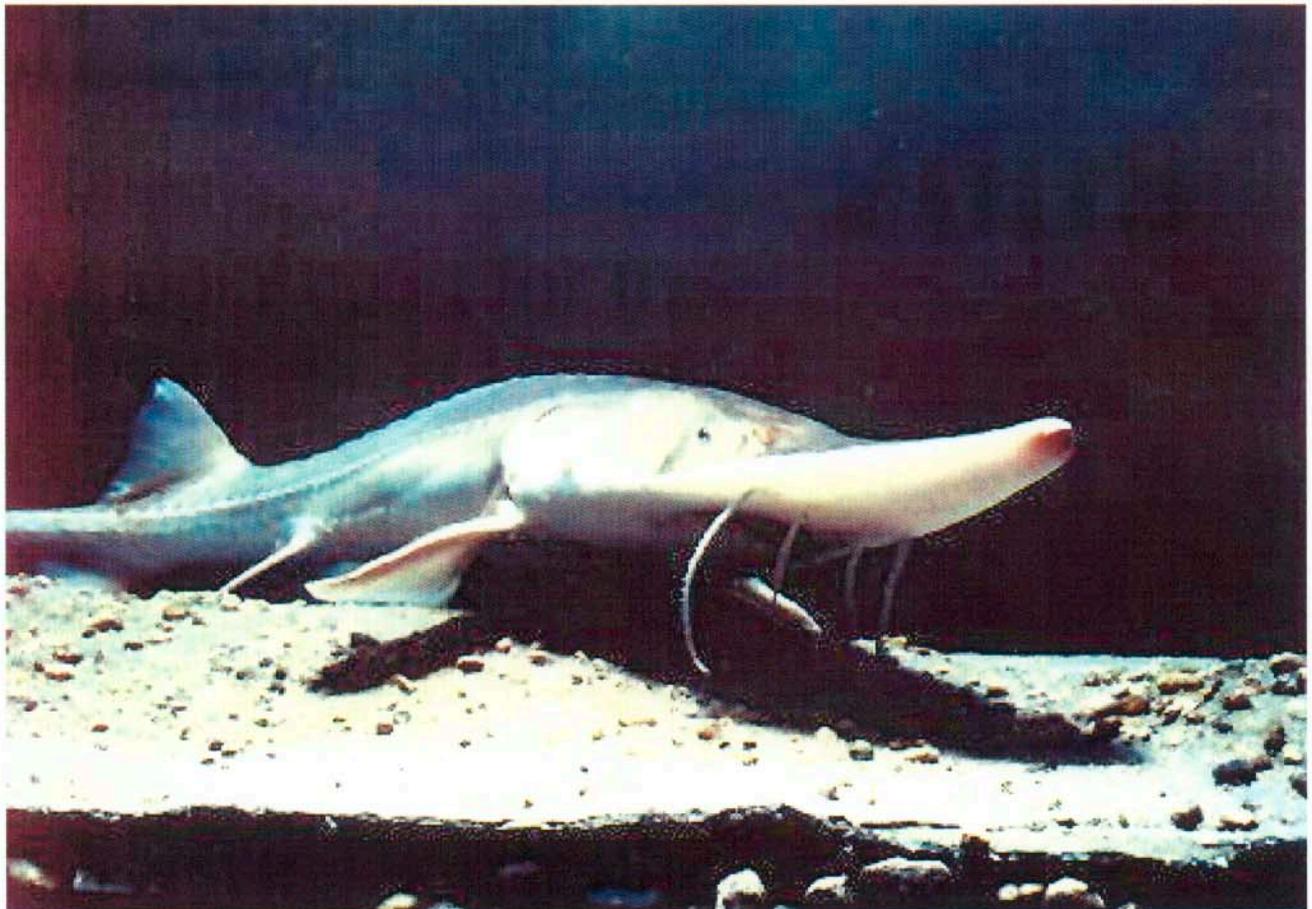




**U.S. Army Corps
of Engineers**

2003

Annual Report for the
Missouri River Biological
Opinion



2003 ANNUAL REPORT

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

June 18, 2004

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

2003 Annual Report
Biological Opinion on the
Operation of the Missouri River Main Stem System,
Operation and Maintenance of the Missouri River
Bank Stabilization and Navigation Project, and
Operation of the Kansas River Reservoir System

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 there will be an incidental take of bald eagles.

On November 2, 2003, the Corps submitted a Biological Assessment (BA) to the U. S. Fish and Wildlife Service (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 actions. 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 pallid sturgeon. Because formal consultation was concluded in mid-December of 2003, this report shall only document results of Corps conservation activities and progress in implementation of the elements of the RPA, RPM, and CR in the 2000 BiOp for the calendar year 2003.

In its 2000 BiOp, the USFWS recommended a RPA with numerous elements; i.e., RPM to minimize take/harm of the noted species and CR that would benefit the species. Main elements of the 2000 BiOp RPA include adaptive management, flow enhancement, unbalanced system regulation, habitat restoration/creation/acquisition, and species-specific measures to avoid jeopardy. The 2000 BiOp RPA and RPM are recommended actions and the CR are discretionary actions specific to the four species.

Adaptive management is the first element of the 2000 BiOp 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, which documents Corps actions to implement the BiOp, has been prepared.

Currently, releases from Fort Peck Dam in May and June are volumetrically smaller and colder than USFWS 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 multiple releases, two test releases are planned by the Corps. Drought conditions resulted in lake levels too low to allow spillway releases for the mini test in 2003. As soon as sufficient lake levels occur at Fort Peck Dam, the spring flow mini test will be conducted to determine the long-term integrity of the spillway, to test data collection methodology, and to obtain data on temperature, based on various combined flows from the spillway and the powerhouse. A larger, full test will be conducted the year after the mini test if there is sufficient water. National Environmental Policy Act (NEPA) requirements were met for the mini test flow modifications in March of 2004.

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 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 2003 due to insufficient water in the system.

Under the Habitat element of the 2000 BiOp RPA, the USFWS recommends that the Corps 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.

For 2003, shallow water habitat (defined as less than 5 feet deep with a velocity less than 2 feet per second) was created by excavation of notches, chute excavation, dike modification and chevron construction, and other various structure modification projects. Several projects are in design phase as part of the BSNP Missouri River Fish and Wildlife Mitigation Project. It is estimated that the work above would result in over 400 acres of new shallow water habitat when the projects are fully developed.

The Corps continued to enhance and manage emergent sandbar habitat by installing livestock exclusion fences on the Lake Oahe Reservoir, which protected approximately 200 acres of useable shoreline habitat. Other efforts included sandbar habitat creation for non-drought years and an in depth test of the effectiveness, duration, and movement of the pre-emergent herbicide, Arsenal, on a ten acre test plot on an island in Lewis and Clark Lake.

Elements applicable to specific species are as follows. Least tern and piping plover recommendations 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.

The Corps continued to monitor tern and plover fledge ratios, as has been done for the last 12 years on the Missouri River and 5 years on the Kansas River. Missouri River fledge ratio goals were met in 2003 with a running three-year average of 1.06 for least terns and 1.60 for piping plovers.

Support by the Corps in 2003 for pallid sturgeon propagation and augmentation included supplies and materials assistance to Blind Pony State Fish Hatchery, Neosho National Fish Hatchery, the Gavin's Point National Fish Hatchery, Garrison Dam National Fish Hatchery, Miles City State Fish Hatchery, Bozeman Fish Technology Center, and the University of California (Davis) in excess of \$224,420.

In 2003, the Corps supported population assessment activities in high priority river segments. The Nebraska Game and Parks Commission and the USFWS conducted pallid sturgeon population assessment activities in accordance with guidelines outlined in the document "Long-term Pallid Sturgeon and Associated Fish Community Assessment for the Missouri River and Standardized Guidelines for Sampling and Data Collection." This document is a "work in progress" allowing for updates and improvements in the best interest of the program to provide sound science.

Reasonable and prudent measures to minimize take of bald eagles in 2003 included the continued effort to develop a community index model for the cottonwood plant community with suitable habitat for the bald eagle. Efforts for the least tern and piping plover in 2003 included the continuation of nesting surveys, captive rearing of terns and plovers, evaluation and implementation of operational changes to avoid take, predator aversion efforts, and a comprehensive public outreach program for both the birds and the sturgeon.

Pallid sturgeon work under the CR included funding to continue development and conduct sturgeon genetic techniques to ensure genetic variation, participation as a partner in regional pallid sturgeon recovery work groups, assisting the USFWS and other partners with fish health issues as they relate to pallid sturgeon, and assisting the USFWS and other partners with cryopreservation banking of pallid sturgeon sperm.

TABLE OF CONTENTS

Summary	i	
List of Tables	vi	
List of Acronyms and Abbreviations	viii	
Introduction	1	
<u>Reasonable and Prudent Alternative</u>		
I. Adaptive Management		
I.A) Establish an Agency Coordination Team (ACT)	1	
I.C) Annual Report.....	1	
II. Flow Enhancement		
II.A) Gavins Point Dam	1	
II.B) Fort Peck Dam.....	2	
III. Unbalanced Intrasystem Regulation		8
IV. Habitat Restoration/Creation/Acquisition		
IV.A) Restoration of Submerged Shallow Water Habitat	9	
IV.B) Restoration of Emergent Sandbar Habitat	11	
IV.C) Initiate studies of the lack of sediment transport and impacts on habitat regeneration and turbidity	13	
IV.D) Monitoring of Tern and Plover Nesting Habitat.....	14	
<u>Elements Applicable to Specific Species</u>		
V. Least Tern and Piping Plover		
V.A) Operate the Kansas River	16	
V.B) Fledge ratio goals	16	
V.C) Initiate and conduct a piping plover foraging ecology study on the Missouri River.....	18	
VI. Pallid Sturgeon		
VI.A) Pallid sturgeon propagation.....	17	
VI.B) Pallid sturgeon population assessment	27	

Reasonable and Prudent Measures to Minimize Take

Bald Eagle

Measure 1: Map cottonwood forests.....31

Terns and Plovers

Measure 1: Monitor nesting sites.....31
Measure 2: Previous impacts36
Measure 3: Evaluate operational changes.....36
Measure 4: Captive Rearing.....37
Measure 5: Public information.....39
Measure 6: Predator Aversion41

Pallid Sturgeon

Measure 1: Operational changes.....42
Measure 2: Public information.....42

Conservation Recommendations

Pallid Sturgeon.....43

References Cited45

Appendix

- Appendix A**: List of Biological Opinion Requirements (Table 24)
- Appendix B**: Shallow Water Habitat Program Management Plan, FY 2003
- Appendix C**: Nest Site Location Maps
- Appendix D**: Historical Mortality Report
- Appendix E**: Missouri River Basin Pallid Sturgeon Stocking for 2002-Year Class
- Appendix F**: Missouri River Bank Stabilization and Navigation Project, Fish and Wildlife Mitigation Project, Annual Implementation Report, January 2003
- Appendix G**: Mainstem Missouri River Least Tern Productivity Monitoring, 1986 - 2003
- Appendix H**: Historical Report

List of Tables

Table 1: Mini Test Scenarios3
Table 2: MRNRC Recommended Reservoir Elevation Guidelines for Unbalancing.....8
Table 3: Reservoir Unbalancing Schedule.....9
Table 4: 3-year (2001-2003) Fledge Ratio for Least Terns17
Table 5: 3-year (2001-2003) Fledge Ratio for Piping Plover17

Table 6: Propagation Related Projects and Expenditures for 2003	19
Table 7: Recovery Priority Management Areas 2003 Juvenile Pallid Sturgeon Stocking Activities	20
Table 8: Miles City SFH 2003 Juvenile Pallid Sturgeon Stocking Efforts.....	22
Table 9: Garrison Dam NFH 2003 Juvenile Pallid Sturgeon Stocking Efforts	23
Table 10: Garrison Dam NFH 2003 Pallid Sturgeon Transfers.....	23
Table 11: Gavins Point NFH 2003 Juvenile Pallid Sturgeon Stocking Efforts	25
Table 12: Neosho SFH 2003 Juvenile Pallid Sturgeon Stocking Efforts	27
Table 13: Population Assessment Expenditures for 2003	30
Table 14: Result of 2003 Adult Census and Monitoring Efforts of the Least Tern.....	32
Table 15: Result of 2003 Adult Census and Monitoring Efforts of the Piping Plover	33
Table 16: Total Number of Nests and Nest Fates for Piping Plover and Least Tern for the year 2003	35
Table 17: 2002 Captive Reared Piping Plovers Resighted or Captured in 2003 Canada Released	38
Table 18: 1995-2002 Captive Reared Piping Plovers Resighted in 2003 Missouri River Released	38
Table 19: Captures of Captive Reared Piping Plovers on Nests Released in 1997-2002	39
Table 20: Piping Plover Cages on Uncaged Nests.....	41

LIST OF ACRONYMS AND ABBREVIATIONS

<u>Acronym/Abbreviation</u>	<u>Phrase</u>
ACT	Agency Coordination Team
ADCP	Acoustic Doppler Current Profiler
AOP	Annual Operating Plan for the Missouri River
BA	Biological Assessment
BiOp	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
BSNP	Missouri River Bank Stabilization and Navigation Project
CART	combined acoustic/radio transmitter
c.f.s.	cubic feet per second
CR	Conservation Recommendations
Corps	U.S. Army Corps of Engineers
CWA	Clean Water Act
CY	Calendar Year
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ERDC	Engineering Research Development Center
ESA	Endangered Species Act
FY	Federal Fiscal Year from October 01 to September 30
GPS	Global Positioning System
GIS	Geographic Information System

IP	Implementation Plan
MNRR	Missouri National Recreational River
MRNRC	Missouri River Natural Resources Committee
msl	Mean sea level
MTFWP	Montana Department Fish, Wildlife and Parks
NEPA	National Environmental Policy Act
NGPC	Nebraska Game and Parks Commission
NPS	National Park Service
NRCS	Natural Resources Conservation Service of the U.S. Department of Agriculture
PCR	Polymerase Chain Reaction
PgMP	Program Management Plan
RM	River Mile
RPA	Reasonable and Prudent Alternative
RPM	Reasonable and Prudent Measures
SWH	Shallow Water Habitat
T and E	Threatened and Endangered
TESDMS	Threatened and Endangered Species Data Management System
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UUZ	Under utilized zone

2003 ANNUAL REPORT

Introduction

The U.S. Army Corps of Engineers (Corps) prepares an annual report to provide to 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. This report also acts to evaluate the effectiveness of Corps' conservation activities for the endangered interior least tern and pallid sturgeon and the threatened piping plover and bald eagle.

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

Reasonable and Prudent Alternative

I. Adaptive Management

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

I.A.1. Coordination Meetings

No formal ACT coordination meetings were held in CY 2003 as the Corps and USFWS were in continuous informal consultation and meetings in reference to the 2000 BiOp and the Master Water Control Manual Review and Update. On November 3, 2003, the Corps, in accordance with the Endangered Species Act (ESA) regulations, requested reinitiation of formal consultation based on new information concerning effects of the action on the species not previously considered and the designation of piping plover critical habitat. Further, the Corps had concluded that certain components of the USFWS Reasonable and Prudent Alternative (RPA) contained in the 2000 BiOp do not comport with the regulatory criteria for an RPA. On November 10, 2003, the USFWS accepted the Corps Biological Assessment (BA) and started formal consultation.

I.C. Annual Report

This report meets this requirement.

II. Flow Enhancement

II.A. Gavins Point Dam

The 2000 BiOp states that flow modifications at Gavins Point are needed to provide an ecologically improved hydrograph in the lower Missouri River (Galat 1999, Hesse, 1999). Such flows would restore and maintain sandbars and shallow water areas that serve as nesting and foraging habitat for least terns and piping plovers, as well as nursery

habitat for pallid sturgeon and other native fishes; trigger spawning activity in pallid sturgeon and other native fishes; and reconnect potential riverine and floodplain habitats inundating side channels, backwaters, and other off-channel areas needed as spawning and nursery areas for pallid sturgeon and forage fishes, as well as providing additional foraging areas for terns and plovers (USFWS, 2000). The 2000 BiOp RPA recommended flow modifications that would include higher spring and declining or lower summer flows than now exist that would provide the necessary biological cues and habitat to benefit tern, plovers, and pallid sturgeon, as well as other fish and wildlife.

The Corps and the USFWS are in agreement on the habitat attributes necessary to conserve listed species on the Missouri River as described in the 2000 Bi-Op RPA. However, Corps' engineering studies and analysis demonstrated that the flow modifications at Gavins Point set forth in the 2000 Bi-Op RPA do not provide the intended physical attributes and biological effects originally thought and, therefore, do not ensure the Corps' actions avoids the likelihood of jeopardizing the continued existence of the species. For these reasons, the Corps proposed a series of alternative near term and long term actions it believes would benefit and conserve listed species and avoid jeopardizing their continued existence. The Corps' proposed actions were designed to serve Congressionally authorized project purposes, including flood control, hydropower, water supply, water quality, irrigation, navigation, recreation, and fish and wildlife (Corps, 2003).

The 2002-2003 Annual Operating Plan (AOP) presented a "steady release" schedule during the nesting season of the interior least tern and piping plover. Under a steady release schedule, enough water would be released to meet minimum navigation flow targets, support river recreation, and meet water quality standards. A release of 30,000 cubic feet per second (cfs) from Gavins Point would provide minimum navigation service at least 90 percent of the time between June 15 and August 15. Downstream tributary contributions could provide enough water to allow for lower releases.

Under the steady-release plan, Gavins Point Dam releases would have been increased in May for all runoff scenarios when terns and plovers begin to initiate nesting. The release rate was to be no more than 30,000 cfs, but could be set at a lower level, based on an assessment in mid-May of flows needed to support the service level target in August. This was to result in steady flows during the nesting season. Based on 2002 nesting season results, it was anticipated that sufficient habitat would be available above the release rates to provide for successful nesting. The resulting steady release prevents inundation of nests and chicks. Cycling releases every third day was not planned during the 2003 nesting season except during downstream flood control operations. If results of ESA consultation allowed for the replacement of the steady-release plan with the flow-to-target regulation, releases were to have been set to meet the specified navigation service level with increases made as necessary during the threatened and endangered (T&E) bird species nesting season (Corps, 2003).

II.B. Fort Peck Dam

The 2000 BiOp included release changes from Fort Peck Dam as a component of the RPA. The RPA included two tests, the "mini test" and the "full test." Depending on the

results of the tests and data collection, the Corps may implement a Fort Peck Dam release change intended to support the ESA and the pallid sturgeon recommendations in the 2000 BiOp.

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 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 two 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. Low Fort Peck Lake levels resulting from the current drought have delayed the mini test. The full test will be conducted in the spring following the mini test if adverse impacts resulting from the mini test are acceptable and if the level of Fort Peck Lake is adequate.

II.B.1. Implement mini test

The initiation of the mini test would be a specified date set between May 15 and June 1, depending on weather and other logistical concerns. This date will be set a minimum of 1 month prior to the test and public notice will be made. The discharge rates and timing of flows are described in Table 1.

TABLE 1
MINI TEST SCENARIOS

Duration (days)	Spillway Release (1000 c.f.s.)	Power House (1000 c.f.s.)	Combined Release Total (1000 c.f.s.)
Adjustment: Initial powerhouse release at 8K, reduce to 4K while increasing spillway release from 0 to 4K.			
4	4	4	8
Adjustment: Increase powerhouse release from 4 to 8K while reducing spillway release from 4 to 0K.			
1 ¹	0 ¹	8	8
Adjustment: Increase powerhouse release from 8 to 11K. Reduce powerhouse release from 11 to 7K while increasing spillway release from 0 to 4K.			
4	4	7	11
Adjustment: Increase powerhouse release from 7 to 14K while reducing spillway release from 4 to 0K.			
4	0	14 ²	14 ²
Adjustment: Reduce powerhouse release from 14 to 11K while increasing spillway release from 0 to 4K.			
4	4	11	15
Adjustment: Reduce powerhouse release from 11 to 7K while increasing spillway release from 4 to 8K (maintain a maximum total of 15K). Further reduce powerhouse release from 7 to 4K.			
4	8	4	12

Duration (days)	Spillway Release (1000 c.f.s.)	Power House (1000 c.f.s.)	Combined Release Total (1000 c.f.s.)
Adjustment: Increase powerhouse release from 4 to 7K.			
4	8	7	15
Adjustment: Reduce powerhouse release from 7 to 4K while increasing spillway release from 8 to 11K (maintain a maximum total of 15K).			
4 ³	11	4	15
1 ⁴	11 (no fish barrier)	4	15
Adjustment: Day 1 – Reduce spillway release from 11 to 5K while increasing powerhouse release from 4 to 7K. Day 2 – Reduce spillway release from 5 to 0K while increasing powerhouse release from 7 to 9K. Day 3 – Further reduce powerhouse release from 9K to desired release (7 or 8K).			
NA	0 ¹	Normal	Normal

1. Monitoring Period. Spillway release will be stopped during a 4-12 hour period to perform scour hole and exit channel surveys. The monitoring is scheduled to start at approximately 0830 after the listed spillway releases are stopped. After completion of monitoring, the spillway and powerhouse releases will be adjusted to the next release combination.
2. Approximate powerhouse release will vary depending upon pool elevation.
3. Release combination duration may vary from 4-9 days depending upon monitoring results.
4. Release combination duration as required may vary to provide data without the fish barrier.

A summary of specific 2003 Omaha District actions in support of the Fort Peck Flow Tests include:

- a. Preparation of the Draft Environmental Assessment (EA) for the mini test continued through 2003 with finalization scheduled for March 2004.
- b. Monitoring, evaluation, and data collection has continued using Omaha District personnel and contracts with the Montana Department of Fish, Wildlife, and Parks (MTFWP). The U.S. Fish and Wildlife Service, and U.S. Geological Survey (USGS) also contributed in data collection. Monitoring was initiated in 2001 and shall be continued through Fiscal Year (FY) 2008.

Montana Department of Fish, Wildlife, and Parks/U.S. Geological Survey Activities

The Fort Peck Biological Data Collection efforts continued through 2003. A field crew made up of a combination of the USGS and MTFWP personnel conducted the following 2003 Field Activities for the Fort Peck Flow Modification Biological Data Collection Plan:

The Fort Peck Flow Modification Biological Data Collection Plan is a multi-year monitoring project designed to evaluate the influence of proposed flow and water temperature modifications from Fort Peck Dam on physical habitat elements and biological response of pallid sturgeon (*Scaphirhynchus albus*) and other native fishes. An analysis of the multiple components of these data collection efforts has not been completed. This data is serving as baseline information that will be compared to biological responses with flow enhancement including a years worth of data collection following the full flow test. The Data Collection Plan for 2003 was comprised of six main monitoring components: 1) measuring water temperature and turbidity at several

locations downstream from Fort Peck Dam; 2) examining movements by pallid sturgeon that inhabit areas immediately downstream from Fort Peck Dam; 3) examining flow and temperature related movements of paddlefish (*Polyodon spathula*), blue suckers (*Cyprinus elongates*), and shovelnose sturgeon (*Scaphirhynchus platyrhynchus*); 4) quantifying larval fish distribution and abundance; 5) sampling for young-of-year (YOY) sturgeon; and 6) conducting a larval sturgeon drift study. The 2003 field season represents the third year of data collection activities. The following are summaries of the six main monitoring components for 2003:

- 1) Measuring water temperature and turbidity in the Missouri River downstream from Fort Peck Dam.

Water temperature was monitored between April and October at 18 locations during 2003 using continuous-recording (1-hr intervals) water temperature loggers. Turbidity was monitored at three locations in the Missouri River (Frazer Rapids, Poplar, and Nohly) and one location in the lower Yellowstone River using continuous-recording (1-hr intervals) turbidity loggers. Water temperature and turbidity were also monitored at 2-3 day intervals concurrent with larval fish sampling. The water temperature and turbidity data are collected to compare against data collected during the flow tests via the Fort Peck spillway.

- 2) Determine seasonal use and movement of adult pallid sturgeon in the Missouri River downstream from Fort Peck Dam using telemetry.

One adult sturgeon was sampled in the Fort Peck dam tailrace in mid-November 2003 using a gill net. This occurrence represents the first documented incidence of pallid sturgeon in the tailrace during the last few years. The pallid sturgeon was surgically implanted with a combined acoustic/radio transmitter (CART tag) and will be tracked during the next few years.

- 3) Examine flow and temperature related movements of paddlefish, blue suckers, and shovelnose sturgeon.

Activities for 2003 included implanting blue suckers, shovelnose sturgeon, and paddlefish with CART tags during September 2003 and relocating fish implanted with CART tags during previous years (i.e., 2001 and 2002). In September 2003, a total of 20 shovelnose sturgeon, 19 blue suckers, and 1 paddlefish sampled in the Missouri River between Fort Peck Dam and the Yellowstone River confluence were implanted with CART tags. The three species were relocated in the Missouri River from Fort Peck Dam to near the headwaters of Lake Sakakawea (350 km) and in the lower Yellowstone River (113 km). Relocations were obtained at weekly intervals from April through July 2003 and at biweekly intervals from August through October 2003. Adult pallid sturgeons implanted by the USFWS were also relocated during the tracking intervals as part of this study component. Between April and October, a total of 9,360 km of river were tracked by boat in the Missouri River and lower Yellowstone River. Tracking efforts resulted in 794 relocations of shovelnose sturgeon, 557 relocations of blue suckers, 289 relocations of paddlefish, and 173 relocations of pallid sturgeon. Flights were also conducted during September and

October to relocate fish in areas not tracked by boat. Flights resulted in two relocations of blue suckers and four relocations of shovelnose sturgeon upstream from Intake Diversion Dam. In addition, three paddlefish and one pallid sturgeon (at-large for more than one year) were relocated in the headwaters of Lake Sakakawea. Six continuous-recording telemetry ground stations were also deployed throughout the Missouri River to record upstream and downstream movement events of fish. Four individuals of each species were selected for the internet-based and newspaper-based Adopt-A-Fish Program. This program is administered by Walleyes Unlimited and the Billings Gazette and provides the opportunity for classrooms throughout the country to adopt a fish, name a fish, follow weekly movements via the internet, and learn about fish in the Missouri River.

4) Quantify larval fish and distribution and abundance.

Larval fish were sampled during 21 individual sampling events between late May and early August. A total of 2,052 larval fish samples were obtained from four sites in the Missouri River downstream from Fort Peck Dam (below Fort Peck Dam, spillway channel, Wolf Point, Nolhy, and one site in the Milk River and Yellowstone River).

5) Quantify the distribution and abundance of young-of-the-year sturgeon.

Benthic trawling was conducted during August and September to sample for YOY sturgeon. Trawling was conducted primarily in the lower 60 km of the Missouri River upstream from the headwaters of Lake Sakakawea and to a lesser extent in the lower 4 km of the Yellowstone River. Trawling resulted in the collection of 137 YOY sturgeons and, based on initial observations, a few of these individuals exhibit pallid sturgeon characteristics. These individuals will be more closely examined in the near future.

6) Determining drift rate, drift behavior, and transport of larval sturgeons in the Missouri River downstream from Fort Peck Dam.

A multi-year comprehensive study of larval sturgeon drift behavior and drift dynamics was initiated in late June of 2003. The overall goal of this study is to obtain an understanding of larval sturgeon (shovelnose and pallid) drift behavior and drift dynamics related to hydraulic conditions in the Missouri River. This initial study was conducted in a natural side channel of the Missouri River and had the following objectives: 1) to examine the vertical distribution of larval shovelnose sturgeon in the water column, 2) to determine drift rates of larval shovelnose sturgeon, and 3) to provide initial considerations for modeling larval sturgeon drift dynamics in the Missouri River.

In addition to monitoring activities, information on hatchery-raised and adult pallid sturgeon was also obtained during 2003. Field activities resulted in the collection of 25 hatchery-raised juvenile pallid sturgeons and three adult pallid sturgeons. Personnel also assisted in collecting pallid sturgeon broodstock during the spring.

Activities associated with the Data Collection Plan will be expanded in 2004 and continue through at least 2008 as outlined in a new 5-year agreement with the U.S. Army Corps of Engineers. The expanded Data Collection Plan includes: 1) measuring water temperature and turbidity, 2) examining seasonal use and movements of pallid sturgeon in the Missouri River upstream from the Yellowstone River confluence, 3) examining flow- and temperature related movements of shovelnose sturgeon, paddlefish, and blue suckers, 4) quantifying larval fish distribution and abundance, 5) quantifying the distribution and abundance of YOY sturgeon, 6) examining the drift behavior, drift rate, and transport of larval sturgeon, 7) quantifying the food habits of piscivorous fishes, 8) evaluating the effectiveness of the Fort Peck spillway fish barrier, and 9) assisting in pallid sturgeon broodstock collection.

U.S. Fish and Wildlife Service Activities

The USFWS in Bismarck, North Dakota are currently examining movements of the adult pallid sturgeon in the area of the confluence of the Yellowstone and Missouri Rivers.

U.S. Geological Survey Activities

The report, "Swimming Height and the Effect of Velocity on Dispersal of Free Embryo and Larval Pallid Sturgeon: An Experimental Study," was prepared for the Corps by the USGS, Biological Resources Division, S. O. Conte Anadromous Fish Research Center. The study is currently unpublished. The following is the list of objectives from the Executive Summary of the Draft report:

Understanding the dispersal dynamics of young pallid sturgeon is important to evaluating the impact of manning and water regulation in the Missouri River on the species. The present project, conducted in 2003 on Missouri River pallid sturgeon, was a laboratory component of a comprehensive study on dispersal dynamics of pallid sturgeon. Our objectives in 2003 were to (1) verify the accuracy of the 12-13 day dispersal (about 243 cumulative temperature degree units – CTU) period found for Missouri River pallid sturgeon in 1997, (2) evaluate the effect of slow, medium, and fast velocity environments on dispersal and drift rate, (3) determine the daily preferred swimming height of fish during dispersal, (4) determine the daily cumulative temperature degree days (CTU) required for development to larva and the end of dispersal, and (5) suggest ways to apply the information to modeling fish dispersal.

II.B.2. Implement full test

The full test will continue to address concerns about long-term spillway operations with engineering tests and will collect data for verification of a water temperature relationship model. In addition, biological data and physical data regarding the full test will be collected to evaluate and analyze the biological response. The full test will be as described or as modified, based on the results of the mini test. The full test will occur the first year following the mini test that lake elevation and runoff criteria can be met, regardless of the intrasystem unbalancing cycle.

III. Unbalanced Intrasystem Regulation

The unbalancing of the three large upper reservoirs described in the 2002-2003 AOP was not implemented due to low runoff in the upper basin in 2003. The Missouri River Natural Resources Committee (MRNRC) provided recommended guidelines for unbalancing the upper three reservoirs to benefit reservoir fishery and the least tern and piping plover (Table 2). As a result of the continuing drought conditions, low reservoir elevations, and below normal mountain snow pack on March 1, the guidelines did not recommend implementation measures to unbalance the reservoirs. Table 3 is the unbalancing schedule to be used once the Missouri River Mainstem Reservoir System (System) has sufficient levels under which unbalancing is recommended by either the MRNRC or the USFWS.

TABLE 2
MRNRC RECOMMENDED RESERVOIR ELEVATION
GUIDELINES FOR UNBALANCING

	Fort Peck	Garrison	Oahe
Implement unbalancing if the March 1 reservoir elevation is above this level.	2234 feet mean sea level (msl)	1837.5 feet msl	1607.5 feet msl
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.	2227-2234 feet msl	1827-1837.5 feet msl	1600-1607.5 feet msl
Scheduling Criteria	Avoid lake level decline during spawn period which ranged from April 15 – May 30	Schedule after spawn period of April 20 – May 20	Schedule after spawn period of April 8 – May 15

TABLE 3
2002-2003 AOP - RESERVOIR UNBALANCING SCHEDULE

Year	Fort Peck		Garrison		Oahe	
	March 1	Rest of Year	March 1	Rest of Year	March 1	Rest of year
1	High	Float	Low	Hold peak	Raise & hold during pawn	Float
2	Raise & hold during spawn	Float	High	Float	Low	Hold peak
3	Low	Hold peak	Raise & hold during spawn	Float	High	Float

Notes (Table 3):

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.

IV. Habitat Restoration/Creation/Acquisition

IV.A. Restoration of Submerged Shallow Water Habitat (Goal by 2020: restoration of 19,565 total acres)

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 and by deferring maintenance in areas where the risk to the navigation channel is 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.

IV.A.2. Develop habitat restoration plans and strategies in segments 10 through 16

For Segment 10, a 90% design has been completed for the restoration of 46.5 acres of shallow water habitat on newly acquired land at Ponca State Park in Nebraska. Plans and Specifications for the project will be completed in early FY 2004 and a construction contract should be awarded by the third quarter of FY 2004.

For Segments 11-15, a Program Management Plan (PgMP) was produced for development of shallow water habitat (SWH). The PgMP outlines work per reach, cost estimates, available programs, and accounting metrics for a comprehensive program. This report will 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. The shallow water habitat plan to create habitat in Segments 11 through 15 is attached as Appendix B titled, "Shallow Water Habitat Program Management Plan, FY 2003".

The following activities were completed in calendar year 2003 as part of the shallow water habitat development program.

- Excavated 85 notches between river miles 21 and 112. Work was done by contract and consisted of 85 notches up to 100' wide excavated between 2' and 5' below normal navigation stage. Notches were either excavated along public property with the intent of eroding the top-bank and increasing aquatic acreage or, if along private property, were excavated to diversify existing habitat.
- Excavated 21 notches by in-house work crews. Notches were excavated approximately 100' back into the bank. A pilot chute to and from each notch was excavated to the river. These notches were excavated along Overton Bottoms for the purpose of eroding the bank and increasing the amount of shallow water aquatic habitat in the river.
- Excavated 2 chutes approximately 1200' in length. Chutes were excavated by in-house crews. Chutes are located at Overton South.
- Realigned and enlarged the existing Overton North chute. Purpose of work was to increase the amount and frequency of flow in the chute and to encourage erosion and widening of the chute. Work was done by in-house crews.
- Relocated levee at Overton South. Relocated levee will allow for widening of the top width of the river in this area.
- Performed dike modification and chevron construction between River Miles 555 and 541. A total of nine river miles were modified through the Missouri River Mitigation Project.
- Constructed the California Bend Section 1135 Project. This is a multiple side chute project along the right bank just north of Blair, Nebraska.
- Constructed the Tieville-Decatur Bend Mitigation Project. This is a multi-purpose project that includes native river fish benefits, waterfowl benefits, and increased flood plain connection.
- Continued or began design work for Worthwine Island Chute; Lower Hamburg Chute; Marion Bottoms Chute; Franklin Island notches; Diana Bend notches; Marion Bottoms notches; Kansas Bend chutes; Dike and Chevron designs at Tobacco Island, Langdon Bend, Boyer Bend, Blackbird Bend; and various other structure modification projects.

The total number of acres of new shallow water habitat is being determined through field measurements. It is estimated that the work described above will result in over 400 acres of new shallow water habitat when the projects are fully developed.

IV.B. Restoration of Emergent Sandbar Habitat

IV.B.2. Provide Reservoir beach and island habitat

IV.B.2.a. Maintain reservoir habitats through intra-system regulation

The 2002-2003 AOP 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. Unbalancing did not occur in 2003 because of insufficient reservoir water elevations.

IV.B.3. Artificial or Mechanically Created Habitat

IV.B.3.a Provide created sandbar habitat on Segments 2, 4, 8, 9, 10 to supplement natural sandbar habitat

An Implementation Plan (IP) was developed for the non-flow creation and maintenance of Emergent Sandbar Habitat (ESH) to comply with the 2000 BiOp. The purpose of the IP is to describe non-flow methods of creating and maintaining ESH. Potential non-flow habitat creation and maintenance methods include but are not limited to the following:

- Increasing the height of existing submerged sandbars utilizing dredges to pump and place material to create exposed sandbar conditions.
- Mechanical manipulation of existing sandbars by pushing submerged sand to exposed elevations utilizing bulldozers, and/or excavators.
- Contouring existing sandbars to either minimize high dunes or to add minor topographical height variations utilizing bulldozers, front-end loaders, scrapers, and/or excavators.
- Contouring existing sandbars to provide depositional areas for organic material, wetted areas, and/or shallow ephemeral pools to increase forage production and forage availability.
- Investigate supplemental nitrification of sites with poor or insufficient forage production.
- Set up and removal of sand fences on existing habitat areas to add important microhabitat features and/or create dunes to add topographical variations.

- Short term armoring of productive nesting areas with temporary materials such as logs or bales.
- Vegetation removal by aquatically approved pre-or post-emergent herbicide application (i.e. glyphosate), or, by utilizing scrapers, mowers, discs, chippers or similar type machines or by burning.
- Creating dynamic sandbar complexes by cutting shallow water channels through existing large sandbars.
- Reducing localized predator impacts by removal of land bridges and perches.
- Enhancing terrestrialized linear habitats with livestock exclosures and enclosures, peninsula cutoffs, and providing site security through slope reductions and/or substrate modifications.

Work on design plans and specifications for construction of three ESH complexes in reach 10 continued through 2003. These projects consist of dredging sand from the riverbed to create habitat at locations where birds have historically nested. If funding is made available, and the NEPA process can be completed, a contract could be awarded in the third quarter of FY 2004. Additional design efforts are underway in reaches 8, 9, and 10. In 2003, three projects were accomplished to create ESH in the Omaha District.

Two of the habitat creation projects took place on the Lake Oahe Reservoir. The first project protected approximately 200 acres of useable shoreline habitat by installing livestock exclusion fences along the Kenel Flats area on the Standing Rock Sioux Reservation. Prior to the installation of the fences, the landowner's cattle freely wandered the shoreline of Lake Oahe. This resulted in an occasional trampling of piping plover and least tern nests. The fence line include several "tag lines" which allowed access to the reservoir at intervals for the cattle but did not allow them to freely roam the shoreline. The cost of this project was \$8,300. An additional benefit of the fencing was that it provided the groundwork for future partnerships with the Standing Rock Sioux Tribe and an opportunity to share information with members of the Tribe on the importance of protecting and/or enhancing threatened and endangered species habitat along the shoreline within their reservation.

The other habitat creation project at Lake Oahe was accomplished on one of many peninsulas in the Little Bend area of the reservoir. This project created 1.9 acres of habitat at elevation 1616 and 4.5 acres at elevation 1610. The project created some much needed suitable habitat at a higher elevation for non-drought years. Many areas being used by piping plovers and least terns during the past few drought years are under water during normal water years. In addition to creating habitat during higher water years, the channel cut to form the island was wide enough to serve as a terrestrial predator barrier. The top elevation of the island was cut down to allow the island to be completely submerged on an infrequent basis to control vegetation and the side slopes were flattened to create the desired wet areas for foraging. The island was also cleared of existing vegetation. The total cost of the project was \$132,384.

The third project was the Gavins Point Project study initiated in 2003 to assess Arsenal herbicide as a tool to control vegetation on least tern and piping plover nesting areas. Arsenal is a pre- and post-emergent herbicide that may provide residual control to prevent rapid re-vegetation of treated areas. Four 1-acre treatment areas were established on an island (River Mile 838.0) in Lewis and Clark Lake that had previously been used by least terns and piping plovers but had become too vegetated for nesting use. Treatments consisted of Arsenal, Arsenal with mowing, mowing, and a vegetated reference area. An unvegetated reference area of preferred conditions was selected on another island just upstream. Intensive sampling of each area included measures of Arsenal in the substrate and nearby water; monitoring of vertebrate use and mortalities; sampling of invertebrate biomass; and measurements of vegetation cover, density, and visual obstruction. Arsenal chemical was detected throughout the season on treated areas but was not detected in adjacent terrestrial or aquatic areas. Arsenal successfully killed existing vegetation and prevented re-growth of vegetation throughout the 2003 season. In particular, vegetation conditions on the plot treated with Arsenal and mowed were very similar to conditions on the reference site. While vegetation on the mowed treatment area was initially reduced, it rapidly re-grew. Arsenal treated areas were used by a variety of terrestrial wildlife and no mortalities were observed. Additionally, invertebrate biomass on Arsenal treated areas was similar to the vegetated and unvegetated reference areas. Preliminary results of 2003 monitoring suggest that application of Arsenal herbicide can kill vegetation and create conditions suitable for nesting with no effects on wildlife or invertebrate communities. Monitoring of treatment areas will continue for two more years to determine residual effects on vegetation in treatment areas.

IV.C. Initiate studies of the lack of sediment transport and impacts on habitat regeneration and turbidity

The Corps has begun scoping of three sediment management tests in Segments 8, 9, and 10. The first such effort is a test flow from Fort Randall Dam that is designed to further define the parameters needed to flush sediments through Lewis and Clark Lake (Segment 9) into the river reach below Gavins Point Dam (Segment 10). Meetings with river biologists (Federal, state, and private), the USGS, and river engineers with reservoir sediment management experience (USBR, academia, consultants, etc.) have provided information on study and data needs, scheduling, and funding possibilities. Initial data collection efforts are planned for FY 2005 but could begin earlier if funding is made available.

The second effort is a fall test flow from Gavins Point Dam after the System has been refilled following the current drought. The test will consist of a release of approximately 60,000 cfs for a period of approximately 60 days. The test would be monitored for physical changes in sandbar distribution and characteristics in the reach of the river from Gavins Point Dam to Ponca State Park. Representative island/bars will be monitored to determine the factors that limit the initiation of scour and tests would be performed on techniques that may aid the scouring process. Examples include vegetation removal prior to the test discharges, physical conditioning (i.e., disking) prior to the test, etc. This would increase the total amount of bare sandbar habitat in this reach and would allow for

a redistribution of the habitat. The Corps will begin the scoping efforts for this test in FY 2004.

The third test, habitat construction and conditioning, will be conducted downstream from Gavins Point Dam. Under this test, new sandbar habitat would be constructed following the fledging of the least terns and piping plovers. As releases from Gavins Point Dam are increased the following spring to meet the navigation service requirements, arrangements would be made to make releases in excess of that planned to serve navigation such that the new sandbar habitat would be inundated for a day or two. This may consolidate the substrate and potentially mix organic material in the surface layer. The objective of this test is to determine if there is a difference in least tern and piping plover productivity between the conditioned habitat and the habitat that is constructed and not inundated. This test will be scoped and conducted as soon as the system has adequate water.

IV.D. Monitoring of tern and plover nesting habitat

Missouri River Habitat Assessment Activities

The Corps conducted an intensive assessment of least tern and piping plover habitat use and availability on the reach of the Missouri River below Gavins Point Dam in September of 2003. The objectives of the assessment were: 1) describe habitat characteristics of areas used by nesting piping plovers and least terns; 2) develop an estimate of overall habitat availability for the reach; 3) calculate estimates of habitat availability at various flow levels; and, 4) provide detailed measure of vegetation characteristics for planning management actions. The Corps selected 15 random 0.3 mile sections of the Gavins Point River Reach for sampling. Perimeters were measured of all interchannel islands that overlapped the sampling areas with a Global Positioning System (GPS) to provide to estimate of island sizes. Random points were generated at a density of 2 per acre on all interchannel islands within the sampling area. At each of these points, a variety of measurements on vegetation structure, density, composition, and visual obstruction, as well as elevation and slope were collected. In addition, similar measurements at 50 randomly selected least tern (n = 25) and piping plover (n = 25) nests sites were collected.

The Corps conducted a preliminary analysis of this data in 2003, including the creation of Geographical Information System (GIS) databases and summary statistics. Preliminary results suggest that habitat used by terns and plovers in 2003 was similar to results from previous studies, confirming that the majority of nest sites occur in areas with extremely sparse vegetation, high visibility, and small slopes. A large proportion of the sampled habitat did not meet the characteristics measured at nest sites, suggesting that habitat conditions on the Gavins Point River Reach in 2003 were extremely poor. Analysis of this data will continue in 2004. In addition, the Corps plans to integrate the sampling data with remote sensing data to provide a more complete picture of habitat conditions and trends over time.

Remote Sensing Data Collection

Aerial imagery of the entire length of the Missouri River, excluding only Lake Oahe in South Dakota, was collected by the U. S. Department of Agriculture (USDA) in the summer of 2003. The characteristics of the data vary geographically, but all data were collected as either real-color or color infrared with 2 m maximum resolution. These data were purchased in 2003 and will be delivered in 2004. Additionally, real-color (2 ft resolution) remote sensing data set of Lake Oahe in South Dakota was purchased through a cooperative agreement with the State of South Dakota. These data will also be delivered in 2004. Both sets of data will be processed in 2004 and used to assist in determining current habitat conditions and aid in the development of habitat management projects.

Reservoir Habitat Assessment

The Corps conducted a reservoir habitat assessment on Lake Sakakawea in North Dakota in 2003. Due to increased use of the reservoir by piping plovers and least terns, it was decided it was important to begin assessing habitat use and availability to increase our understanding of the effects of management actions and water management on reservoir habitat. The objectives for this study were to determine and quantify the range of nest site characteristics of piping plovers and least terns; assess vegetation, slope, and substrate attributes within historic nesting areas; evaluate habitat conditions in historic nesting areas; and demonstrate the effects of reservoir elevation on habitat availability.

Data were collected within historic nesting areas and at nests. Historic nesting areas were determined using nesting data from 1996 to 2002 and elevation contours from 1947. A total of 20 randomly located transects were sampled within these historic areas. Thirty-one randomly selected nests were also sampled. At nest sites, field personnel took measurements at the nest bowl and 3 and 9 meters in four directions from the nest to determine patch homogeneity.

Field personnel collected a variety of vegetation measurements including ground and canopy cover estimates, height, and dominant species. Six particle size categories were used to describe substrate characteristics. GPS data were collected determine distance to water and vegetation and to calculate slope.

The Corps found that nest sites had very little vegetation cover and most observed vegetation was late season forbs. Nest sites were also gently sloping and had a consolidated mix of substrate particles. We used the range of characteristics observed at nest sites to determine availability of suitable habitat within elevation categories of historic sites. Only a small proportion of the historic areas met the characteristics observed at the nest sites, and the proportion varied with elevation.

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

During the nesting season, the Corps has continued to coordinate extensively with the Manhattan office of the Service 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, several times a week, 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 that 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 after unregulated high flow events occur on the river and flood nests and also prior to resuming normal lake operations. This operation leads to abnormal storage of water in Corps lakes within the Kansas River basin.

V.A.2. Gather data and evaluate whether Kansas River provides source or sink

Since 1999, the Corps has funded Dr. Roger L. Boyd of Baker University to conduct annual breeding surveys of the least terns and piping plovers nesting on the Kansas River. These surveys include collecting and evaluating productivity, habitat, and other pertinent data needed for the Corps to decide whether the Kansas River provides a source or sink for these species. The Corps will make an evaluation after the 2005-nesting season. Annual breeding survey reports are prepared for the Corps by Dr. Boyd and are coordinated with the USFWS. The USFWS's Manhattan office has agreed with the Corps' plan to use data from these annual breeding survey reports to make the "source or sink" evaluation in 2005.

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

Table 4 shows the Corps has exceeded the three-year (2001-2003) fledge ratio 0.70 for least terns with a three-year fledge ratio of 1.06. Table 5 shows the Corps has exceeded the three-year (2001-2003) fledge ratio 1.13 for piping plovers with a three-year fledge ratio of 1.60. Emergent sandbar habitat created by the high water flows in 1997 provided habitat for terns and plovers. This has allowed the Corps in subsequent years to reach the required fledge ratio for the terns and plovers.

TABLE 4
THREE-YEAR (2001-2003) FLEDGE RATIO FOR
LEAST TERNS (REQUIRED 0.70)

	Adult Census	Fledged Juveniles	Fledge Ratio
2001	653	341	1.04
2002	731	465	1.27
2003	741	323	0.87
3 Yr. Total (2001-2003)	2125	1129	1.06

TABLE 5
THREE-YEAR (2001-2003) FLEDGE RATIO FOR
PIPING PLOVERS (REQUIRED 1.13)

	Adult Census	Fledged Juveniles	Fledge Ratio
2001	1054	740	1.40
2002	1134	1073	1.89
2003	1338	1001	1.50
3 Yr. Total (2001-2003)	3526	2814	1.60

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

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 are evaluating 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 site; 3) identify characteristics of high quality plover foraging habitat in the Great Plains; and 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; and 4) habitat selection is a function of habitat characteristics and invertebrate abundance.

The 2003 CY saw the third and final season of the foraging ecology study completed. The report is being prepared by Virginia Polytech University. For more information, contact the Corps Office at P.O. Box 710, Yankton, SD 57078.

VI. Pallid Sturgeon

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

Six hatcheries are currently involved in pallid sturgeon propagation efforts to augment wild populations in the Missouri River basin. Four hatcheries are operated by the FWS: Bozeman Fish Technology Center (Bozeman FTC), Garrison Dam National Fish Hatchery (Garrison Dam NFH), Gavins Point National Fish Hatchery (Gavins Point NFH), and the Neosho National Fish Hatchery (Neosho NFH). The remaining two facilities are operated by state agencies: Miles City State Fish Hatchery (Miles City SFH) operated by the Montana Department of Fish, Wildlife, and Parks and the Blind Pony State Fish Hatchery (Blind Pony SFH) operated by the Missouri Department of Conservation.

Propagation efforts are coordinated through the Upper and Middle Basin “Workgroups” as well as a “Propagation Workgroup” to achieve annual stocking goals. The Propagation Workgroup was cooperatively established by the Corps and the USFWS in 2002 and comprises members representative of the Corps, USFWS, and the States of Montana and Missouri possessing the unique knowledge and experience critical to successful propagation of pallid sturgeon. The Propagation Workgroup prioritizes propagation needs each year to facilitate achievement of the “Average Annual Shortfall” (Corps responsibility) as identified in RPA Element VI.A. in the BiOp.

In 2003, the Propagation Workgroup prioritized needs for annual propagation efforts as has been done in the past. Prioritization was based on the following criteria established by the propagation workgroup.

Priority 1: Pallid Sturgeon production

- Spawning expenses (hormones, genetic analysis, broodstock collection)
- Production expenses (feed, water, pumping, heating, chilling, water treatment)
- Cryopreservation (liquid nitrogen)

Priority 2: Facility upgrades and expansion

- Increase production capabilities (additional tanks, improved water supply)
- Necessary preventative maintenance on existing facilities (equipment repairs, filters, UV disinfection, etc.)
- Improvements to increase efficiency (upgraded UV systems, etc.)

Priority 3: Supplies and equipment

- Backup supplies to repair equipment
- New equipment

Priority 4: Labor

- Spawning (benefits multiple facilities and the overall program)
- Distribution (benefits multiple facilities and the overall program)
- Fish production

- Community of Practice Meetings
- Hatchery maintenance and administration

The Corps provided supplemental support for propagation efforts including needs inclusive of Priority items 1-3. In 2003, there was no funding directed toward covering costs associated with labor (Priority 4 items). Through Military Interdepartmental Purchase Requests (MIPRs) and contracts, the Corps supported pallid sturgeon propagation/population augmentation throughout the Missouri River basin. Table 6 provides a summary of the Corps support of the propagation/population augmentation.

TABLE 6
PROPAGATION RELATED PROJECTS AND EXPENDITURES FOR 2003

Description/Project Title	Cooperator	Expenditure
Propagation, Population/Agumentation	Blind Pony State Fish Hatchery	\$31,000
Propagation, Population/Agumentation	Neosho National Fish Hatchery	\$21,800
Propagation, Population/Agumentation	Gavins Point National Fish Hatchery	\$37,290
Description/Project Title	Cooperator	Expenditure
Propagation, Population/Agumentation	Garrison Dam National Fish Hatchery	\$39,267
Propagation, Population/Agumentation	Miles City State Fish Hatchery	\$51,230
Propagation, Population/Agumentation	Bozeman Fish Technology Center	\$36,838
Genetic Variability Analysis Recommendations for Adult Pairings	University of California (Davis)	\$7,000
	Total Propagation Support	\$224,425

The Corps provided assistance and training in Passive Integrated Transponder (PIT) tagging as well as elastomere tagging of juvenile pallid sturgeon prior to stocking. Corps Project offices throughout the Missouri River basin participated in these efforts. The Corps also provided assistance with distribution and stocking activities. Stocking efforts included assisting with transporting of juvenile pallid sturgeon from “Upper” basin hatcheries (upstream of Gavins Point Dam) to stocking sites in the “Lower” basin (downstream from Gavins Point Dam).

In addition to the annual prioritization effort, facility limitations were identified for each of the hatcheries to meet future propagation demands. Limitations of the program identified:

- inadequate production capabilities to meet future stocking requirements
- inadequate broodstock holding capabilities (volume of holding space)
- improving water reliability, quality, quantity, and temperature control

- diet development and specialized fish distribution equipment

These additional needs of the program were incorporated into Appendix B of the Corps' 2003 Biological Assessment on the Operation of the Missouri River Mainstem Reservoir System, the Operation and Maintenance of the Bank Stabilization and Navigation Project, and the Operation of Kansas River Reservoir System.

A total of 5,313 YOY juvenile pallid sturgeons representing the 2003-year class, and a total of 17,156 juvenile pallid sturgeons representing the 2002-year class were stocked in 2003. An additional 956 fish from the 2001-year class were stocked early in 2003 for a total of 23,425. In Recovery Priority Management Area (RPMA) 1, no pallid sturgeon were stocked due to the potential of moving fish that originate from areas known to harbor the pallid sturgeon iridovirus into this reach where the virus has yet to be found. Table 7 (CY 2003) and Appendix E (FY 2003) summarize the RPMA stocking activities for 2003.

TABLE 7
RECOVERY PRIORITY MANAGEMENT AREAS
2003 JUVENILE PALLID STURGEON STOCKING ACTIVITIES

RPMA	2003-Year Class	2002-Year Class	2001-Year Class
2	0	4,124	0
3	0	601	0
4	5,313	12,431	956
Total	5,313	17,156	956

All stocking efforts throughout the Missouri River basin resulted from progeny originating in the upper basin (adults captured in the Missouri/Yellowstone River confluence area). No spawning activities occurred in the lower basin in 2003.

Bozeman Fish Technology Center Activities

The Bozeman FTC has 3 primary water sources (warm and cold springs and a warm well) providing versatility for temperature control and water reliability. Because of the facility's diverse water supplies, there are no specialized equipment needs for heating or cooling water to meet temperature needs for pallid sturgeon production. The facility operation relies on the ability to reuse water rather than the single pass system. An ultraviolet (UV) unit provides 30,000 micro-Watt-second/cm² of protection for disease prevention, parasite infestations, and cross contamination via the reuse water system. Biofiltration improves water quality via natural processes by binding the unionized ammonia through the reuse system. Water passes through sand filters increasing water clarity resulting in enhanced effectiveness of the UV treatment system.

Attempts to collect wild broodstock from the Missouri River above Fort Peck Reservoir were unsuccessful in 2003. Previous capture and spawning efforts had been met with some success with the use of a temporary streamside spawning station at Fort Robinson Bridge.

There were no spawning efforts conducted by the Bozeman FTC staff in 2003. However, eggs from successful spawning efforts at the Miles City SFH and the Garrison Dam NFH were transported by vehicle to the Bozeman FTC. A total of 7 families were represented with 4 females and 6 males. Two males were utilized for fertilization per female for 3 of the females. A fourth female was misidentified as a male during pre-spawning screening. Therefore, eggs from this female were fertilized by one of the previously used males resulting in an additional 1:1 family cross. The eggs were incubated and hatched in 63°F water. Hatch success was highly variable yielding a wide range (20-80%) between family crosses regarding percent hatch. Mean water temperature was 68°F following hatching through October. Newly hatched fry were fed Cyclopeze and Bio-diet starter. Post-fry stage fish were fed experimental feed manufactured at the Bozeman FTC. These fish are scheduled for stocking in the Missouri River above Fort Peck Reservoir in 2004 provided that fish health results do not detect the pallid sturgeon iridovirus.

Additional activities at the Bozeman FTC include specialized efforts to produce feeds meeting the unique nutritional requirements of pallid sturgeon. The development of broodstock diets is ongoing. These specialized diets will be used at the Gavins Point NFH providing long-term benefits to the future captive broodstock program. Additional diets are being researched and developed to meet the nutritional needs of all life stages of the pallid sturgeon.

Fish Health

All fish health assessments conducted at the Bozeman FTC resulted in negative results regarding the pallid sturgeon iridovirus.

Miles City State Fish Hatchery Activities

The Miles City SFH relies on two primary water supplies to carry out propagation activities. A low volume well water supply and the Yellowstone River provide water to meet the facilities needs. Water is filtered and UV treated prior to entering the culture tanks. The use of boilers provide the capability of heating water to facilitate growth during periods of colder ambient temperatures and a chiller is utilized to moderate the Yellowstone River water during the warmer summer months.

Wild broodstock were captured in the Fort Peck Reach in the vicinity of the Yellowstone and Missouri River confluence. A total of 7 adults were transported to the Miles City SFH. Originally, the crew believed that they had 5 males and 2 females; however, one of the smaller fish was misidentified and was actually a female. All adults were injected with Leutinizing Hormone Releasing Hormone (LHRH) to induce ovulation and spermiation. Females were injected at a rate of 0.10 mg/kg body weight and males were injected at 0.02 mg/kg body weight.

The original 2 females were successfully spawned and the eggs were crossed with 3 different males yielding a total of 6 families (additional milt was provided from male pallid sturgeon from the Garrison Dam NFH to facilitate these genetic pairings). Eggs

from the misidentified female were crossed with a single male (duplicate) yielding an additional family cross for a total of 7 families produced at Miles City SFH.

A portion of the eggs were shipped to the Garrison Dam NFH and the Bozeman FTC to facilitate their culture efforts and provide the additional insurance of rearing these families at multiple facilities to minimize the chance of catastrophic loss of an entire year or family cross. The remaining eggs were retained at the Miles City SFH for production and stocking purposes. Mean water temperature was 62°F from May through October during the primary growing season. Mean water temperature was 50°F from November through May while the 2002-year class was being maintained through the winter months.

Percent hatch of the 2003-year class was never quantified in efforts to minimize handling to alleviate stress and the potential for expressing disease or causing other fish health related setback associated with handling. Biodiet starter #2 and Silver Cup Trout #1 and #2 were the only diets used to rear the pallid sturgeon at Miles City SFH.

Table 8 shows that all 2002-year class fish were stocked into RPMA 2 at four locations (two locations on the Missouri River and two on the Yellowstone River). The 2002-year class fish were all from a single female. Progeny were stocked out with a Pit Tag at the base of the dorsal fin along the left side with an additional pair of elastomere markings on the underside of the rostrum to identify year class and female (red and yellow) to allow for future identification of these fish in the event that the Pit Tag is shed or non-functional in future field collections.

TABLE 8
MILES CITY SFH 2003
JUVENILE PALLID STURGEON STOCKING EFFORTS

RPMA	Location/River	Number	Year Class
2	Intake/Yellowstone River	550	2002
2	Fairview Bridge/Yellowstone River	550	2002
2	Culbertson/Missouri River	550	2002
2	Wolf Point/Missouri River	536	2002
Total Stocked		2,186	2002

Garrison Dam National Fish Hatchery Activities

The Garrison Dam NFH relies on the Missouri River (Lake Sakakawea) to supply water for all propagation activities. The water is filtered (15 microns) and UV treated to provide protection from disease and parasite infestations.

In conjunction with the broodstock collection efforts that provided adults to the Miles City SFH, the Garrison Dam NFH also received 3 females and 10 males for spawning purposes. Both males and females were injected to induce spermiation and ovulation. Males were injected with LHRH at 0.02 mg/kg of body weight and females were injected at 0.05 mg/kg of body weight. Only 1 female of the 3 was successfully spawned. Eggs

from this female were fertilized using 6 different males producing a total of 6 families. In addition to the successful spawning efforts at Garrison Dam NFH, additional eggs were received from the Miles City SFH and incorporated into the 2003-year class production efforts.

The mean percent hatch for all eggs was 21% (2003-year class). After hatching, Biodiet Starter feed sizes #1 through #3 was introduced and fed to the young pallid sturgeons. These fish were later converted to Silver Cup Salmon #2 diet. The 2002-year class fish were fed Silver Cup Salmon diet in 2003. Mean water temperature was 65°F and ranged from 35°F-68°F.

The 2002-year class fish were all from a single female. Progeny were stocked out with a Pit Tag at the base of the dorsal fin along the left side. Table 9 summarizes Garrison NFH stocking activities for 2003. A portion of the 2002-year class fish were transferred to different locations and/or used for purposes other than stocking efforts. Refer to Table 10 to review pallid sturgeon transfer information.

TABLE 9
GARRISON DAM NFH 2003
JUVENILE PALLID STURGEON STOCKING EFFORTS

RPMA	Location, Facility and/or Purpose	Number	Year Class
4	Mulberry Bend	2,069	2002
4	Bellevue	1,769	2002
4	Booneville	1,441	2002
4	Mulberry Bend	1,763	2003
4	Bellevue	1,781	2003
4	Booneville	1,769	2003
Total Stocked		10,592	2002, 2003

TABLE 10
GARRISON DAM NFH 2003 PALLID STURGEON TRANSFERS

RPMA	Location, Facility and/or Purpose	Number	Year Class
NA	Gavins Point NFH (fall transfer-16 families)	4,425	2003
NA	Neosho NFH (fall transfer-9 families)	3,919	2003
NA	Fish Health Assessment (120 routine sampling & 100 for Polymerase Chain Reaction (PCR) verification, 17 to UC Davis for iridovirus testing and 19 for diagnostic work)	256	2002, 2003
NA	Abernathy Fish Technology Center (research)	4,000	2003
NA	Oxytetracycline Study	2,000	2003
Total Transfers		14,600	2002, 2003

Cryopreservation

Cryopreservation efforts included adding 15 males to the repository. Previously, there were 26 donors made up the existing assemblage of genetic material. The total representation for the basin is now 41 males. All representation is from fish originating in the Fort Peck Reach.

Fish Health

Fish were sampled for the pallid sturgeon iridovirus (both the 2002 and 2003 year classes) and tested positive. Therefore, no stocking was permitted in RPMA 1 or 2; however, all fish were stocked into RPMA 3 or 4 or transferred to downstream rearing hatcheries or used for research purposes. The Montana Department of Fish, Wildlife, and Park's Fish Health Policy and associated Fish Health Committee would not approve fish from the Garrison Dam NFH to be stocked within the State of Montana's boundaries because of the positive testing for the pallid sturgeon iridovirus.

Gavins Point National Fish Hatchery Activities

The Gavins Point NFH is supplied by two primary water sources. Two wells (one primary source) provide a portion of the facilities water. However, the primary water supply is from the Missouri River (Lewis and Clark Lake). The well water is pumped through a packed column (aeration) and stored in a water tower. Gravity enables the water to be passively supplied to the Sturgeon and Endangered Species Buildings for propagation activities. The lake water is supplied from Lewis and Clark lake via a siphon system, filtered through a rotating drum micro strainer (17 microns) and UV treated in the endangered species building before entering the rearing tanks. The UV system was re-plumbed in 2003 to allow continuous UV protection while accommodating routine maintenance of the system. The dual water supplies provide plentiful water and enable the facility to moderate warmer temperatures from the Missouri River by blending the cooler well water during the summer months. During the winter months, the well water provides the ability to increase rearing temperatures slightly above ambient temperatures. Because of the diversified water supplies, heating and chilling water to meet the requirements of the pallid sturgeon is unnecessary.

The facility has not conducted spawning activities since 1999. The Gavins Point NFH is the only facility holding future captive broodstock and, therefore, there is inadequate space available to hold wild broodstock to facilitate spawning efforts at the present time. Although spawning did not take place, the hatchery staff played an active role in the spawning efforts at the Miles City SFH. Refer to Table 11 for Gavins Point NFH stocking activities for 2003.

TABLE 11
GAVINS POINT NFH 2003
JUVENILE PALLID STURGEON STOCKING EFFORTS

RPMA	Location, River and Tag Type	Number	Year Class
2	Intake, Yellowstone River, PIT, and Elastomere	490	2002
2	Fairview Bridge, Yellowstone, PIT, and Elastomere	489	2002
2	Wolf Point, Missouri River, PIT, and Elastomere	489	2002
2	Culbertson, Missouri River, PIT, and Elastomere	483	2002
3	Sunshine Bottoms, Missouri River, PIT, and Elastomere	301	2002
3	Standing Bear Bridge, Missouri River, PIT, and Elastomere	300	2002
4	Mulberry Bend, Missouri River, PIT	80	2001
4	Bellevue, Missouri River, PIT	79	2001
4	Mulberry Bend, Missouri River, PIT, and Elastomere	500	2002
4	Bellevue, Missouri River, PIT, and Elastomere	500	2002
4	Booneville, Missouri River, PIT, and Elastomere	535	2002
Total Stocked		4,246	2001, 2002

Juvenile pallid sturgeons from the 2002-year class were transported from the Garrison Dam NFH to the Gavins Point NFH. Five families were represented in the transferred fish and these families have been included into the future captive broodstock program.

A variety of diets have been used at the facility in 2003. An experimental broodstock diet (0305) produced by the Bozeman FTC was used on the 1998-year class of future captive broodstock. BioDiet Starter sizes 1 through 4, 1.3 mm and 2.0 mm, broodstock diet, 4.0 mm and 5.0 mm, and commercial Silver Cup sizes 1 through 4 plus broodstock extruded slow sinking sizes 3.0 mm and 4.0 mm were all utilized for the various ages of production (fish for stocking) and growth and maintenance for future broodstock.

Records regarding water temperature are closely monitored at the facility. The following provides mean temperature and range in degrees Fahrenheit by month for the fiscal year:

October 2002: Mean = 54.9; range = 47-60
 November 2002: Mean = 44.5; range = 42-47
 December 2002: Mean = 40.4; range = 38-42
 January 2003: Mean = 44.9; range = 42-46
 February 2003: Mean = 45.1; range = 42-47
 March 2003: Mean = 49.3; range = 45-51
 April 2003: Mean = 52.0; range = 51-53
 May 2003: Mean = 56.7; range = 53-64
 June 2003: Mean = 64.2; range = 61-67
 July 2003: Mean = 68.1; range = 67-72
 August 2003: Mean = 68.3; range = 67-71
 September 2003: Mean = 66.0; range = 67-70

Cryopreservation

The Gavins Point NFH added 13 males to their cryopreservation storage. They now have a total of 22 represented at the facility. This is essentially a subset of what is being held at the Garrison Dam NFH.

Fish Health

Both the 2002 and 2003 year classes tested positive for the pallid sturgeon iridovirus. These results precluded fish from Gavins Point NFH to be stocked into the Missouri River in Montana.

Neosho National Fish Hatchery Activities

The Neosho NFH relies exclusively on well water for all propagation efforts; however, a portion of the facility utilizes ponds for various fish cultural activities. Due to the exclusive use of cold well water, the water must be heated to provide temperatures conducive to rearing requirements for pallid sturgeon. The facility also reuses a portion of the water and, therefore, UV treatment systems are a necessity to minimize the potential for the spread of disease and parasite infestations in this intensive culture environment.

The Neosho NFH did not spawn any adult pallid sturgeon in 2003. The existing facility does not contain the essential infrastructure to hold and spawn wild pallid sturgeon. Future expansion plans will accommodate both spawning and quadruple current production capabilities.

The Neosho NFH received juvenile pallid sturgeon from the spawning efforts in the upper basin (Missouri/Yellowstone River origin) again in 2003. These fish were from the 2002-year class, which comprised a total of 3 families. A single female is represented in these 3 families.

All fish were fed a natural diet, such as krill and bloodworms, rather than commercial diets. The fish were handled as minimally as possible. The concept of photo inventories was explored by taking pictures from high above each tank to approximate tank and total inventories. Prior to stocking, all fish were automatically counted by the computer software during PIT tagging procedures. The photo inventories were found to be remarkably accurate.

Fish from the 2001-year class were stocked in the fall of 2002 and fish from the 2002-year class were stocked in the fall of 2003. Table 12 summarizes Neosho SFH 2002 and 2003 stocking activities.

TABLE 12
NEOSHO SFH 2003
JUVENILE PALLID STURGEON STOCKING EFFORTS

RPMA	Location	Number	Year Class
4	Mulberry Bend	666	2002
4	Bellevue	717	2002
4	Booneville	876	2002
4	Mulberry Bend	310	2001
4	Bellevue	302	2001
4	Booneville	344	2001
Total Stocked		3,215	2001, 2002

Fish Health

Routine fish health samples were collected on 60 representative fish prior to stocking. The fish test negative for the pallid sturgeon iridovirus and rated in the high quality range relevant to liver condition.

Blind Pony State Fish Hatchery Activities

The Blind Pony SFH relies exclusively on Blind Pony Lake for water for all propagation activities. Drought conditions persisted throughout the basin and, as a result, the decision was made not to bring any wild pallid sturgeon into the facility for spawning and subsequent propagation efforts.

Blind Pony SFH provided support to other facilities rearing pallid sturgeon in 2003 by providing tagging equipment, fish feed, and assisting with the distribution of pallid sturgeon from the upper basin to the lower Missouri River (below Gavins Point Dam).

A variety of equipment purchases were made including specialized equipment for sexing pallid sturgeon by minimally invasive methods. The Terason Ultrasound System will be used for determining sex of adult pallid sturgeon to minimize stress to pallid sturgeon adults prior to spawning operations. A broodstock distribution tank was purchased to facilitate transport of adult pallid sturgeon from the river to the hatchery and back to the river after spawning efforts are complete. Aerators were purchased for use in pallid sturgeon rearing in the future. There were no fish health or cryopreservation activities conducted at the facility in 2003.

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

The “Pallid Sturgeon Population Assessment Team” continued to develop the standardized protocols for sampling on the Missouri River. This team comprises tremendous knowledge, experience, and expertise and has compiled a detailed series of standard operating procedures to cover a range of protocols from the habitat classification system to universal data sheets. Future plans include an independent technical review to

further develop this plan to ensure a sound scientific program for the Missouri River system.

In 2003, the Corps supported population assessment activities in high priority river segments. The Nebraska Game and Parks Commission and the USFWS conducted pallid sturgeon population assessment activities in accordance with guidelines outlined in the document "Long-term Pallid Sturgeon and Associated Fish Community Assessment for the Missouri River and Standardized Guidelines for Sampling and Data Collection (Draft-2004)." This document is a "work in progress," thus allowing for updates and improvements in the best interest of the program to provide sound science.

Great Plains Fish and Wildlife Management Assistance Office Activities

In 2003, the USFWS was able to commit an additional crew to the population assessment program. The Great Plains Fish and Wildlife Management Assistance Office (USFWS-Pierre, South Dakota) began sampling efforts in March of 2003. This crew sampled river segments 5 and 6 as identified in the draft document "Long-term Pallid Sturgeon and Associated Fish Community Assessment for the Missouri River and Standardized Guidelines for Sampling and Data Collection". River segments 5 and 6 include the Missouri River from Fort Randall Dam downstream to the Niobrara River (segment 5) and from the Niobrara River to the headwaters of Lewis and Clark Lake (segment 6). In addition to these efforts, a Master's Degree project has been integrated into the sampling efforts to evaluate food habits of both shovelnose and pallid sturgeon in this reach and also to evaluate gear efficiencies for collecting sturgeon species.

This crew has exceeded the base required sampling effort for this program by a magnitude of 4 times. As a result, this crew sampled 46 pallid sturgeons in FY 2003 and a total of 72 prior to the end of CY 2003. All of these fish were hatchery reared with the exception of 1 wild adult that was used during propagation efforts at the Gavins Point NFH and released into the Fort Randall reach due to concerns related to the pallid sturgeon iridovirus. This fish was originally captured in the Fort Peck reach in the Yellowstone and Missouri River confluence area. Drifting trammel nets were the most effective method for collecting pallid sturgeon. Gill netting and set lining were also effective in the capture of pallid and shovelnose sturgeon. Hoop netting and trawling (beam) were inefficient in collecting sturgeon species in general; however, the diversity of gears facilitates the assessment of a series of target species that have been incorporated into the program to better detect changes in the ecosystem over time (USFWS, 2004).

Nebraska Game and Parks Commission Activities

The Nebraska Game and Parks Commission (NGPC) continued their participation in the program in 2003. The NGPC sampled river segment 9 as identified in the draft document "Long-term Pallid Sturgeon and Associated Fish Community Assessment for the Missouri River and Standardized Guidelines for Sampling and Data Collection". Segment 9 encompasses the Missouri River from the Platte River to the Kansas River.

Only 3 pallid sturgeons were captured in this segment. Two of these fish were assumed to be wild, as they did not possess any tags. One of the wild fish was captured during gill

netting efforts (2.0 inch mesh) in a wing dike tip pool on an inside bend. The other wild fish was captured in association with a revetment scallop on the outside bend while otter trawling. The bottom velocity was 1.65 m/s at the mid-point of the trawl sample. The third fish was a hatchery propagated and stocked fish (from Garrison Dam NFH) and was identifiable by its PIT Tag. This fish was stocked at the Booneville, Missouri, site on April 25, 2002 and was recaptured 367 miles upstream on March 24, 2003. This fish was collected during gill netting efforts (1.5 inch mesh) in a wing dike tip pool on an inside bend. Bottom velocities for both of the pallid sturgeon sampled in pool mesohabitats were <0.3m/s. Several other native species (i.e., sicklefin and sturgeon chubs, blue sucker, etc.) were sampled during these intensive sampling activities in this channelized segment of the Missouri River. The ratio of pallid sturgeon to all sturgeon species was 1:1078 for segment 9 (NGPC, 2004).

Columbia Fishery Resources Office Activities

The Columbia Fishery Resources Office (USFWS-Columbia, Missouri) also continued their participation in the population assessment program in 2003. The FWS sampled River Segments 13 and 14 as identified in the draft document "Long-term Pallid Sturgeon and Associated Fish Community Assessment for the Missouri River and Standardized Guidelines for Sampling and Data Collection." Segment 13 extends from Glasgow, Missouri to the Osage River and Segment 14 captures the lower portion from the Osage River to the mouth near St. Louis.

A total of 7 pallid sturgeons were collected during sampling efforts in 2003. Of the 7 pallid sturgeon sampled in 2003, there were 5 that were determined to be wild (unmarked) and 2 originated from hatchery stocking efforts. Four of these fish were collected with drifting trammel nets, 2 in otter trawls, and a single pallid sturgeon was collected in a gill net. Six of the seven were collected in the channel border mesohabitat (4 in inside bends and 2 in confluence areas). A variety of native species were sampled throughout this lower portion of the Missouri River in addition to the pallid sturgeon. The ratio of pallid sturgeon to all sturgeon species was 1:1188 for Segment 13 and 1:278 for Segment 14 (USFWS, 2004).

Although natural reproduction has been documented in the lower Missouri River in the late 1990's and in the Fort Peck Reach in 2002, there has been no evidence of recruitment into the population.

In addition to supporting population assessment activities, the Corps provided quality assurance for the program during field sampling activities to ensure sampling was conducted in accordance with the standardized protocols. Corps population assessment expenditures are summarized in Table 13.

TABLE 13
PALLID STURGEON
POPULATION ASSESSMENT EXPENDITURES FOR 2003

Description/Project Title	Cooperator	Expenditure
Pallid Sturgeon Population Assessment (segments 5 & 6)	U.S. Fish and Wildlife Service, Great Plains Fish and Wildlife Management Assistance Office, Pierre, SD	\$41,300
Pallid Sturgeon Population Assessment (segment 9)	Nebraska Game and Parks Commission, Lincoln, NE	\$165,080
Pallid Sturgeon Population Assessment (segments 13 & 14)	U.S. Fish and Wildlife Service, Columbia Fishery Resource Office, Columbia, MO	\$166,000
Telemetry of Known Sex Post-Spawn Pallid Sturgeon	U.S. Fish and Wildlife Service, Missouri River Fish and Wildlife Management Assistance Office, Bismarck, ND	\$54,500
Total		\$426,880

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

The USGS has proposed a detailed research investigation to identify some of the specifics of these issues (hybridization, lack of reproduction/recruitment). The population assessment efforts would also aid in the identification of the causes.

Reasonable and Prudent Measures to Minimize Take

Bald Eagle

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

Measure 1.1. Identify stands with periodic flooding

Measure 1.2. Determine baseline mortality and tree vigor

Late in 2003, the U. S. Army Engineering Research Development Center (ERDC) Environmental Laboratory began contract work on the Missouri National Recreation River (MNRR) with several relevant tasks. The first task is to publish a "Profile" on the cottonwood community, providing the natural history information necessary to finish the community index model began in June 2002. The second task is to develop floristic quality scores for the MNRR. A floristic quality rating is one of the variables in the index model. The third task is to secure photography for a 5-mile reach of the MNRR and conduct a pilot study on identifying cottonwood and associated community stands. A component of this task is to explore ways of characterizing the health and vigor of cottonwood stands.

These three and other tasks in the contract are designed to potentially apply to a larger reach of river in the future. The "Profile" is in the publication process. The floristic lists are ready for Corps and other team members for input and review. One set of photographic images was obtained but found to be unsuitable. Additional images have been ordered from Surdex Corporation, Chesterfield, MO (1" = 1000' NCS Color photography contact prints from August 1997 (approximately 15 prints), 1" = 1000' NCS CIR photography contact prints from June/July 1999, August 2000, and October 2001 (approximately 15 prints from each year, 45 total prints)). Another activity was to develop a matrix of possible metrics for identifying cottonwood health and vigor. Metrics include those that can be obtained from aerial photo interpretation and ground verification.

Terns and Plovers

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

Measure 1.1. Population survey information

- a. Total number of colonies**
- b. Total number of birds**
- c. Map nest site locations**

Measure 1.2. Monitoring information

- 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**

Monitoring of tern and plover nesting sites on the Missouri River was conducted by Corps of Engineers personnel on the Missouri River below Fort Peck, Garrison, Fort Randall, and Gavins Point Dams, on Lake Sakakawea, Lake Oahe, Lake Francis Case, and Lewis and Clark Lake. Service personnel monitored Fort Peck Lake and Lake Audubon National Wildlife Refuge under a contract. Dr. Roger Boyd, Biology Department, Baker University, monitored the Kansas River under a contract.

Training sessions for productivity monitoring were held on May 20-21, 2003 at the Gavins Point Project Office, on May 27-28, 2003 at the Garrison Project Office, on May 29, 2003 at the Fort Peck Project Office, and on June 3, 2003 at the Oahe Project Office. Attendees at the four sessions included 41 Corps of Engineers, 3 South Dakota Department of Game, Fish, and Parks, 2 U.S. Fish and Wildlife Service, and 2 National Park Service personnel. Training included sessions on the Endangered Species Act (ESA), least tern and piping plover life histories, ESA permit conditions, monitoring techniques, data input, and GPS techniques.

Productivity surveys for least terns and piping plovers began on the following dates for reaches on the Missouri River: below Gavins Point Dam – April 25, 2003; Lewis and Clark Lake – May 16, 2003; below Fort Randall Dam – May 14, 2003; Lake Francis Case – June 27, 2003; Lake Oahe – May 2, 2003; below Garrison Dam – May 14, 2003; Lake Sakakawea – May 7, 2003; below Fort Peck Dam – May 21, 2003; and Fort Peck Lake – May 23, 2003.

Monitoring continued through the spring and summer and was concluded on all reaches by the end of August 2003, by which time all monitored chicks had fledged. An adult census for both species was conducted on the Missouri River from Fort Peck Lake to fifty miles below Gavins Point Dam at Ponca State Park, Nebraska. The census was begun on June 16, 2003, and completed on June 30, 2003.

Productivity monitoring surveys were conducted on five to ten-day cycles. Nests were found, mapped, and tracked until the eggs hatched or the nest was otherwise terminated. Chicks were tracked from hatching to fledging. The results of the 2003 adult census and monitoring efforts for the piping plover and least tern can be found in Tables 14 and 15.

TABLE 14
RESULT OF 2003 ADULT CENSUS AND MONITORING EFFORTS
OF THE INTERIOR LEAST TERN

	Adult Census	Nests	Nest Hatched	Nest Success (a)	Mayfield Nest Success (b)	Total Chicks Fledged	Fledge Ratio (c)
Fort Peck Lake	2	1	0	0.0	0.0	0	0.00
Missouri River Below Fort Peck Dam	38	19	10	52.6	73.7	12	0.63

	Adult Census	Nests	Nest Hatched	Nest Success (a)	Mayfield Nest Success (b)	Total Chicks Fledged	Fledge Ratio (c)
Lake Sakakawea	25	15	13	86.7	69.0	7	0.56
Missouri River below Garrison Dam	144	89	63	70.8	72.2	92	1.28
Lake Oahe	70	51	35	68.6	67.3	42	1.20
Missouri River below Fort Randall Dam	50	39	30	76.9	71.7	23	0.92
Lewis and Clark Lake	46	41	13	31.7	20.3	9	0.39
Missouri River below Gavins Point Dam	366	247	178	72.1	63.3	138	0.75
Total	741	502	342	68.1	62.0	323	0.87

(a) Nest Success = number of nests per 100 attempts

(b) Mayfield Nest Success = $(1 - N_u/E)^h$, where N_u = number of unsuccessful clutches, E = exposure-days (total) and H = clutch age at hatching (23 days for least terns)

(c) Fledge Ratio = number of fledged chicks per pair of adult birds

TABLE 15
RESULT OF 2003 ADULT CENSUS AND MONITORING EFFORTS
OF THE PIPING PLOVER

	Adult Census	Nests	Nest Hatched	Nest Success (a)	Mayfield Nest Success (b)	Total Chicks Fledged	Fledge Ratio (c)
Fort Peck Lake	17	7	2	28.6	100.0	3	0.35
Missouri River Below Fort Peck Dam	6	3	2	66.7	43.5	8	2.67
Lake Sakakawea	528	235	193	82.1	41.8	280	1.06
Missouri River below Garrison Dam	149	85	62	72.9	66.9	124	1.66
Lake Oahe	301	161	130	80.7	67.0	277	1.84
Missouri River below Fort Randall Dam	37	22	14	63.6	47.5	27	1.46
Lewis and Clark Lake	14	10	5	50.0	53.2	11	1.57
Missouri River below Gavins Point Dam	286	176	121	68.8	53.1	271	1.90
Total	1338	699	529	75.7	56.3	1001	1.50

- (a) Nest Success = number of nests per 100 attempts
- (b) Mayfield Nest Success = $(1 - N_u/E)^h$, where N_u = number of unsuccessful clutches, E = exposure-days (total) and H = clutch age at hatching (23 days for least terns)
- (c) Fledge Ratio = number of fledged chicks per pair of adult birds

Data collected in the field was then inputted into the Threatened and Endangered Species Data Management System (TESDMS). After a quality control check by biologists, the data was made available on the TSEDMS. The TSEDMS was accessible via the Internet to appropriate federal and state personnel.

Due to a security upgrade of the server where the TSEDMS resides, major parts of the TSEDMS program had to be rewritten before and during the nesting season. This major effort precluded refining the TSEDMS. No new reports were added to the TSEDMS for 2003. In 2003, crew efficiency in using the GPS equipment, data loggers, and TSEDMS improved as the personnel became more proficient and comfortable using the equipment and software. It is expected efficiency will increase for the 2004 nesting season with the purchase of Trimble Recon data loggers in the fall of 2003.

In 2003, there were 741 least tern adults counted on the Missouri River, the second highest recorded for the river since censusing began in 1986 (1994 with 777 adults counted is the highest year). The 741 adults represented a slight (1.3%) increase over the 2002 adult census of 731 least terns. Least tern numbers were nearly the same for four of the reaches, Fort Peck Lake, below Fort Peck Dam, Lake Sakakawea, and Lewis and Clark Lake. Tern numbers were down substantially on two of the reaches with Lake Oahe down 34% from 2002 (70/106) and below Fort Randall Dam down 40% (50/84). These declines were offset by increases below Garrison and Gavins Point Dams. The Missouri below Garrison Dam saw a 14% gain (144/126) and the Gavins Point Reach saw a 17% gain (366/314). The 366 least terns below Gavins Point were a record for that reach. It should also be noted that the 366 terns on this fifty-mile stretch of the river represented nearly half (49.4%) of all the least terns on the Missouri River system.

Productivity was down 31% (323/465) for the least tern on the Missouri River in 2003 compared to 2002. All reaches, except Fort Peck Lake, which had no productivity in 2002 and 2003 and below Fort Peck Dam, which saw an increase of two fledglings in 2003 compared to 2002, saw declines in fledge numbers. The largest percentage loss was on Lewis and Clark Lake, which saw a decline of 62% (9/24) while the largest decline in numbers was below Gavins Point with a net loss of 69 (138 – 207). The decline in fledgling numbers is reflected in a decline in the fledge ratio which went from 1.27 fledglings per adult pair in 2002 to 0.87 in 2003. This marks the fourth decline in the last five years in the fledge ratio and is the first time the annual fledge ratio for the Missouri River system has fallen below 1.00 since 1997.

With 1,338 adult piping plovers counted, 2003 marked the fourth consecutive year of record numbers of plovers on the Missouri River and the seventh consecutive annual increase in adult piping plover numbers. Seven of the eight reaches saw an increase in plover numbers (Lewis and Clark Lake the lone exception) with Lake Sakakawea (528), Lake Oahe (301) and below Gavins Point (286) seeing record numbers. The 1,338

plovers represent an 18% increase over 2002's 1,134 birds. Lake Oahe saw the greatest increase in numbers with a gain of 98 from 2002's count of 203.

Productivity in 2003 did not match 2002 record year of 1,073 fledged plovers, but, nonetheless, was robust with 1,001 fledglings, second only to 2002. This represented a 7% decline from 2002. Lake Sakakawea (288), Lake Oahe (277), and below Gavins Point (271), had the highest number of fledglings, although Lake Sakakawea's numbers represented a 108 fledgling drop from 2002 and below Gavins Point was down 17 from 2002, while Oahe was up 68. The fledge ratio for the Missouri River in 2003 was 1.50 fledglings per adult compared to 1.89 in 2002. This fledge ratio is in line with recent years with the 2001 fledge ratio being 1.40 and 2000's being 1.60. Reach by reach, generally, the fledge ratios were lower compared to 2002 with Lake Sakakawea having the largest decline, going to 1.06 in 2003 from 1.65 in 2002. The biggest increase was below Fort Peck Dam, which went to 2.67 compared to 0.00 in 2002.

Nest sites located on the Missouri River and reservoirs were mapped using GPS equipment. The nest site data was then incorporated into the U.S. Army Corps of Engineers, Omaha District, Geographic Information System (GIS). Nest site maps can be found in Appendix C "Nest Site Location Maps".

TABLE 16
TOTAL NUMBER OF NESTS AND NEST FATES
FOR PIPING PLOVER AND INTERIOR LEAST TERN
FOR THE YEAR 2003

	Piping Plover	Interior Least Tern
Total Nests	699	502
Hatched	529	342
Collected	0	0
Destroyed Flooded	22	30
Destroyed Weather	37	25
Destroyed Predation	21	26
Destroyed Human Disturbance	8	1
Destroyed Livestock	1	1
Destroyed Bank Erosion	1	0
Destroyed Unknown Cause	38	21
Fate Unknown	27	31
Abandoned	13	17
Non-viable Eggs	3	8

The fledge ratio for least terns on the Missouri River in 2003 was 0.87 fledglings per adult pair. The fledge ratio for piping plovers on the Missouri River in 2003 was 1.50 fledglings per adult pair. Tern and plover chicks were known to have been lost to predation and to weather events such as thunderstorms and hail. The number lost cannot

be quantified. One piping plover chick was destroyed when a surveyor accidentally stepped it on.

During site visits, nest elevations were determined as being above or below the 18-inch-above-water-level mark. Those found to be below eighteen inches elevation were flagged in TEDMS. The nests were then closely monitored by the Corps to prevent loss from flooding.

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

Measure 2.1. Daily and hourly release fluctuations below dams

Measure 2.2. Changes in releases due to maintenance or other isolated causes

Measure 2.3. Changes in releases to prevent downstream flood impacts

In November of 2003, the Corps prepared a Historic Mortality Report to compile and evaluate all previous information on impacts of take from release changes below dams, changes in releases due to maintenance or other isolated causes, and release changes to prevent downstream flood impacts. This was a major work effort requiring considerable effort including significant data entry, review of past operational scenarios, and significant data analysis. The Historic Mortality Report may be found in Appendix D.

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

The year 2003 is the 18th year of regulation since the piping plover and interior least tern were federally listed as threatened and endangered species, respectively. Stream gages have been installed on the Missouri River to monitor stream flows during the nesting season. These gages provide a check, as well as a stage history, throughout the season to help relate the effects of regulation and natural events at intervals along the river. The gaging data must be supplemented with observations of nesting activities and conditions to provide the information that is needed for regulation. A dynamic flow routing model has been developed to closely predict maximum river stages along the river for different combinations of daily discharge and hourly power peaking characteristics.

Beginning in 1999, the Omaha District created a computerized Threatened and Endangered Species Data Management System. Report data, which is updated daily, includes nest records, census and productivity data, site descriptions, field journals, and messages. This database provided vital information again during the 2003 nesting season and proved to be a valuable tool in aiding release decisions benefiting threatened and endangered birds.

Although the Corps prevented inundation of nests following the listing, where possible, and accomplished habitat creation, fledging continued to be lower than predicted by the USFWS 1990 Biological Opinion until 1998 when fledge ratios exceeded the goal for both species. Predation, habitat degradation, severe weather, nest inundation, recent record runoff, and other factors contributed to the previously disappointing low fledging. The record fledging that occurred for both species in 1998, and the subsequent above average fledge ratios achieved since then, can be attributed to the large amount of habitat

created by the high flows of 1997. The creation of additional habitat has also allowed greater flexibility in the release levels at the lower two System projects.

For 2003, the majority of piping plovers found again were found on Garrison reservoir, below Gavins Point Dam, and Oahe Reservoir. Excellent shoreline habitat existed due to the lower reservoir levels caused by the reduced runoff. A record number of piping plover adults, 1338, were found on the Missouri River System this year yielding a fledge ratio of 1.5 chicks per pair of adults. A total of 741 adult terns nested on the System in 2003. This was the second highest total since surveys began in 1988. The majority of least terns were found on the Missouri River reaches below Garrison and Gavins Point and on Oahe Reservoir. Tern nesting was also very successful. The fledge ratio for naturally raised terns was 0.87 fledglings per pair. (Corps, 2004)

In August 2003, in response to a court order, the Corps reduced releases from Gavins Point Dam to 21,000 cfs for three days. The Corps undertook an analysis of the Fort Randall, Lewis and Clark Lake, and Gavins Point Reaches to determine if any unfledged least tern or piping plover chicks would be put at risk when releases were subsequently raised back up to 25,000 cfs. It was determined that unfledged piping plover chicks at a sandbar at River Mile (RM) 778.8 below Gavins Point Dam could be lost if they were cut off by rising water inundating sandbars that had been exposed during the lower releases. It was decided that the 4,000 cfs increase would be stepped up over two days to minimize the chance of take and that Corps personnel would be on-site to monitor the chicks. On August 16 and 17, Corps personnel monitored the plover chicks at RM 778.7 during the increase in releases from Gavins Point Dam. It was noted that several of the chicks had fledged by the time of the water increase. Two unfledged chicks, however, were “herded” back up to the main sandbar. The operation was completed without the loss of any chicks.

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 the Service.

There was no captive rearing conducted in 2003.

Measure 4.2 Initiate a peer review on Captive Rearing Protocol

Personnel from Corps hosted Phase 1 of a 2-tiered Peer Review on February 26-27, 2004 in Yankton, South Dakota. Phase 1 consisted of the Animal Health and Husbandry team conducting a focused “best practices” review of the physical facilities, the practices, veterinary care guidelines, diet sources and food preparation, contamination containment and prevention, handling and disposal of mortality of specimens, and products and technologies being used to ensure the most current state-of-the-art products and methods are put into practice with the Captive Rearing Program. The Animal Husbandry and Health team members include: Kim Smith, Curator of Birds, Milwaukee County Zoo, Milwaukee, WI; John Dinan, Nongame Program Coordinator, Nebraska Game and Parks Commission, Lincoln, NE; Dr. Joshua Dien, VMD, Veterinary Medical Officer, National Wildlife Health Center, Madison, WI; and Kate Banks, Aquarist, New England

Aquarium, Boston, MA. A final report and summary of findings will be available February 2004.

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

In 2002, Canada and the United States cooperated in an operation to salvage piping plover eggs threatened by inundation on Lake Diefenbaker, Saskatchewan (SK). Above normal rainfall in the region resulted in record water levels in the reservoir. All attempts were made to maintain viable nesting sites. With permission from the USFWS, personnel from Environment Canada's Canadian Wildlife Services collected eggs for transport to the Corps Captive Rearing Facilities in Yankton, South Dakota. Fledged juveniles were later returned to Chaplin Lake, a Western Hemisphere Shorebird Reserve south of Lake Diefenbaker for release. Table 17 summarizes the piping plovers that were resighted or captured in 2003 after their release in Canada. Table 18 summarizes the piping plovers that were resighted in 2003 after their release on the Missouri River. Table 19 summarizes the captive reared piping plovers that were recaptured on nests in 2003 after their releases between 1997 and 2002.

TABLE 17
2002 CAPTIVE REARED PIPING PLOVERS
RESIGHTED or CAPTURED IN 2003
CANADA RELEASED*

Date	Location
April 10, 2003	Bolivar Flats near Galveston, Texas
May 10-12, 2003	Danielson site, Lake Diefenbaker
May 31 - July 8, 2003	Butterfly Lake on the Missouri Coteau
June 12 & 18, 2003	Mudflat on Big Quill Lake, SK
June 13, 2003	Female Plover captured on nest at Chaplin Lake, SK
June 17, 2003	Female Plover captured on nest, Lake Diefenbaker
June 25, 2003	Key West PFRA wetland, on the Missouri Coteau
September 6, 2003	Padre Island National Seashore, Texas

*Birds were tagged with white band on upper left leg, two black bands on the lower left, and a metal service band on lower right leg

TABLE 18
1995 - 2002 CAPTIVE REARED PIPING PLOVERS RESIGHTED IN 2003
MISSOURI RIVER RELEASED*

Date	Location
May 9, 2003	RM 789.5
May 14, 2003	RM 777.7
May 16, 2003	RM 757.2, near nest #16
May 21, 2003	Parry Lake, Montana
May 22, 2003	RM 869.0, RM 866.7 and RM 1197 (Moose Flats)

Date	Location
June 6, 2003	Lake Sakakawea
June 11, 2003	Associated with nest #231 @ RM 802.5
June 12, 2003	RM 863.7 on nest with 4 eggs, RM 863.7 on nest with 3 eggs and RM 869.0 on nest
June 18, 2003	RM 756.7
September 5, 2003	Port O'Connor Beach, Texas
September 9, 2003	Mustang Island, Texas (2 birds)
September 30, 2003	Mustang Island, Texas

*Birds were tagged with light blue flag on upper leg, and metal service band on right lower leg

TABLE 19
CAPTURES OF CAPTIVE REARED
PIPING PLOVERS ON NESTS IN 2003
RELEASED IN 1997-2002

Release Date	Release Location	Date Recaptured	Recapture Location
August 6, 2001	Missouri RM 834.3	June 10, 2003	Kansas RM 114
July 27, 1998	Missouri RM 840.0	June 12, 2003	Missouri RM 801.5
July 26, 1997	Medicine Hat, Montana	June 13, 2003	TNC Refuge, Bowdoin, Montana
August 13, 2002	Missouri RM 869.5	June 18, 2003	Missouri RM 869.5
July 24, 1998	Missouri RM 840.0	June 18, 2003	Missouri RM 863.7

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

Public information and educational programs:

Dennis Daum of the Gavins Point Project and Greg Pavelka of the Corps hosted a reporter and cameraman doing a story on Endangered Species for the Sioux City Journal. The article on piping plovers appeared in the newspaper in May 2003.

On July 4, the Bismarck, North Dakota, Tribune printed an article alerting the public to stay off of posted sandbars.

Casey Kruse, Greg Pavelka, and Bruce Vander Lee of the Corps were interviewed by a reporter for the Omaha World Herald for an article on least terns and piping plovers that appeared in the newspaper in July 2003.

The Threatened and Endangered Species Section, Technical Support Branch, Operations Division, and Gavins Point Project personnel provided access to the Missouri River and were interviewed by a writer for Nebraskaland Magazine. An article on the Missouri River and endangered species appeared in the December 2003 issue of the magazine.

Sarah Kuhl, summer interpretive ranger at the Gavins Point Project, presented several programs on threatened and endangered species to the Lewis and Clark Boy Scout Camp in preparation for scouts' summer canoe trips on the Missouri River.

Craig Fleming and Mike Hubert of the Fort Randall Project developed educational placemats, brochures, and posters to help inform the general public about endangered species, their needs, Corps actions, and how they can assist in their recovery. Placemats were distributed to the surrounding area restaurants and convenience stores. Approximately 5,000 were distributed in the Chamberlain area and approximately 15,000 were distributed between Platte and Springfield, South Dakota, with the majority of those being placed in and around the Pickstown, South Dakota area. Each contact with marina and business owners was used as an opportunity to provide education and build support for the Corps actions to recover these listed species.

In cooperation with the USFWS and other state agencies the Threatened and Endangered Species Section, Technical Support Branch, Operations Division, designed and produced a new information brochure "Missouri River Species at Risk". The brochure provides information on the Least Tern, Piping Plover, and Pallid Sturgeon. The initial printing of 33,000 brochures was distributed to all Corps field projects offices in the Omaha District. Other agencies were given information on how to order the brochures.

Human disturbance reduction measures:

Fort Peck Lake: Restriction signs were placed to protect the nesting area of Beach 1 on the north face of Fort Peck Dam.

Lake Sakakawea: Restriction signs were placed on islands in Steinke Bay and on islands adjacent to the Centennial Sportsman Recreation Area to deter disturbance of the birds. The Riverdale Office closed the West Totten low water boat ramp to prevent off road vehicles from accessing the West Totten piping plover nesting area.

Missouri River below Garrison Dam: Restriction signs were placed around nesting sites on sandbars at Heskett (RM 1319.5), Little Heskett (RM 1319.3), and Mary's Bend (RM 1304.0).

Lake Oahe: The Bismarck Crew placed restriction signs at McLean (RM 1291.7). The Mobridge crew put up "Do Not Enter - Endangered Species" signs and fencing along the banks of Blue Blanket (RM 1189) and State Line (RM 1232). "No Trespassing" signs were put up at Fort Manuel (RM 1229), Kenel Flats (RM 1230), and Demery Island (RM 1231.5).

Lake Francis Case: A small least tern colony was found near the North Point Campground (RM 881). The area was posted with Threatened and Endangered Species signs and fenced by Fort Randall Project personnel. The site was monitored by South Dakota Department of Game, Fish, and Parks personnel to prevent North Point campers from disturbing the colony.

Missouri River below Fort Randall Dam: Sandbars at RM 870.0 and RM 869.5 were fenced and signed. A human deterrence patrol was conducted on July 4 from RM 870.0 to RM 842.0 and on July 5 from RM 880.0 to RM 845.0.

Lewis & Clark Lake: Restriction signs and orange twine fencing were placed around nesting sites at RM 841.8.

Missouri River below Gavins Point Dam: Restriction signs and orange twine fencing were placed around nesting sites on sandbars at RM 804.5, 801.5, 795.3, 793.6, 788.5, 781.5, 778.7, 777.7, 770.5, 761.3, 759.0, and 756.7. Law enforcement officers from the U.S. Fish and Wildlife Service and the South Dakota Department of Game, Fish, and Parks did deterrence patrols on July 4 and July 5 from RM 806.0 to RM 756.0. USFWS special agents in Sioux Falls and Pierre, South Dakota, and Bismarck, North Dakota, were given access to the Threatened and Endangered Species Data Management System to track nesting activity.

Measure 6. The Corps shall implement aversive action to reduce predation on least tern and piping plover nests, chicks, and adults.

No actions were implemented in 2003 to reduce predation on least terns. For piping plovers, wire mesh cages were placed over the nests to deter predation. Table 20 lists by reach the number of plover nests that were caged, the number of caged nests that were successful, the number of plover nests that were not caged, and the number of not caged nests that were successful.

**TABLE 20
PIPING PLOVER CAGED AND UNCAGED NESTS**

Reach	Caged Nests	Caged Nests – Successful	Percent Hatched	Not Caged Nests	Not Caged Nests – Successful	Percent Hatched
Fort Peck Lake	0	0	0	7	2	28.6
Fort Peck River	0	0	0	3	2	66.7
Lake Sakakawea	0	0	0	131	90	68.7
Garrison River	45	40	88.9	36	18	50.0
Lake Oahe	53	41	77.4	51	43	79.4
Ft. Randall River	7	5	71.4	13	7	53.8
Lewis & Clark Lake	5	3	60.0	4	2	50.0
Gavins Pt. River	113	88	77.9	58	33	56.9
Total	223	117	79.4	315	204	64.8

Pallid Sturgeon

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

Operational changes that would impact sturgeon are primarily associated with flows. These flow changes are being evaluated as part of the Master Manual Environmental Impact Statement (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

Threatened and endangered species have been incorporated into the Corps interpretive programs at the projects along the Missouri River system. Project visitor centers highlight the three species of focus providing information regarding their life histories and current status. A brochure is under revision providing information and awareness for the public regarding these species. The brochure has been completed and disseminated to all projects.

The Gavins Point Aquarium (located at the Gavins Point NFH) has developed and initiated the use of a touch screen system for visitors to learn more regarding threatened and endangered species and increase public awareness. Specific sections were developed in 2002 for the pallid sturgeon, the interior least tern, and the piping plover.

Pallid sturgeon stocking events included multiple agencies in the lower Missouri River. In conjunction with the Missouri River Natural Resource Conference in April, a ceremonial stocking was held at the Ponca State Park in Nebraska. Colonel Ubbelohde, along with the USFWS's Mary Gessner and John Blankenship (Region 6), stocked pallid sturgeon as part of a media event featuring the cooperation between the agencies targeting recovery of the endangered pallid sturgeon. Several other individuals participated in the stocking event. Media stocking events were also held in conjunction with pallid sturgeon stocking efforts at the Franklin Island State Park near Booneville, Missouri. These events were captured by journalists and have made the press throughout the Missouri River system.

Pallid sturgeon propagation and augmentation, population assessment, and research activities are presented to Upper and Middle Basin Pallid Sturgeon Workgroups annually.

Handling protocols developed by the Pallid Sturgeon Recovery Team have been incorporated into all Corps supported pallid sturgeon projects to ensure that "take" is not occurring. Teams developing standardized sampling have made recommendations to the Recovery Team to modify, clarify, and update handling protocols.

Conservation Recommendations

Recommendations Applicable to Single Species

1. **Bald Eagle**
2. **Least Tern and Piping Plover**
3. **Pallid Sturgeon**

Pallid Sturgeon

4. Provide funding to continue development and conduct sturgeon genetic techniques to ensure genetic variation.

Dr. Bernie May, University of California (Davis), has conducted genetic analysis of adult pallid sturgeon and made recommendations for a mating matrix to maximize the genetic variability by crossing the most unrelated parents. Dr. May has conducted this work since 2001. Each year, the adult pallid sturgeon captured for use in the propagation and augmentation program are analyzed. Genetic pairing recommendations are provided back to the facilities conducting spawning efforts to maximize the genetic variation of the progeny. In 2003, Rob Holm, Project Leader, Garrison Dam NFH, provided a duplicate sample to validate the quality of the analysis. Dr. May's results for this test of Quality Assurance passed, as the two-sample analyses were virtually identical.

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

The Corps' biologists are regular and active participants in the Upper and Middle Basin Pallid Sturgeon Workgroups. These workgroups have served as a network for pallid sturgeon projects. Partnerships have been developed within these workgroups to facilitate the development of standard operating procedures for the pallid sturgeon population assessment program, propagation plans, and stocking plans. The workgroups have developed prioritization guidelines for recovery and research needs of the species. In 2003, Corps biologists participated in a peer review of the function of the Upper Basin Pallid Sturgeon Workgroup.

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

Representative fish health sampling of propagated pallid sturgeon is required by the USFWS and, in some cases, by state fish health policies at each facility involved in culture efforts of pallid sturgeon. The Propagation Plans that were developed by the Pallid Sturgeon Propagation Workgroup have adopted the guidelines established by the state and Federal agencies current policies. The pallid sturgeon iridovirus has been an obstacle in achieving stocking goals since the late 1990's. The virus has been detected at state and Federal facilities in Montana, North Dakota, South Dakota, and Missouri, and in the "wild" in hybrid pallid/shovelnose sturgeon in the lower Mississippi River. The virus is believed to be naturally occurring. Ongoing efforts to develop a more accurate methodology for analyzing samples for the pallid sturgeon iridovirus are being explored by the University of California, Davis, and the Bozeman FHC (USFWS). Polymerase

Chain Reaction (PCR) testing has been developed and used diagnostically for an iridovirus common in white sturgeon (*Acipenser transmontanus*). This methodology is highly accurate and reliable; however, unique cell lines of the virus must be isolated and tested to develop the PCR test specific to the pallid sturgeon iridovirus. Current techniques rely on histology, thus reducing the likelihood of detection.

14. Assist the USFWS and other partners with cryopreservation banking of pallid sturgeon sperm.

Through the propagation and augmentation program, the Propagation Workgroup identified the need for increased cryopreservation capabilities. As a result, cryopreservation capabilities were increased throughout the Missouri River basin. All 6 of the facilities rearing pallid sturgeon are now equipped with at least one 35 liter milt storage unit. This upgrade provides increased storage capabilities to ensure that milt is available for perpetuation of future genetic stocks. All systems are alarm equipped to notify staff prior to reaching critical levels of liquid nitrogen in the storage units. This enhancement will enable the storage of backups of each preserved genetic sample at a minimum of two facilities to protect against loss of individual genetic samples. The sperm repository is currently represented by 41 males.

References Cited

- Braaten, Patrick J., D.B. Fuller, N. McClenning, W. Waller, L. Holte, R. Lott, 2003. Fort Peck Flow Modification Biological Data Collection Plan, Summary of 2003 Field Activities, U. S. Geological Survey and Montana Department of Fish, Wildlife, and Parks, Fort Peck, MT.
- Galat, D.L. 1999. Restoring the natural range of Missouri River flow variability to benefit declining species. Pages 15-18 in R. Sakrison and P. Sturtevant, editors. Proceedings, watershed management to protect declining species. American Water Resources Association, Middleburg, VA, TPS-99-4, 561pp.
- Hesse, L.W. 1999. Missouri River discharge and the ecosystem – target flows. Report to the Missouri River Natural Resources Committee, Missouri Valley, IA, 14pp plus appendices.
- Kynard, Boyd, E. Parker, D. Pugh, T. Parker. 2004. Swimming Height and the Effect of Velocity on Dispersal of Free Embryo and Larval Pallid Sturgeon: An Experimental Study. Unpublished report. U.S. Geological Survey, Biological Resources Division, S.O. Conte Anadromous Fish Research Center, Turners Falls, MA.
- Le Fer, Daniel. 2003. Thesis Working Plan, Virginia Polytech University.
- Nebraska Game and Parks Commission. 2004. Pallid Sturgeon Population Assessment Program 2003 Annual Report; Segment 9.
- U.S. Army Corps of Engineers. 2003. Missouri River Mainstem System 2002-2003 Annual Operating Plan, Northwestern Division, Missouri River Basin, Water Management Division, Omaha, NE.
- U.S. Army Corps of Engineers. 2004. Summary of Actual Calendar Year 2003 Operations, Northwestern Division, Missouri River Basin, Water Management Division, Omaha, NE.
- U.S. Army Corps of Engineers. 2002. Annual Report, 2002 Field Season, Piping Plover Foraging Ecology.
- U.S. Army Corps of Engineers. 2003. Final Biological Assessment on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System, Northwestern Division.
- U.S. Fish and Wildlife Service. 2000. Biological Opinion on the Operation of the Missouri River Main Stem Reservoir System, Operation and Maintenance of the Missouri River Bank Stabilization and Navigation Project, and Operation of the Kansas River Reservoir System, Region 6 Denver, CO, Region 3 Fort Snelling, MN.

U.S. Fish and Wildlife Service. 2004. Pallid Sturgeon Population Assessment Program 2003 Annual Report; Segments 5 & 6, Great Plains Fish and Wildlife Management Assistance Office, Pierre, South Dakota.

U.S. Fish and Wildlife Service. 2004. Pallid Sturgeon Population Assessment Program 2003 Annual Report, Segments 13 & 14. Columbia Fishery Resources Office, Columbia, Missouri.

APPENDIX A

List of Biological Opinion Requirements (Table 24)

Table 24. Summary of Reasonable and Prudent Alternative, Reasonable and Prudent Measures to Minimize Take, and Conservation Measures

<u>Reasonable and Prudent Alternative</u>	<u>Implementation Objective</u>
<u>Elements Applicable for Multiple Listed Species in Ecosystem</u>	
I. Adaptive Management	
A. Establish an Agency Coordination Team (ACT)	March 2001
1. Coordination Meetings	Twice a year
B. Develop Endangered Species and Habitat Monitoring Plan	Within 1 year
C. Annual Report	Annually
II. Flow Enhancement	
A. Gavins Point Dam:	
1. Spring Rise: 17.5 Kcfs above full service for 30 days between 1 May - 15 Jun	Once every 3 years/start 2003
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.	
B. Fort Peck Dam	
1. Implement mini-test	2001
2. Implement full test. Spring release between May and the end of June with: Range of flows 20 to 30 Kcfs, temperature (18° C) at Frazer, MT for a minimum of 3 weeks.	2002
3. Implement full enhancement flows, modified based on test	2003, once every 3 years
C. Other Segments	
Investigate the applicability of flow enhancement at Garrison Dam, implement if applicable	2005

A-1

Reasonable and Prudent Alternative**Implementation Objective****III. Unbalanced Intrasystem Regulation**

2001

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

2001

2002

2003

2004

2005

2010

2015

2020

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 1998 baseline habitat evaluations on Fort Peck River (Segment 2)**c. Meet minimum baseline acres on Fort Peck River (Segment 2)**

2015

2015

2003

2015

Reasonable and Prudent Alternative

Implementation Objective

2. Provide reservoir beach and island habitat.

- a. Maintain reservoir habitats through intra-system regulation 2001
- b. Identify all potential habitat enhancement on reservoir segments (Segments 1,3,5) 2005
- c. Complete 25% of reservoir projects identified above 2010
- d. Complete 50% of reservoir projects identified above 2015
- e. Complete 100% of reservoir projects identified above 2020

3. Artificially or Mechanically Created Habitat

- a. Provide created sandbar habitat on Segments 2, 4, 8, 9, 10 to supplement B1 above Years B(1a), B(1c) are deficient
- C. Initiate studies of the lack of sediment transport and impacts on habitat regeneration and turbidity 2003
- D. Monitoring of tern and plover nesting habitat Once every 3 years

Elements Applicable to Specific Species

V. Least Tern and Piping Plover

- A. Operate the Kansas River to provide overall benefits to conservation of least terns and piping plovers 2001
 - 1. Develop a study plan. 2002
 - 2. Gather data and evaluate whether Kansas River provides source or sink. 2005
- B. Provide habitat to meet or exceed fledge ratio goals of 0.70 for least terns and 1.13 for piping plovers 2001 (3 year average)
- C. Initiate and conduct a piping plover foraging ecology study on the Missouri River 2005

A-3

Reasonable and Prudent Alternative**Implementation Objective****VI. Pallid Sturgeon**

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

2001 -2011
2003 - Evaluation

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.

2001

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

Begin in 2001

2. Identify and map spawning habitat

Implement strategy by 2001 to
conduct mapping by 2002.

3. Channel training structure maintenance

Coordinate construction activities
with the Service and affected State
agencies.

4. Prioritize research needs

2000

Reasonable and Prudent Measures to Minimize Take

Terms and Conditions

Bald Eagle

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

Complete within 2 years of final BO.

- 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.

Measure 2 Develop management plan for cottonwood regeneration

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

Conduct population surveys and productivity monitoring annually.

- 1. Population survey information
 - a. Total # of colonies
 - b. Total # of birds
 - c. Map nest site locations
- 2. Monitoring information
 - a. Total # of nests and nest fates
 - b. Total # of fledged chicks/pair and other chick fates
 - c. Elevation of nests above water level

Report survey and monitoring information in the Annual Report.

Reasonable and Prudent Measures to Minimize Take**Terms and Conditions**

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

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

Submit report by Jan 2002 of the impacts to take resulting from historic operational changes (1986-2000). To include protocols to prevent historic cases of take from reoccurring.

Avoid operational caused flooding and spiked releases.

Report all documented incidental take immediately to Service.

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

The Corps will re-consult 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."

1. Continue captive rearing program, coordinate with Service

2. Initiate a peer review on Captive Rearing Protocol

3. Continue research into the effectiveness of the captive rearing program.

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.

Any changes to Protocol will be coordinated with and approved by the Service.

Peer review every 5 years start in 2001. Finish the captive reared plover study. Through the adaptive management process, identify if additional research necessary or if captive rearing should continue.

Report all captive rearing activities in the Annual Report.

Produce and update public service announcements.

Engage in intensive public relations efforts for tern and plover conservation.

Post all tern and plover nesting areas off limits to human disturbance.

Initiate studies to address cumulative impacts of increased recreational facility expansion

Apply all available predator management techniques including, cages, strobe lights, and trapping.

Pallid Sturgeon

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

Avoid operational changes that may affect spawning.

Report all documented incidental take immediately.

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

The Corps will re-consult 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.

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

Recommendations Applicable to Multiple Species

1. Develop a Recovery and Implementation Program.
2. Document current and future water depletions.

Recommendations Applicable to Specific Species

Bald Eagle

Pursue the recovery tasks assigned in the implementation schedules.

1. Conduct or participate in wintering and nesting bald eagle surveys.
2. Determine population dynamics of wintering and nesting birds.
3. Protect and manage habitat.
4. Conduct public outreach on the value of river habitat to the bald eagle.
5. 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.

Conservation Recommendations

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 impacts wintering ground activities have on long-term survival.

Pallid Sturgeon

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

APPENDIX B

Shallow Water Habitat Program Management Plan, FY 2003

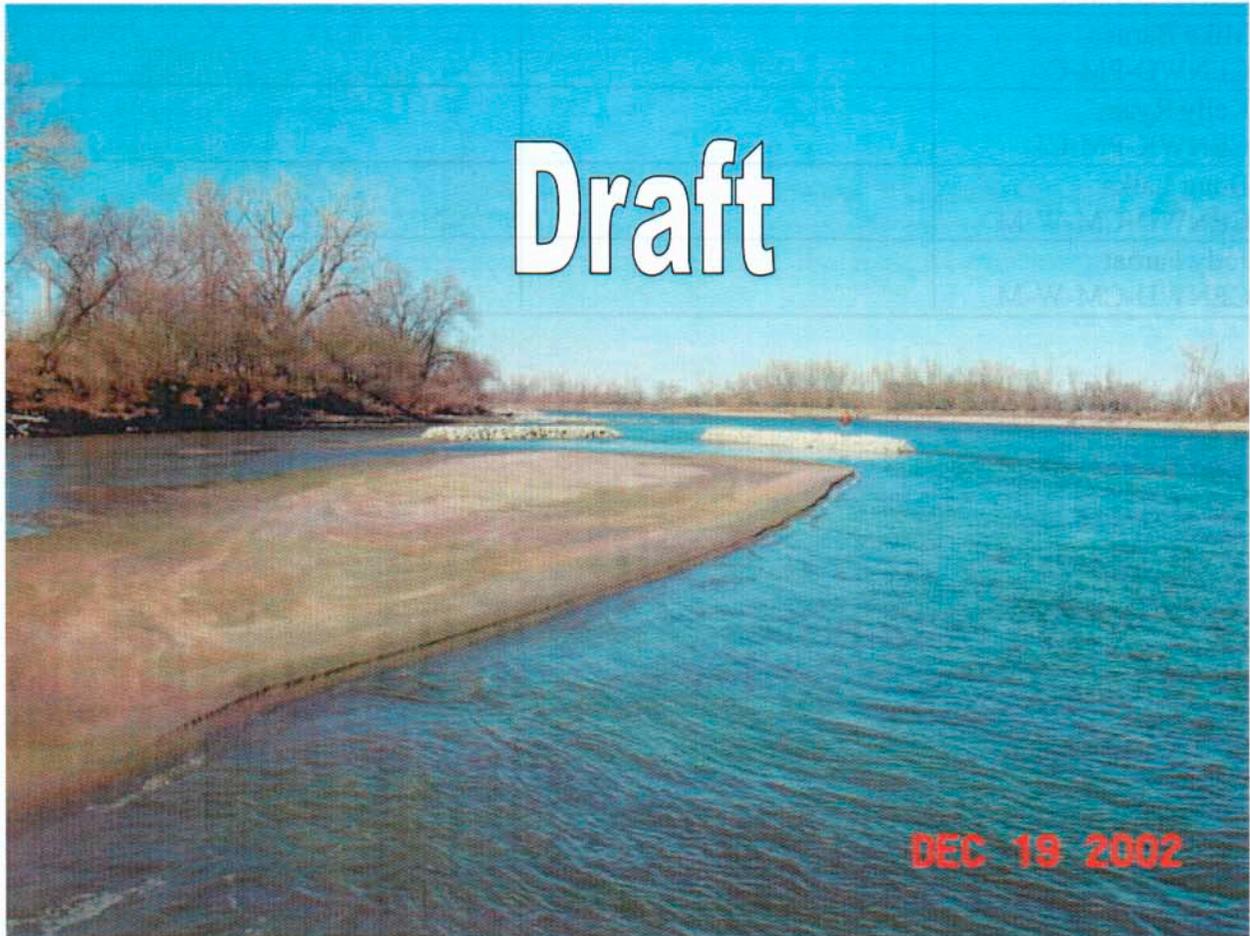


SHALLOW WATER HABITAT PROGRAM MANAGEMENT PLAN

US Army Corps
of Engineers

FY 2003

MISSOURI RIVER, PONCA TO THE MOUTH



August 2003

• Program Management Plan
 . Shallow Water Habitat, Missouri River, Ponca to the Mouth

The members of the PDT have review the PgMP and approve it's contents.

Name	Date	Signature
John Remus SWH Manager CENWO-ED-HF		
Allen Tool CENWK-EC-HH		
Mike Chapman CENWK-EC-HH		
Dan Pridal CENWO-ED-HD		
Mike George CENWO-PM-C		
Mike Barnes CENWO-PM-C		
Kelly Ryan CENWK-PM-CJ		
Doug Latka CENWD-CM-W-M		
Jody Farhat CENWD-CM-W-M		

Program Management Plan
Shallow Water Habitat Development, Missouri River, Ponca to the Mouth
April 2003

1. Introduction: This Program Management Plan (PgMP) outlines the acquisition strategy, resource requirements, and major milestones for accomplishing the shallow water habitat (SWH) requirements set forth in the November 2000 Biological Opinion (BiOp) for the Operations of the Missouri River Main Stem Reservoir System, the Operations and Maintenance of the Missouri River Streambank Stabilization and Navigation Project, and the operation of the Kansas River Projects. SWH is defined in the BiOp as depths 5 feet or less, with velocities less than 2.5 feet per second. Measurement of SWH is discussed in Section 5. This PgMP addresses all SWH development related activities (regardless of program) along the Missouri River from Ponca State Park (RM 753) to the mouth. Progress toward the goals set forth in the PgMP will be reported through the annual BiOp Implementation Report.

2. Purpose: This PgMP is a supplement to the Biological Opinion Implementation Plan and will be used by the SWH Manager, Program Managers (PMs) for other programs/projects, and the Missouri River Strategic Committee for budget preparation, resource allocation, and setting priorities. Exhibit 1 is a FY 2003 work plan and resource allocation requirements for all activities related to SWH development. All separable work items will be executed in accordance with a project specific PgMP.

3. Authorization: Authority to execute the activities addressed in the PgMP is contained in several separate authorizations. Compliance with the Endangered Species Act (ESA) (i.e., the BiOp) requires creation of habitat. A very small amount of this work can be accomplished through the Corps O&M Program, but the vast majority of the work will be accomplished through the programs listed below, with the Mitigation Project being the primary authority. The SWH Program will take advantage of any other authorites/appropriations that may be provided (i.e. MOREAP).

a. Section 601(a) WRDA 1986 and Section 334(b) WRDA 1999, Missouri River Fish and Wildlife Mitigation Project

b. Section 1135 (WRDA 1986) Environmental Restoration Program

c. Section 206 (WRDA 1996) Aquatic Ecosystem Restoration

d. Section 514 (WRDA 1999) Missouri River Enhancement Program

4. Program Components: The following components are part of this PgMP.

a. SWH Development Activities. Following is a brief description of the types of modifications that are planned as part of shallow water habitat development.

• 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 Bank Stabilization and Navigation Project (BSNP). Review of the PMP for Implementation of the BiOp 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.

- Dike Lowering/Notching/Removal. Dikes adjacent to publicly owned land will be targeted for modification in an attempt to increase the top width of the main channel of the Missouri River, or to increase the depth diversity and alluvial dynamics of the channel within the existing top width. 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. These activities will be completed through the O&M, Mitigation, Section 1135, and Section 514 Programs.

- Placement of New Structures. As stated above, simple dike modifications will likely not be sufficient to create the required amount of habitat, while remaining within the assumptions stated in Section 5 below. 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 Exhibit 2.

- 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 long-term goal is to develop a situation where, on average, 200 feet of the existing or future top 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.

b. Monitoring (physical changes). The monitoring plan described below consists of data collection and analysis aimed at determining: (1) the quantity and quality of habitat produced by 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-term. This monitoring does not specifically include any biological monitoring. Biological monitoring plans are being developed under a separate PgMP. However, all monitoring efforts will be fully coordinated, and wherever possible, coincidental with other monitoring efforts.

- **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 of 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). Bed material and suspended sediment data may be obtained on a site specific or special basis.

- **Data Collection.** The collection and processing of the data will be accomplished through contracts and in-house hired labor. The Kansas City District (NWK) has purchased an ADCP unit and has in-house labor resources to collect a limited amount of hydrographic survey data on short-suspended work efforts. Due to the length of the river and the necessity to capture a wide range of hydrologic conditions, a considerable amount of the data collection will be accomplished through contracts. These contracts will be with A/E firms and other government agencies (ERDC, USGS, etc.). Project engineers and scientists will work with both NWK and Omaha District (NWO) GIS/survey personnel and the contractors to develop the protocol, data layer schemes, etc. This work will also be coordinated with other data collection efforts along the river.

- **Data Analysis.** It is not practical, from a cost or logistical point of view, to conduct detailed data collection for every altered river mile. Therefore, detailed data collection will be performed 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.

- **Design Tools.** As part of the monitoring process design tools will be developed. A combination of prototype experimentation and math modeling will be used to develop the necessary design tools to ensure/optimize the performance of the project modifications. This will include applying lessons learned to new designs and fine tuning project modifications.

- c. **Database Maintenance.** Data will be stored in a single GIS database, or in multiple databases that can be accessed by researchers, river managers, and policy makers. The particulars of the database(s) (location, data specifications, etc.) are being developed. The development team includes the Corps, US Fish and Wildlife Service (USFWS), and the US Geological Survey (USGS).

d. **Controlling the Scope.** The direction of this PgMP will be set by the requirements of the November 2000 BiOp (including any supplements, revisions, etc.), or any new BiOp that would modify, replace, or clarify the requirements of the 2000 BiOp. The scope of this program will be determined by the Missouri River Strategic Committee and will not exceed the financial, legal, and regulatory limits of the authorities listed in Section 3 above.

5. **Assumptions and Definitions:**

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% 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.

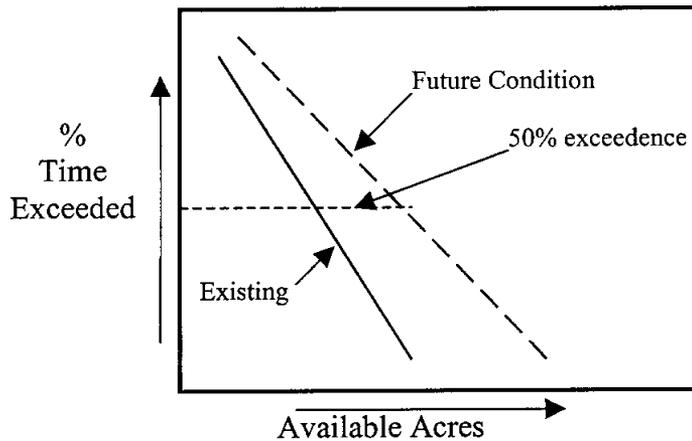


Figure 1. Conceptual Habitat Availability Curves.

b. **Habitat Parameters.** The habitat parameters defined in the BiOp will be used. These are depths less than 5 feet (1.5 meters) and velocities less than 2 feet per second (0.6 meters per second).

c. **Depth Diversity.** Although the BiOp calls for a finite number of acres of shallow water habitat, biologists 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. In addition, there is evidence that a more dynamic alluvial process that allows sandbars to build and erode in response to varying hydrologic conditions is more environmentally preferred than a static channel cross section. Designers must keep this in mind when developing modification plans.

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. The capacity of the Federal Flood Control Projects must be maintained, as well as water supply and water quality. Although recreation is not a specific objective of the program, the recreation value of the river will likely be enhanced. However, public safety concerns must be addressed in the development of individual project sites.

e. Private Property. All modifications will be placed adjacent to Corps-owned land, land that the Corps obtains a sloughing easement on, on 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. Impacts to existing infrastructure will be evaluated on a case-by-case basis. An avoidance/minimization approach will be used to address latent and reciprocal impacts. No modifications will be placed so that erosion of, or damage to, private property will result.

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 flowage easements.

6. Communications:

a. Project Delivery Team. The PDT is comprised of Corps staff from the NWO, NWK and Northwestern Division (NWD), as well as Department of Interior personnel from the USFWS and USGS-BRD. The primary method of communication will be via electronic media (e-mail, ftp, etc.). The PDT will meet at least twice a year to review progress, assess study results, and to develop priority lists. The PDT is listed in Section 8.

b. The Missouri River Strategic Committee. The Corps members of the PDT will meet with the Missouri River Strategic Committee twice a year to review program requirements, develop budget submissions, and to allocate resources.

c. Coordination with Other Programs. The Project Managers and Program Managers responsible for the projects/programs listed in Section 3 will be fully coordinated with and will attend the Strategic Committee meetings on an ad hoc basis.

d. Communication with Other Agencies. Communication with other Federal and State agencies will be accomplished through the established procedures embedded in the programs listed in Section 3.

e. Public Involvement. There will be no formal public involvement plan specific to this PgMP. Public involvement will be accomplished through the processes/requirements of the programs described in Section 3. The primary public involvement process will be the Section 10/404 Permit review process. However, all or parts of this PgMP will be presented and

comments taken through the Annual Operating Plan process, at public scoping meetings associated with cost shared projects (Section 1135, 206, 514), and at meetings with project users.

7. Milestones. Major milestones for the PgMP are presented in Exhibit 1. These milestones are subject to the availability of funding from the various programs listed in Section 3.

8. PDT: The PDT for the PgMP consists of a Primary PDT and a Support PDT. The Primary PDT is comprised of individuals that are responsible for resource allocation relative to the river, regional interface, Strategic Committee coordination, and overall quality management. Many of these individuals will be involved in scoping, reviewing, and producing the technical products. The Support PDT is comprised of individuals that will scope, review, and produce a majority of the technical products. The PDT members are listed below.

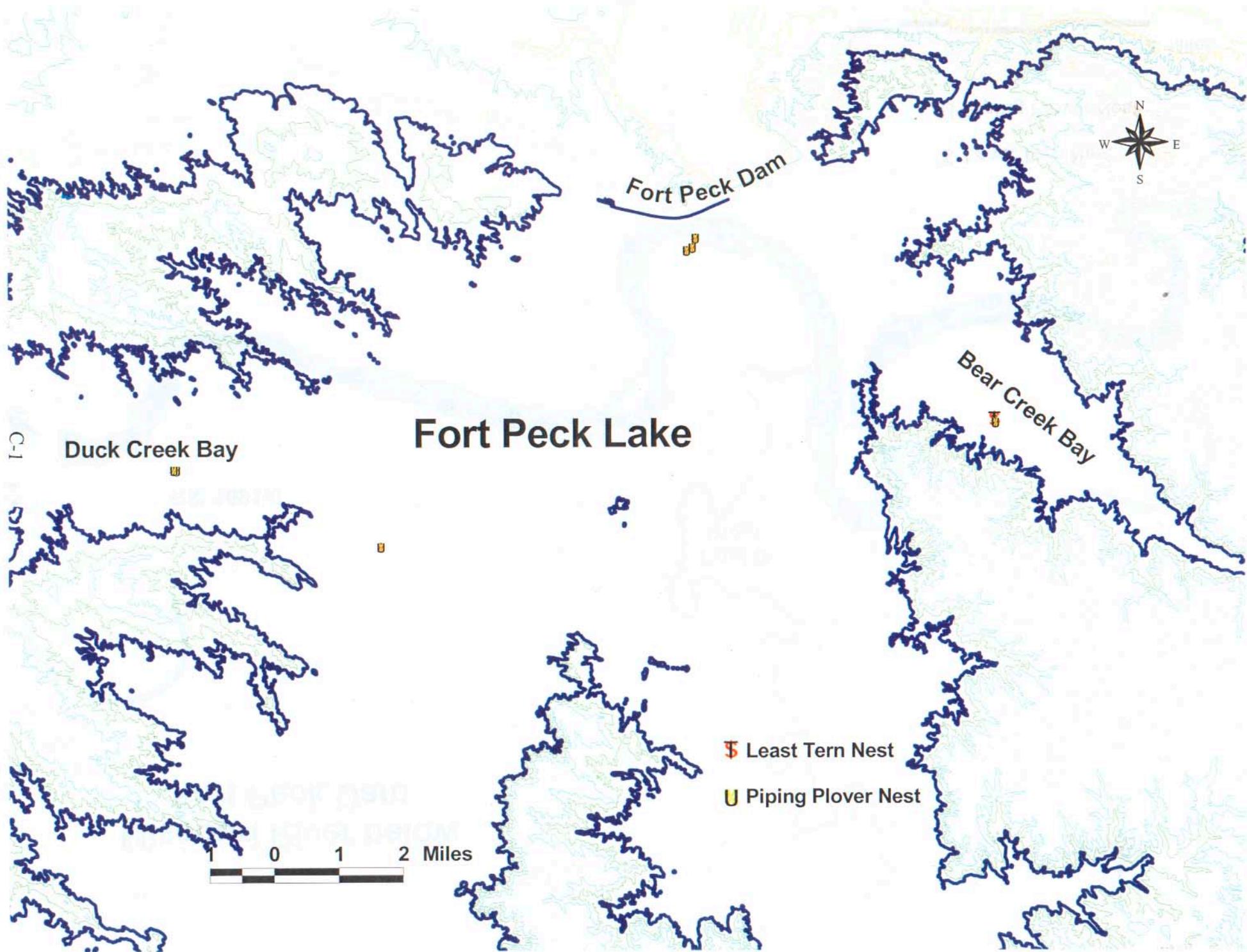
Primary PDT		
Name	Expertise	Responsibilities
John Remus SWH Manager CENWO-ED-HF	Senior Hydraulic Engineer: Sedimentation Transport, Alluvial Geomorphology, Channel Restoration Design	Shallow Water Habitat (SWH) development program over sight, development of monitoring plan and protocols, technical review of project designs, scope preparation and contract administration, Quality Assurance/Quality Control (QA/QC)
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 oversight 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 administration
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.
Mike George CENWO-PM-C	Project Manager for the BiOp Implementation	Oversight of the implementation plan for the BiOp
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.	Program and Project Management activities for the Missouri River Mitigation Project for all states, and site specific PM for development in Missouri and Kansas.
Doug Latka CENWD-CM-W-M	Fisheries Biologist CENWD Missouri River	Regional oversight of biological monitoring and interface with USFWS
Jody Farhat CENWD-CM-W-M	Hydraulic Engineer CENWD Water Management	Overall Program Manager for RM&E, interface with the Missouri River Steering Committee.

Support PDT		
Name	Expertise	Responsibilities
Jeremiah Szynskie CENWK-EC-HH	Hydraulic Engineer: Sedimentation Transport, Numerical Modeling	Conduct numeric model design, technical project design
Dereck Wansing CENWK-EC-HH	Engineering Technician: Database Development, Data Collection,	Data base development and design, data collection method and protocol
Jon Kragt CENWO-IM-P	GIS Expert: Development of Databases and Development/ Application of Geo-spatial Analysis Techniques.	Development and maintenance of databases
Rose Hargrave CENWD-CM-W-M	Project Manager for the Master Manual EIS	Regional budget and funding support
Robb Jacobson USGS-BRD	Geomorphology, database design, impacts assessments	QA/QC reviews, protocol development, interface with USFWS
Jane Ledwin USFWS	Biologist,	Missouri River point of contact for SWH development, maintenance activities, fish and wildlife coordination.
Larry Irvin CENWK-FO-MO	Area Engineer – NWK	O&M of the BSNP below Rulo. Contract Administration
Larry Gann CENWO-CD-FC	Construction Representative	Administration of construction contracts, QC of specifications, BCO reviews, contractor selection.

9. Quality Management: Quality Management Plans (QMP) will be developed for each separable deliverable (i.e., annual data collection plans, site-specific designs, etc.). It will be the responsibility of each individual PM/Project Engineer to develop and execute a QMP for the technical products within their respective programs. The SWH Manager is responsible for documenting the QA Process.

APPENDIX C

Nest Site Location Maps



C-1

Duck Creek Bay

Fort Peck Dam

Fort Peck Lake

Bear Creek Bay

T Least Tern Nest

U Piping Plover Nest

0 1 2 Miles

Missouri River below Fort Peck Dam



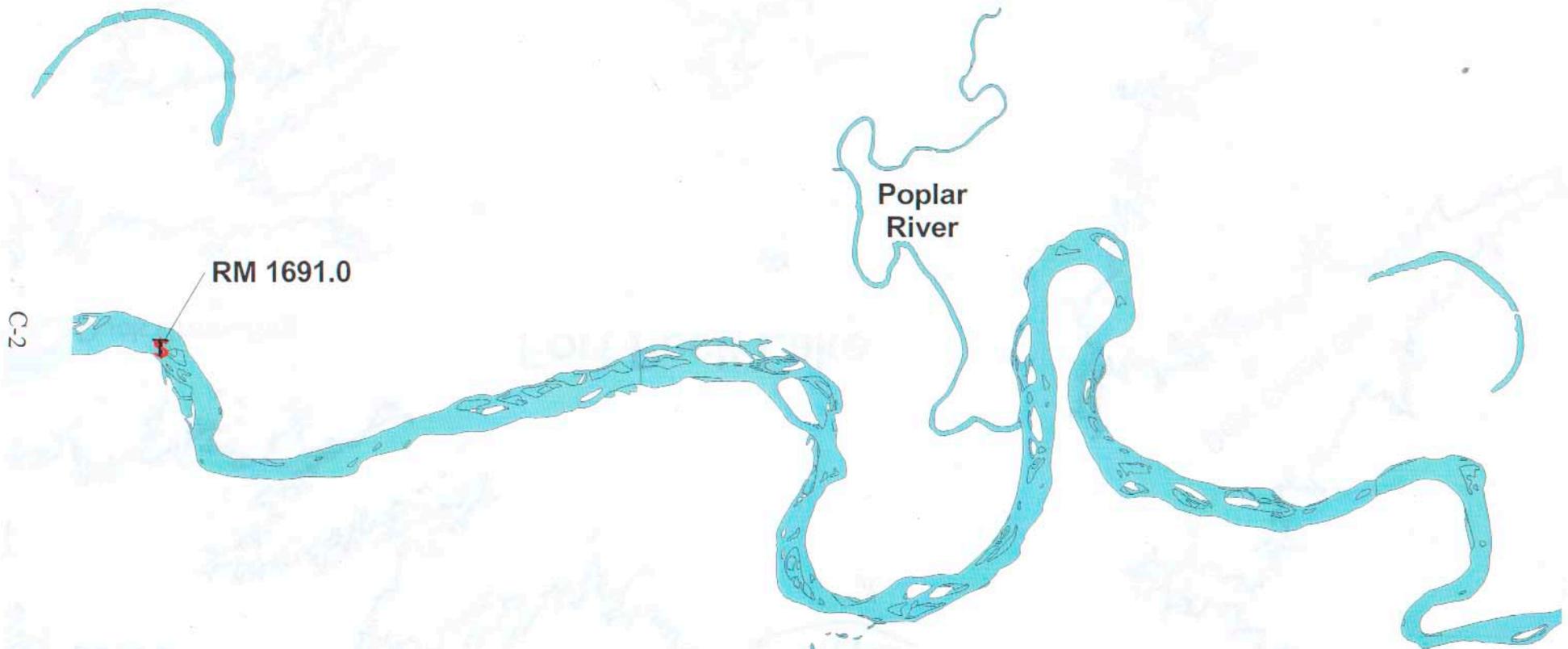
Poplar
River

RM 1691.0

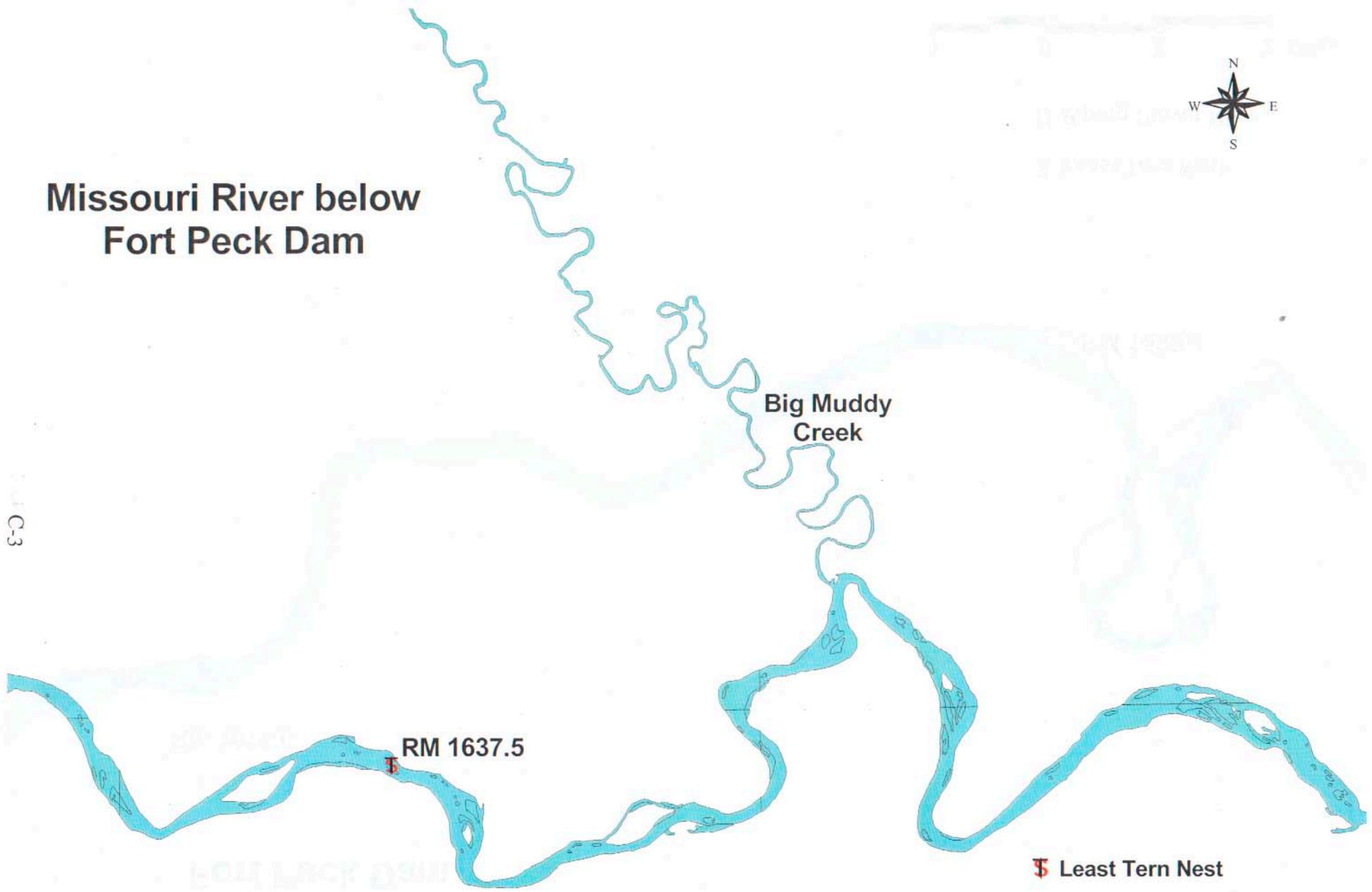
C-2

⚡ Least Tern Nest

U Piping Plover Nest



Missouri River below Fort Peck Dam



Big Muddy
Creek

RM 1637.5

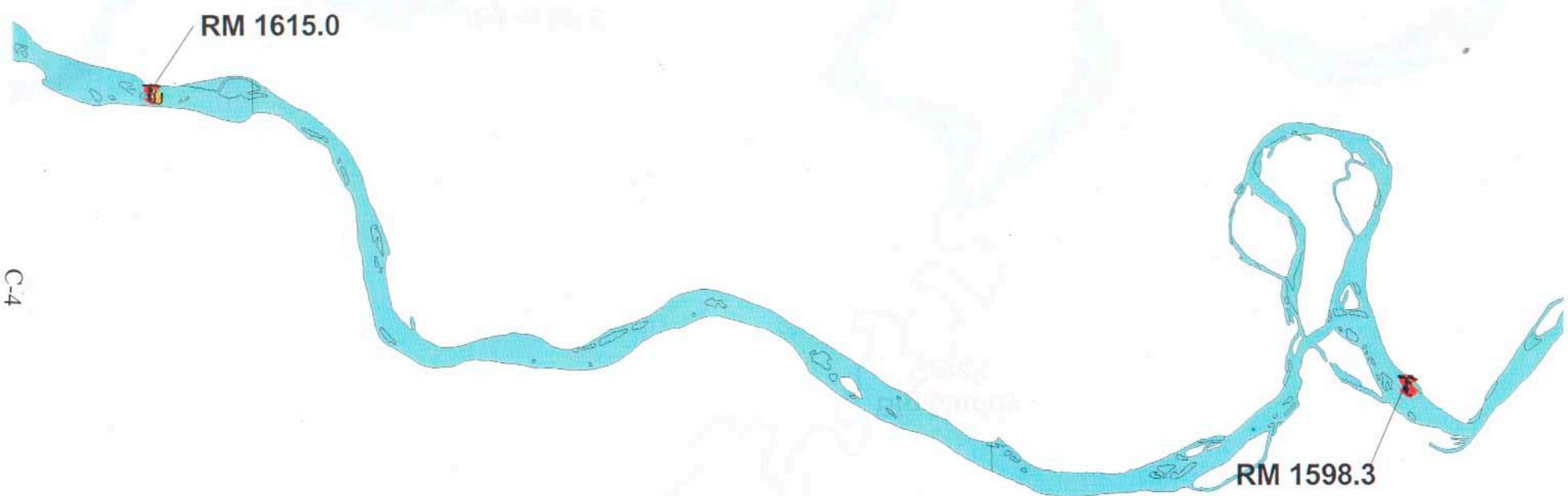
Least Tern Nest

Piping Plover Nest

1 0 1 2 Miles

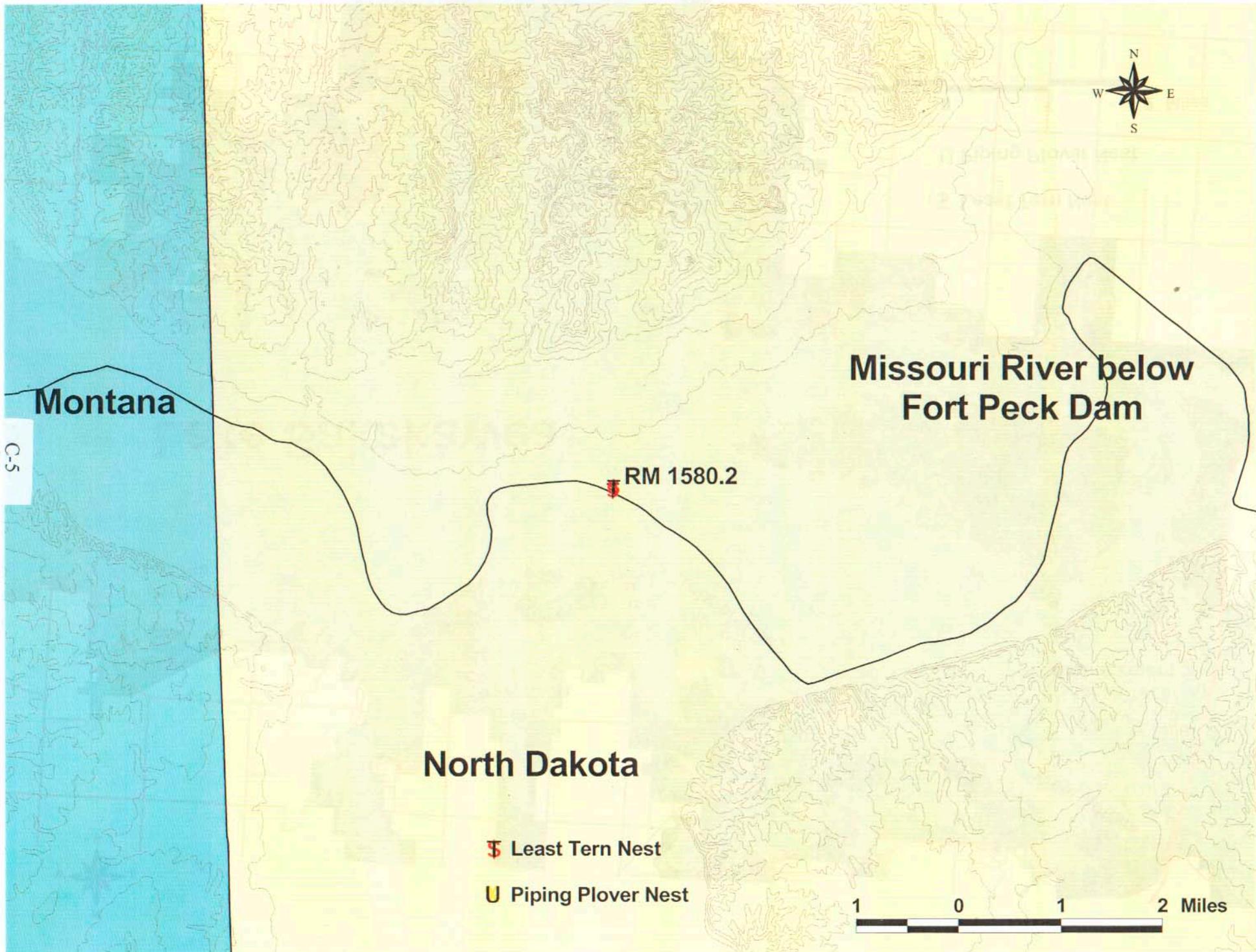
C-3

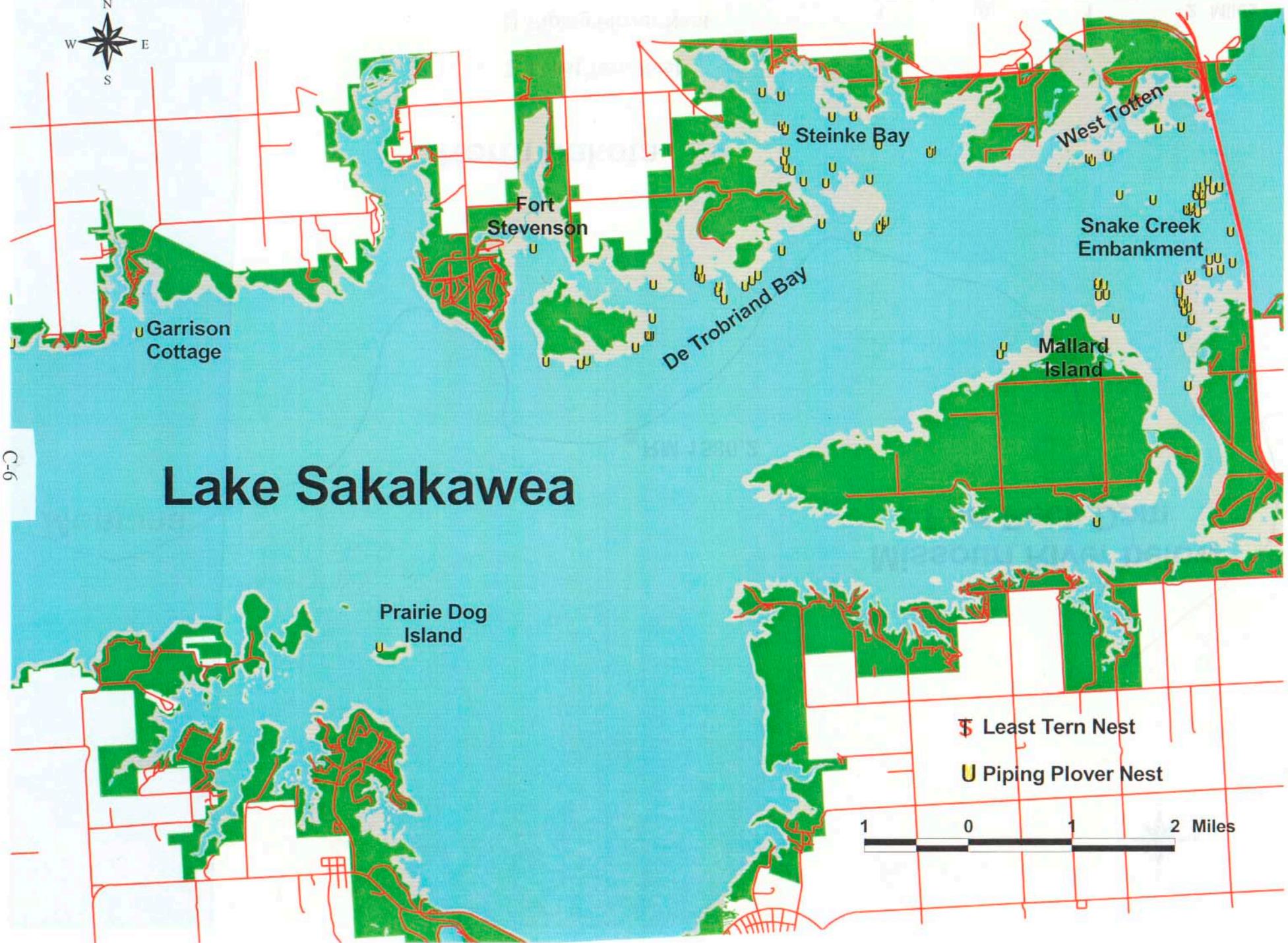
Missouri River below Fort Peck Dam



- Least Tern Nest
- Piping Plover Nest





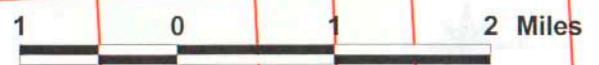


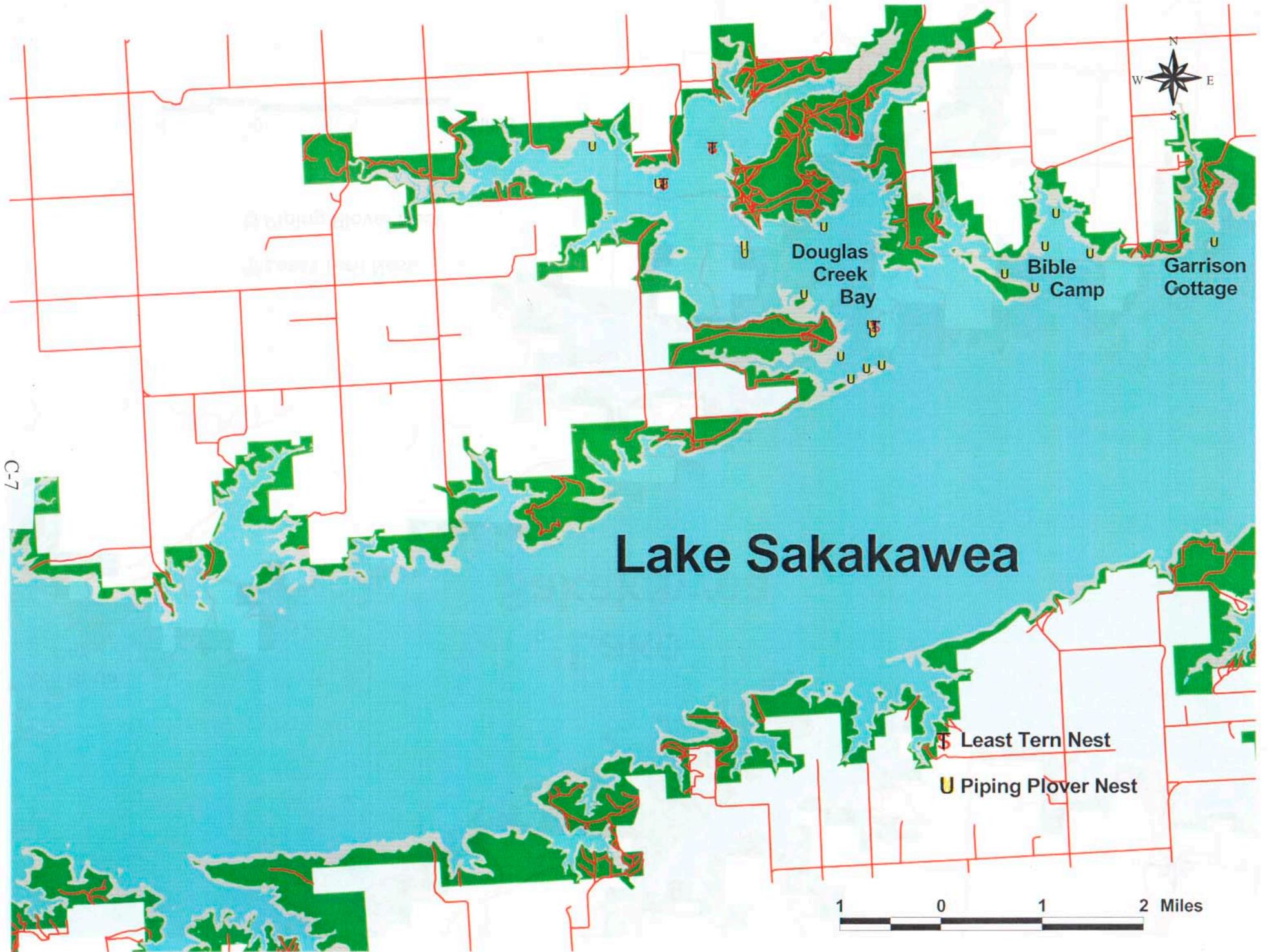
Lake Sakakawea

C-6

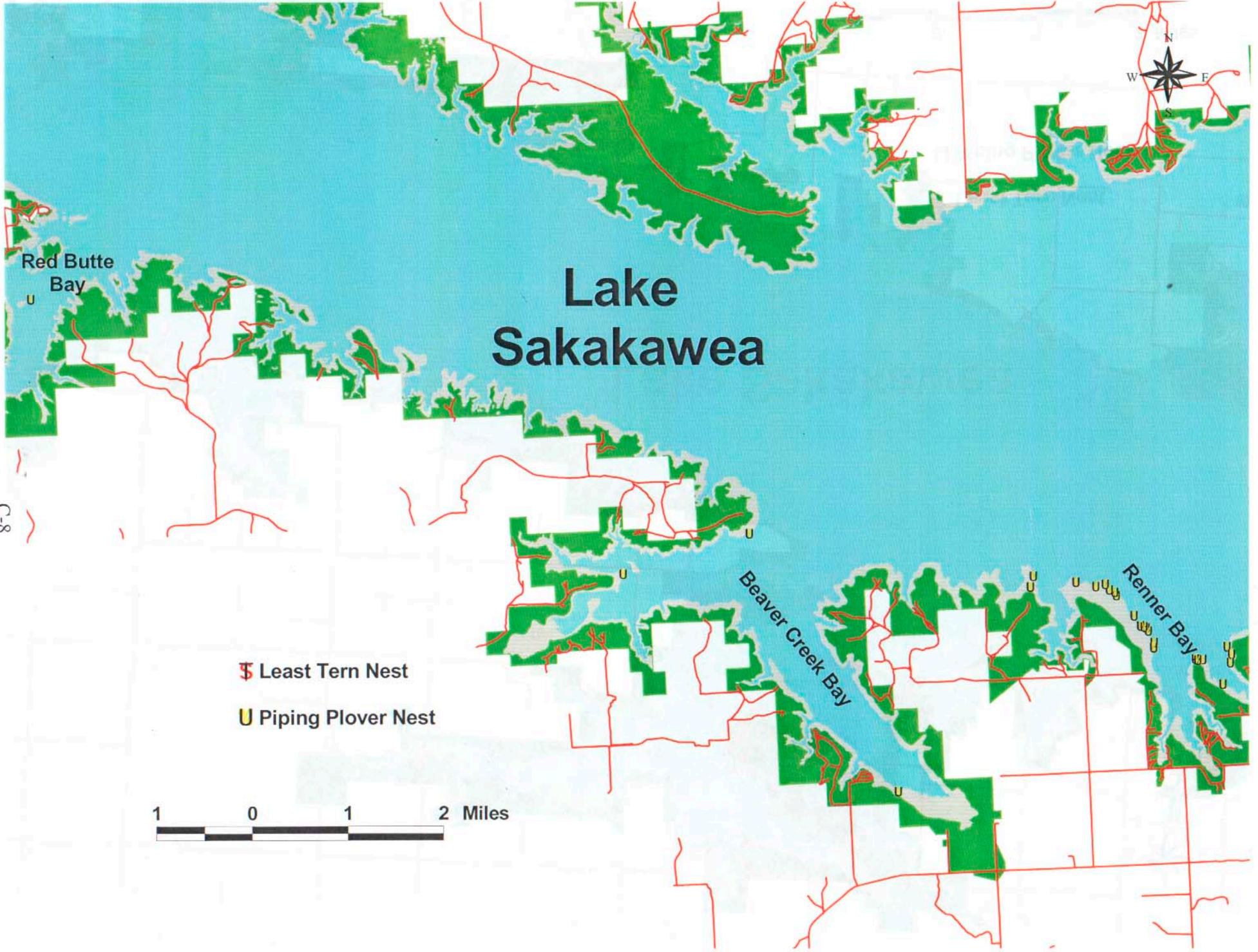
\$ Least Tern Nest

U Piping Plover Nest





Lake Sakakawea



Red Butte Bay

Beaver Creek Bay

Renner Bay

\$ Least Tern Nest
U Piping Plover Nest

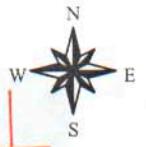
1 0 1 2 Miles

C-8





Newtown



Van Hook Arm

- \$ Least Tern Nest
- U Piping Plover Nest

1 0 1 2 Miles

Shell Village Island



White Earth Bay

Lake Sakakawea

Antelope Creek

Beacon Island

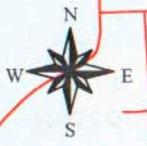
- ⌘ Least Tern Nest
- U Piping Plover Nest

1 0 1 2 Miles



C-11

Lake Sakakawea



Little Egypt

Hofflund Bay

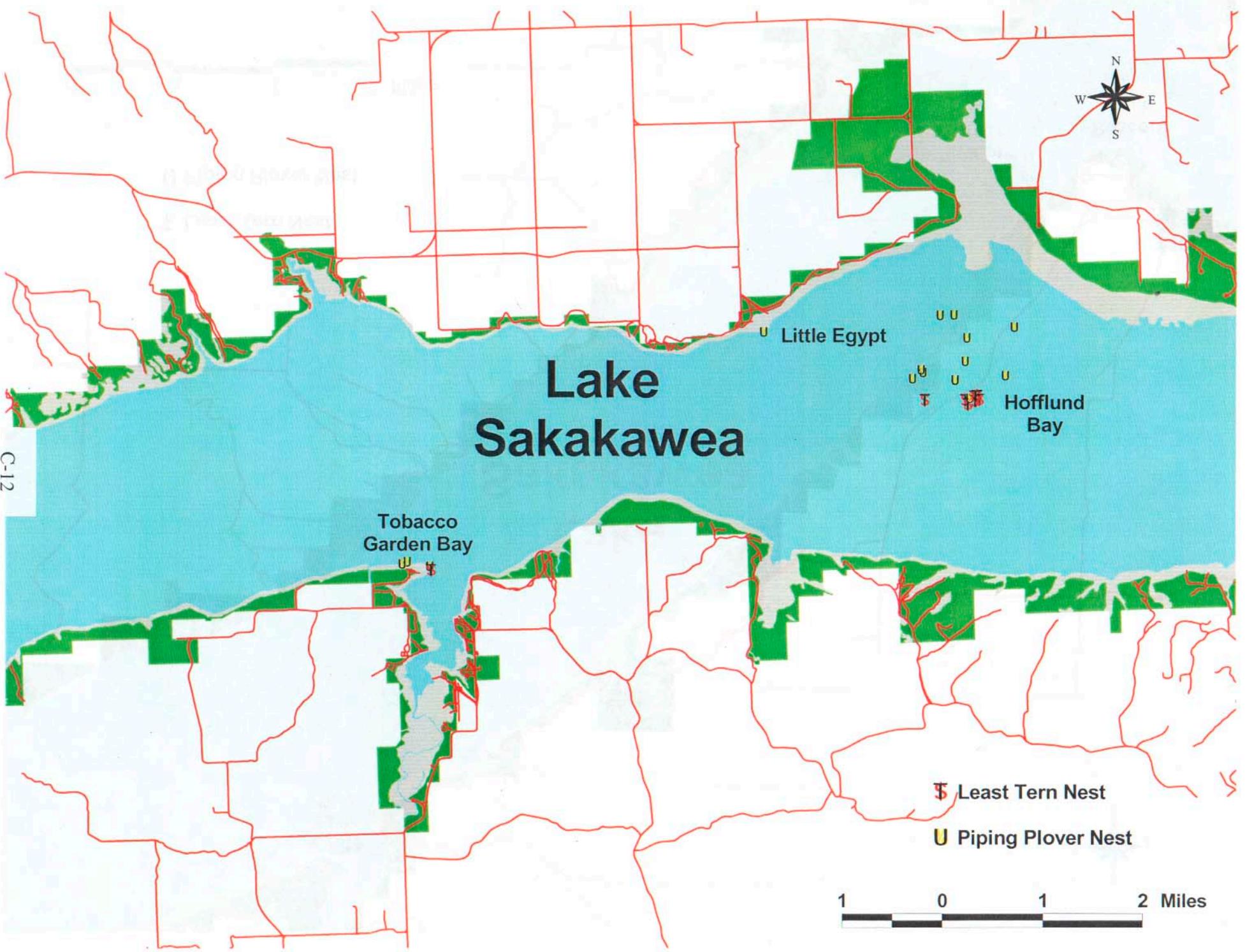
Tobacco Garden Bay

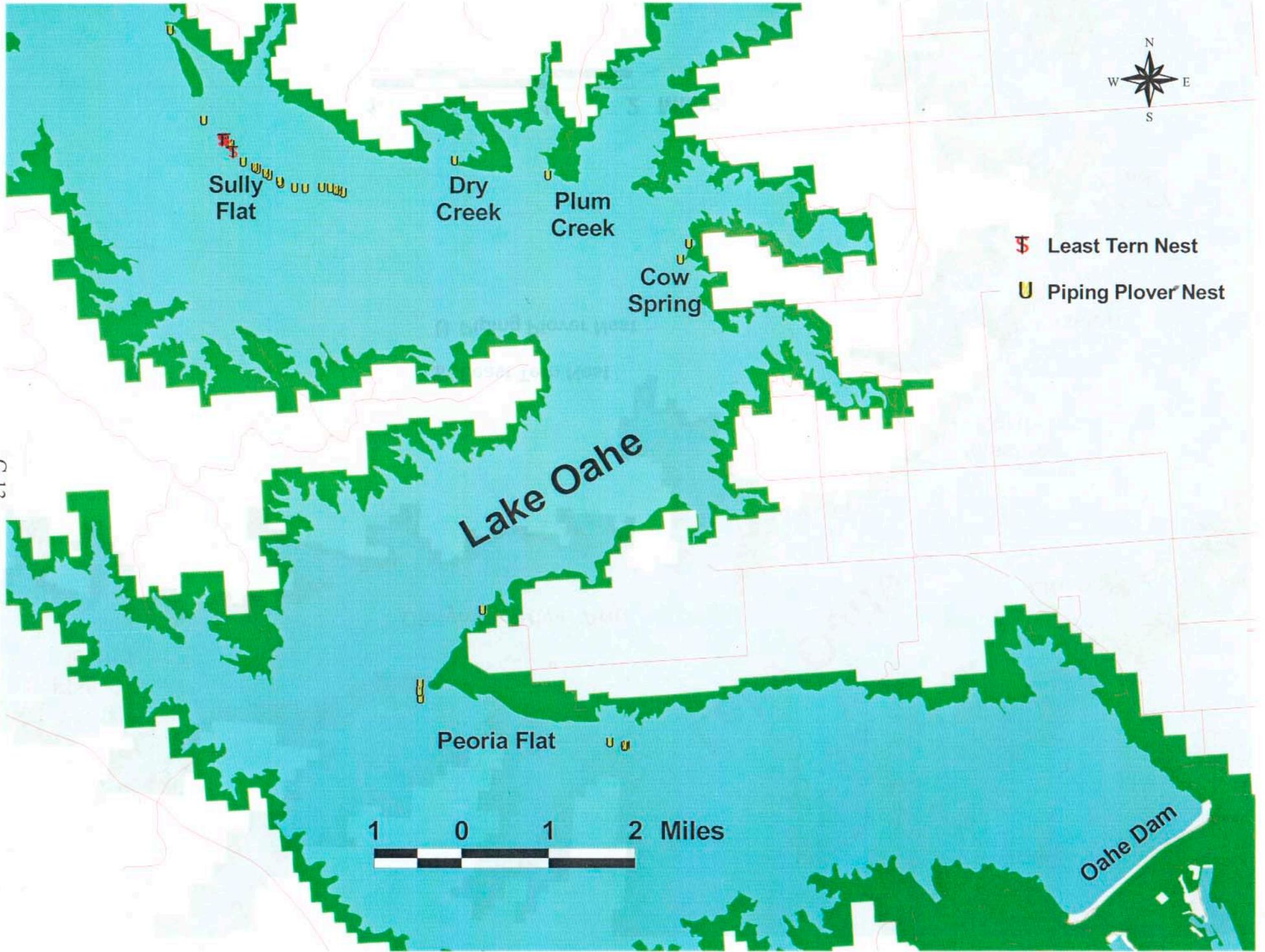
Least Tern Nest

Piping Plover Nest



C-12





- \$ Least Tern Nest
- U Piping Plover Nest



C-13

Sully Flat

Dry Creek

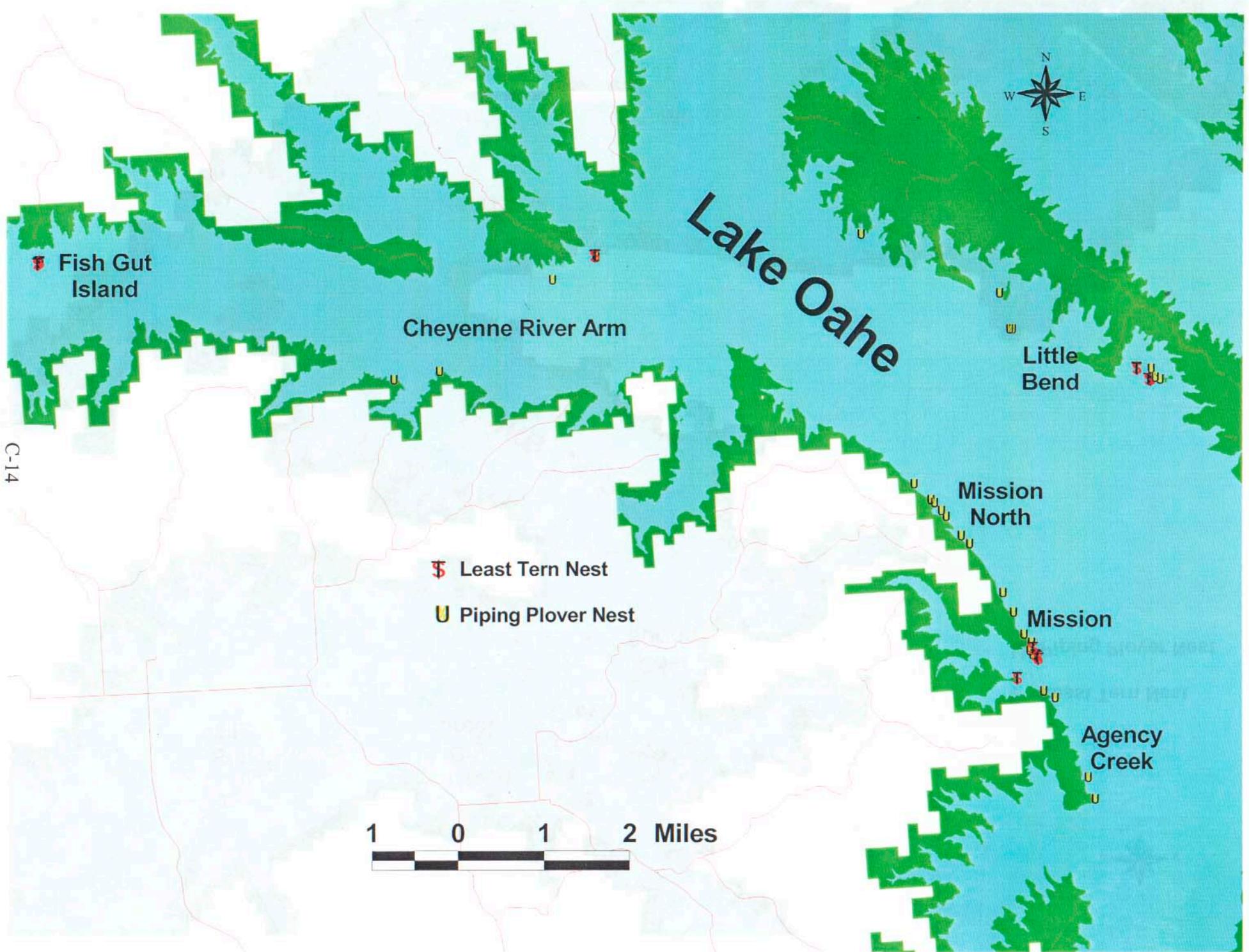
Plum Creek

Cow Spring

Lake Oahe

Peoria Flat

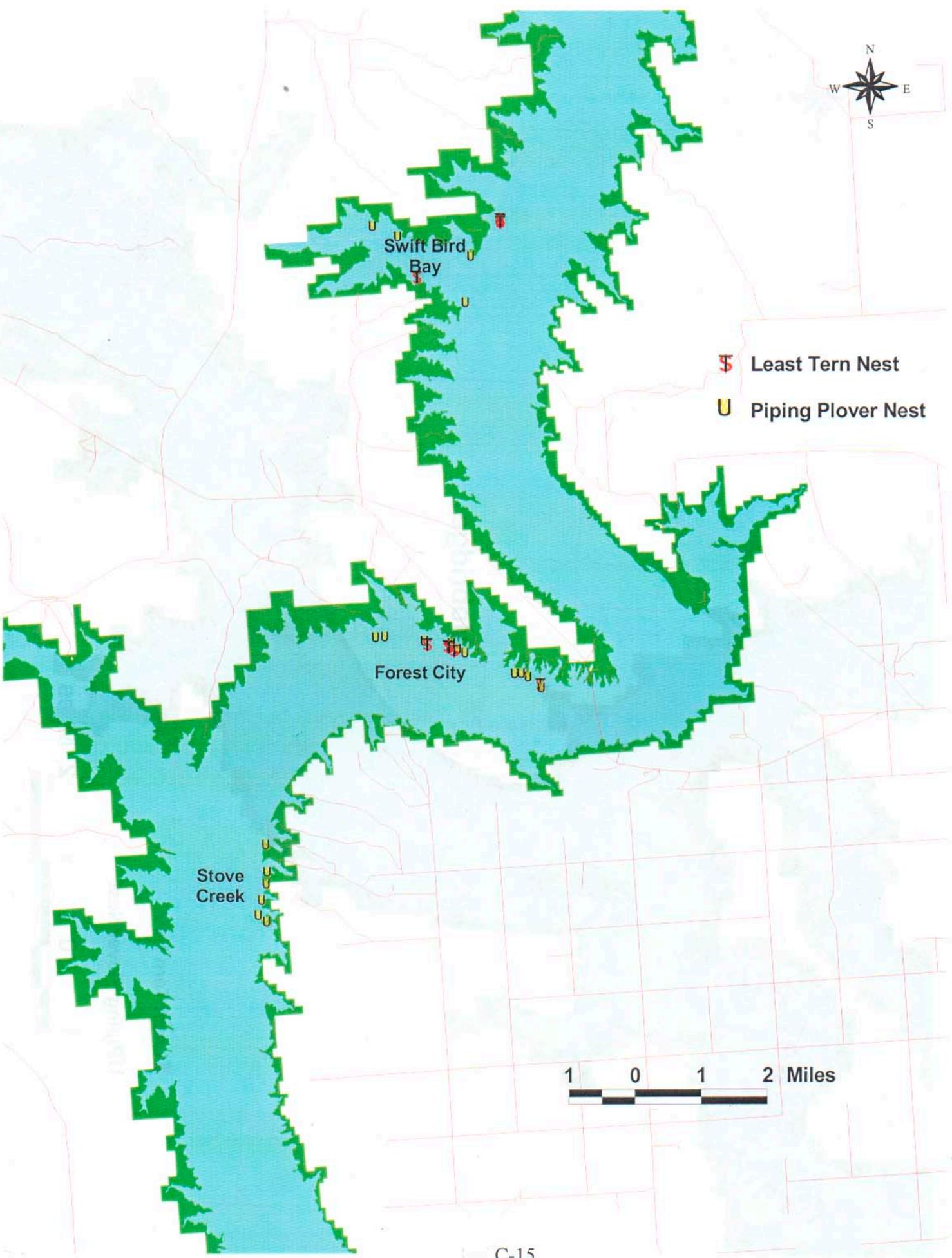
Oahe Dam

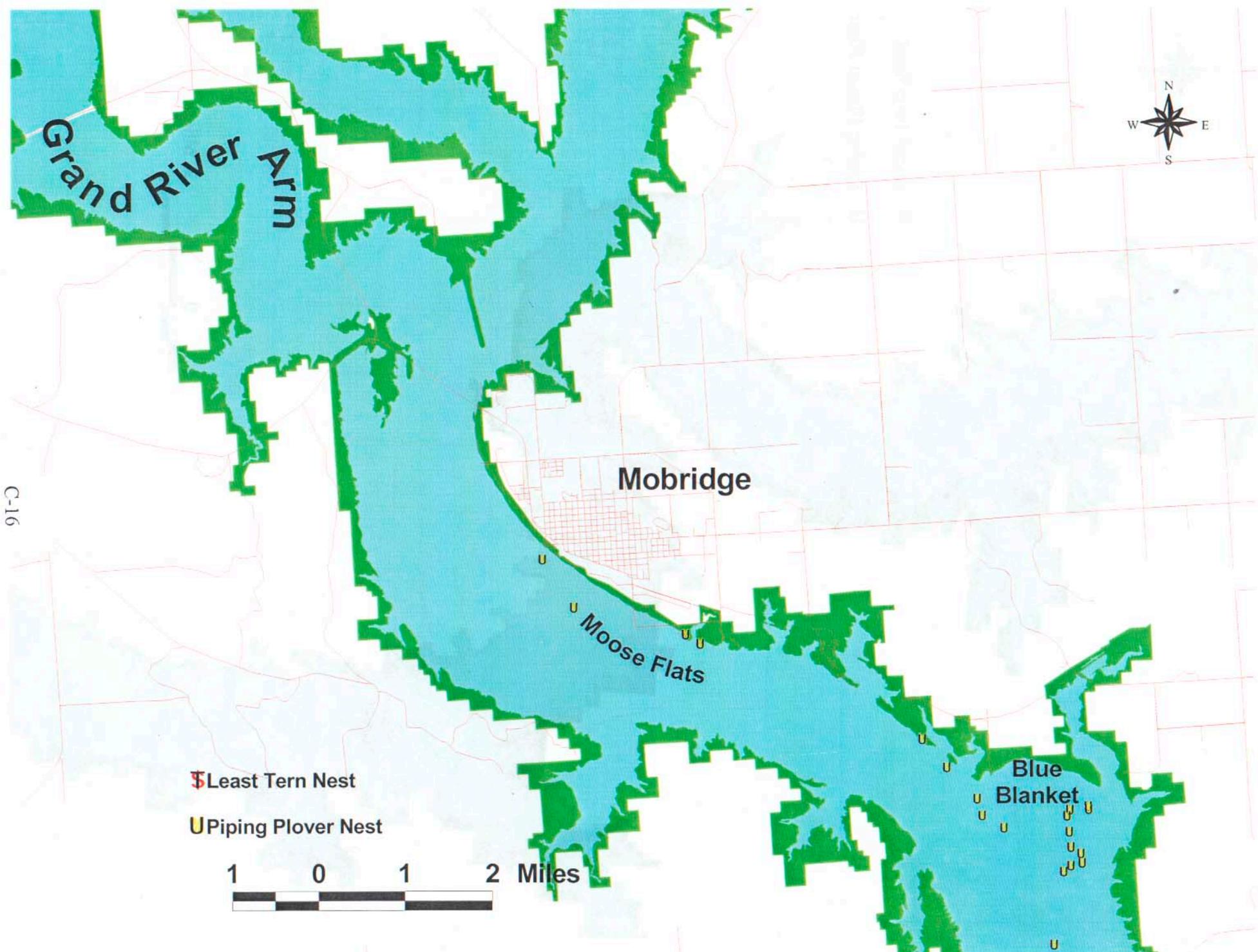


C-14



- § Least Tern Nest
- U Piping Plover Nest





Grand River Arm

Mobridge

Moose Flats

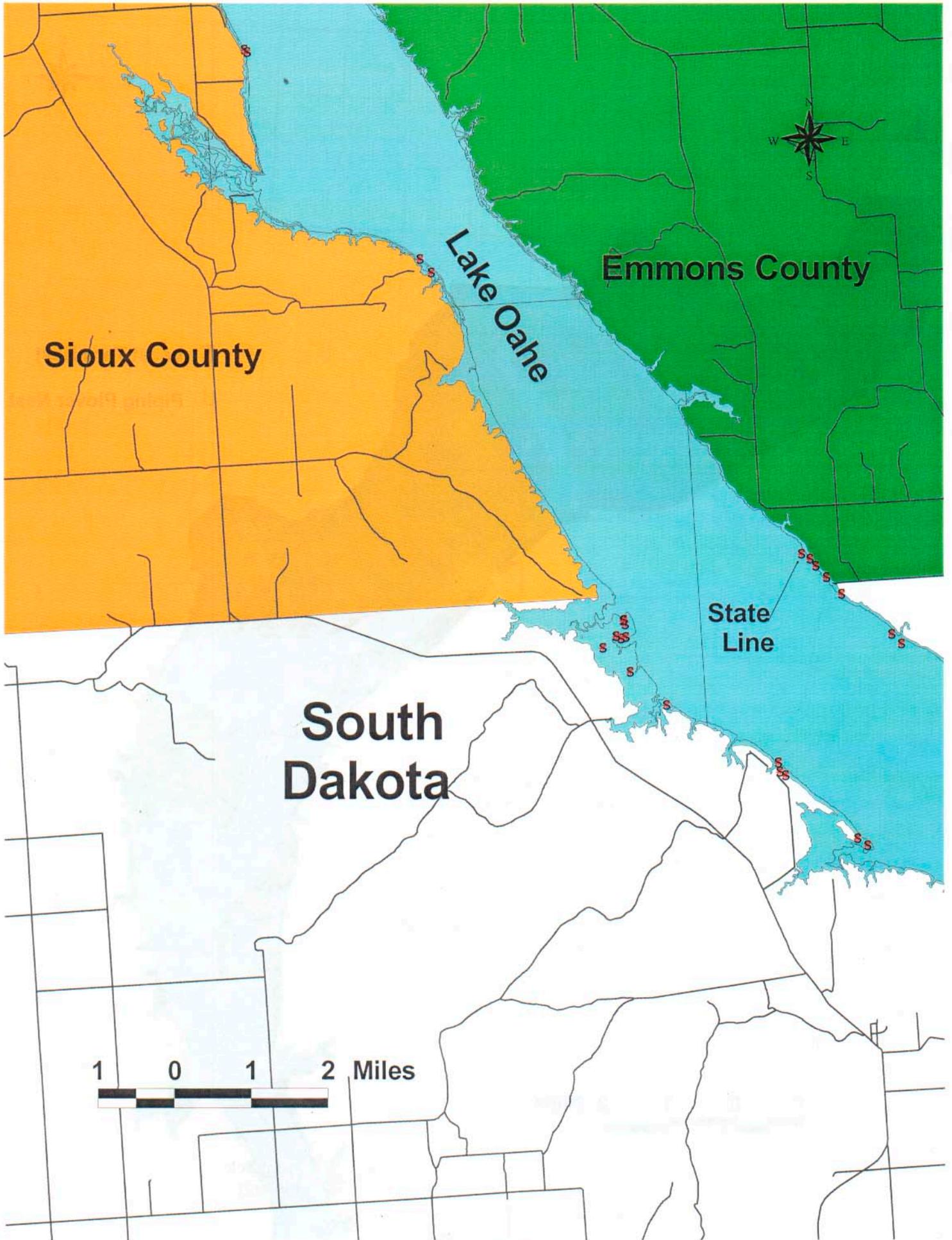
Blue Blanket

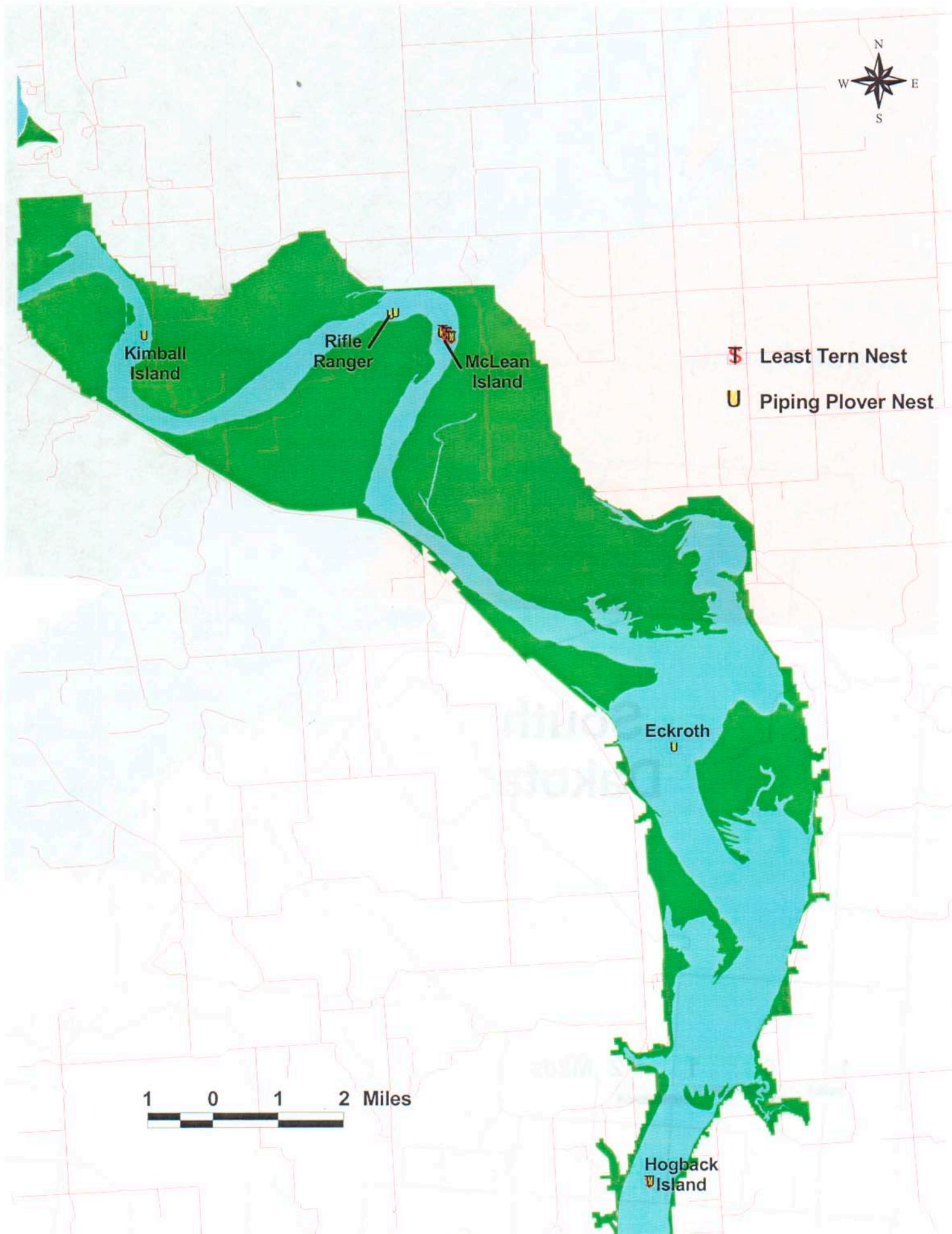
⌘ Least Tern Nest

U Piping Plover Nest



C-16







RM 1380.0

Knife River

Stanton

RM 1374.3

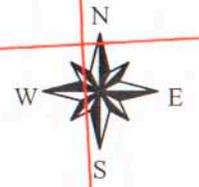
S Least Tern Nest

U Piping Plover Nest

RM 1369.0

RM 1367.5

RM 1364.0



C-19



Washburn



RM 1358.0

RM 1361.0

RM 1362.4

RM 1352.5

RM 1348.0

Least Tern Nest

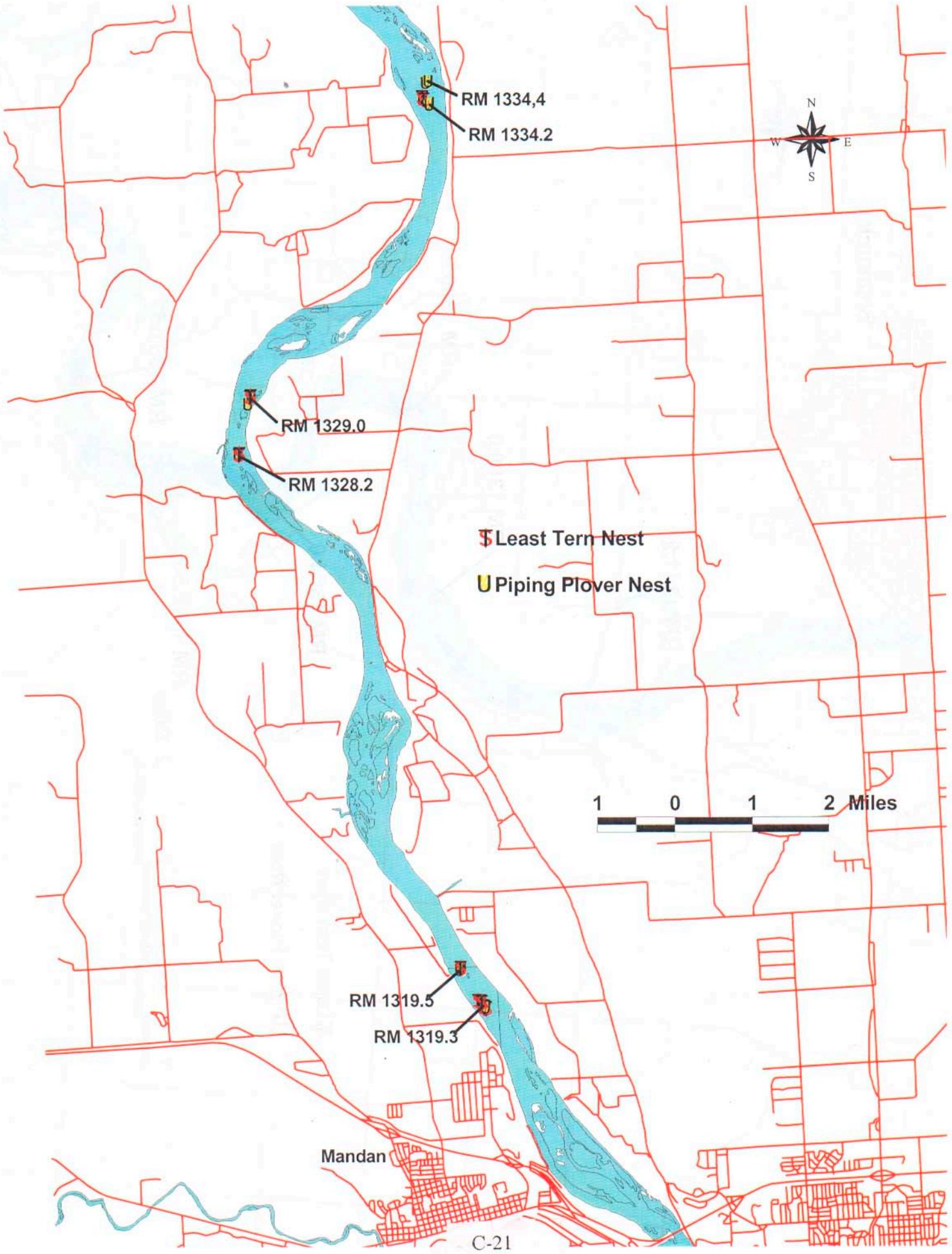
Piping Plover Nest

RM 1347.5



RM 1345.0

C-20



RM 1334,4
RM 1334.2

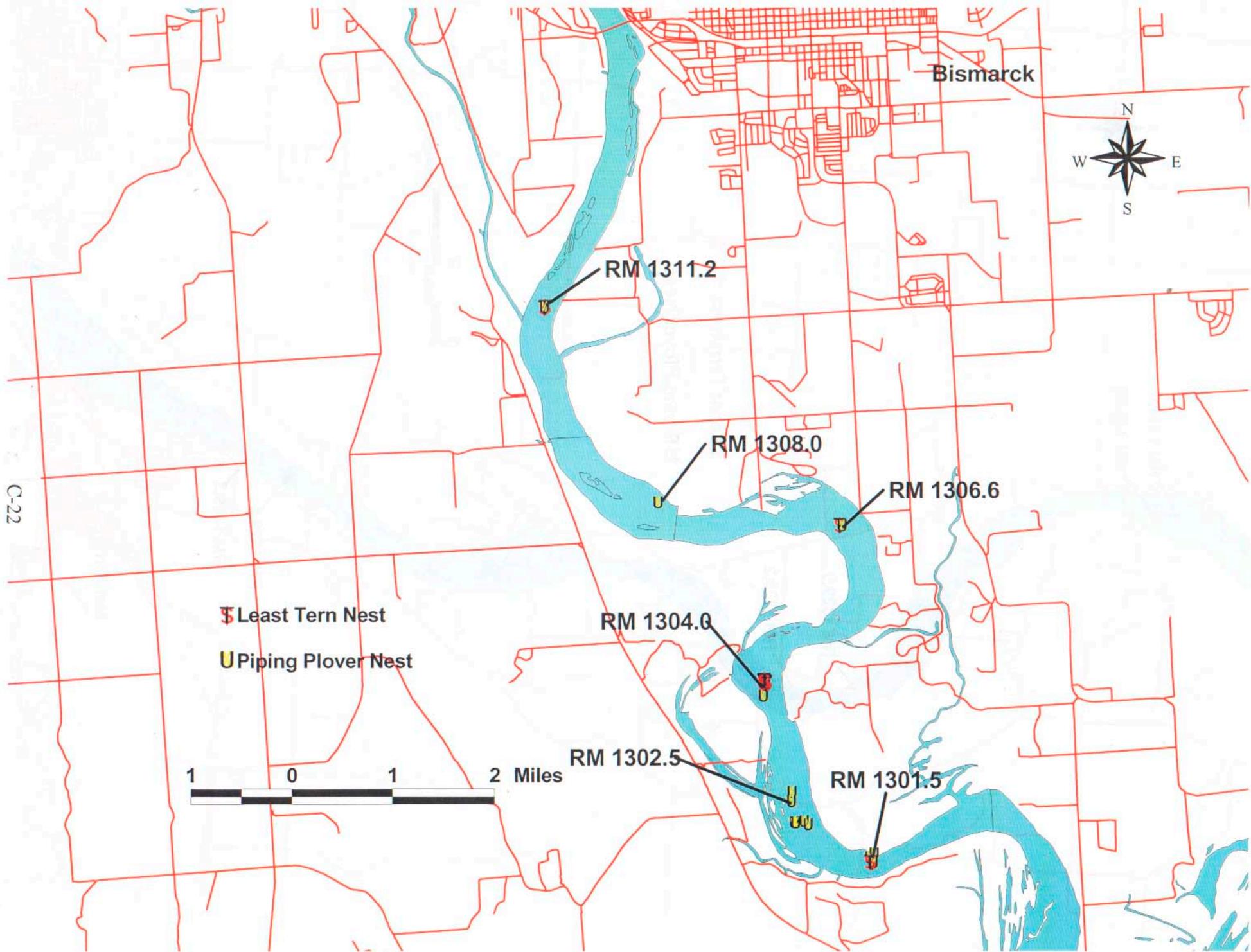
RM 1329.0
RM 1328.2

Least Tern Nest
Piping Plover Nest

1 0 1 2 Miles

RM 1319.5
RM 1319.3

Mandan



C-22

South Dakota



Lake Francis Case

RM 880.7

Fort Randall Dam

- § Least Tern Nest
- U Piping Plover Nest



RM 875.0

C-23

South
Dakota

RM 875.0



South Dakota

Nebraska

C-24

RM 870.0

RM 869.5

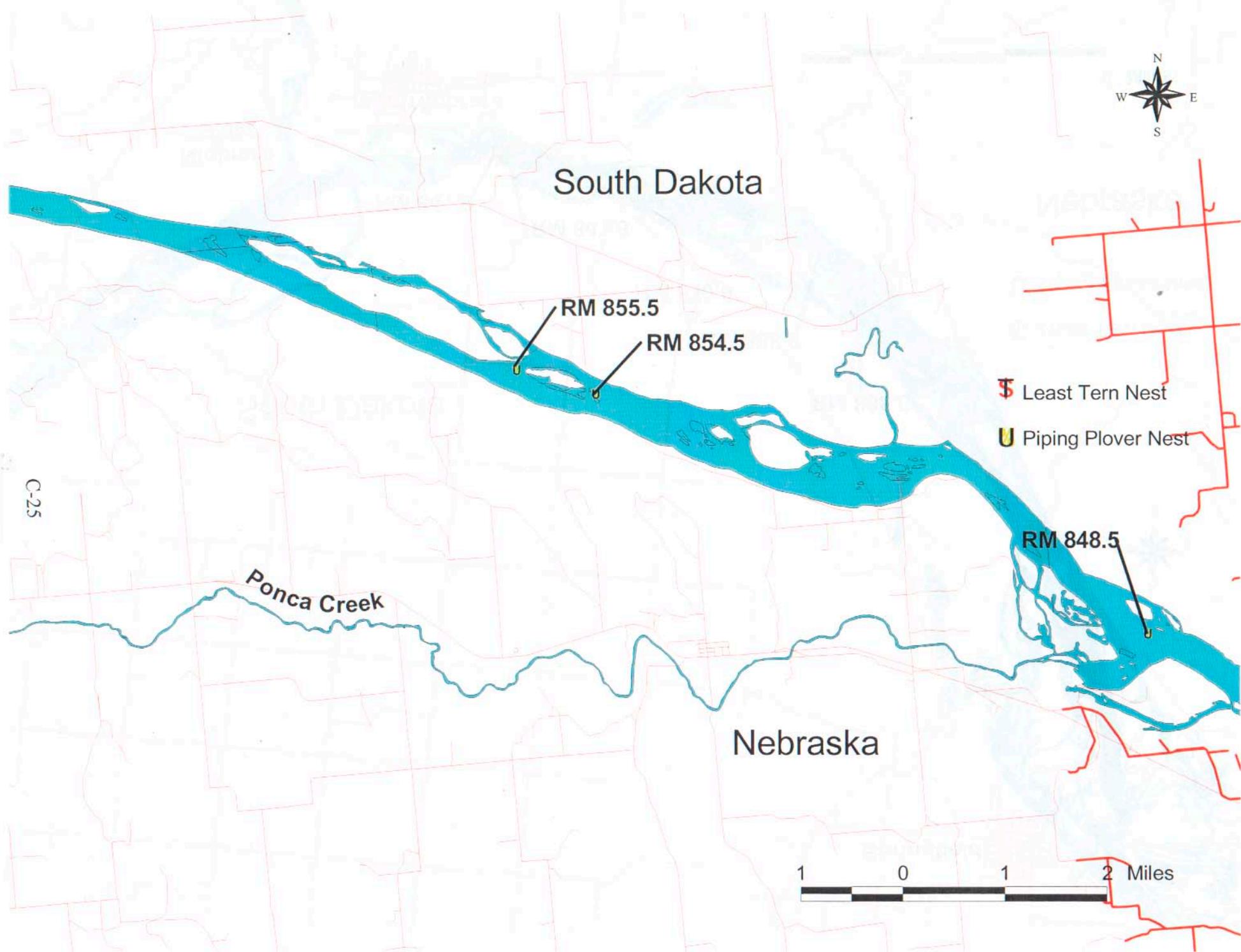
RM 867.0

⌘ Least Tern Nest

U Piping Plover Nest

RM 863.7





South Dakota



RM 855.5

RM 854.5

Least Tern Nest

Piping Plover Nest

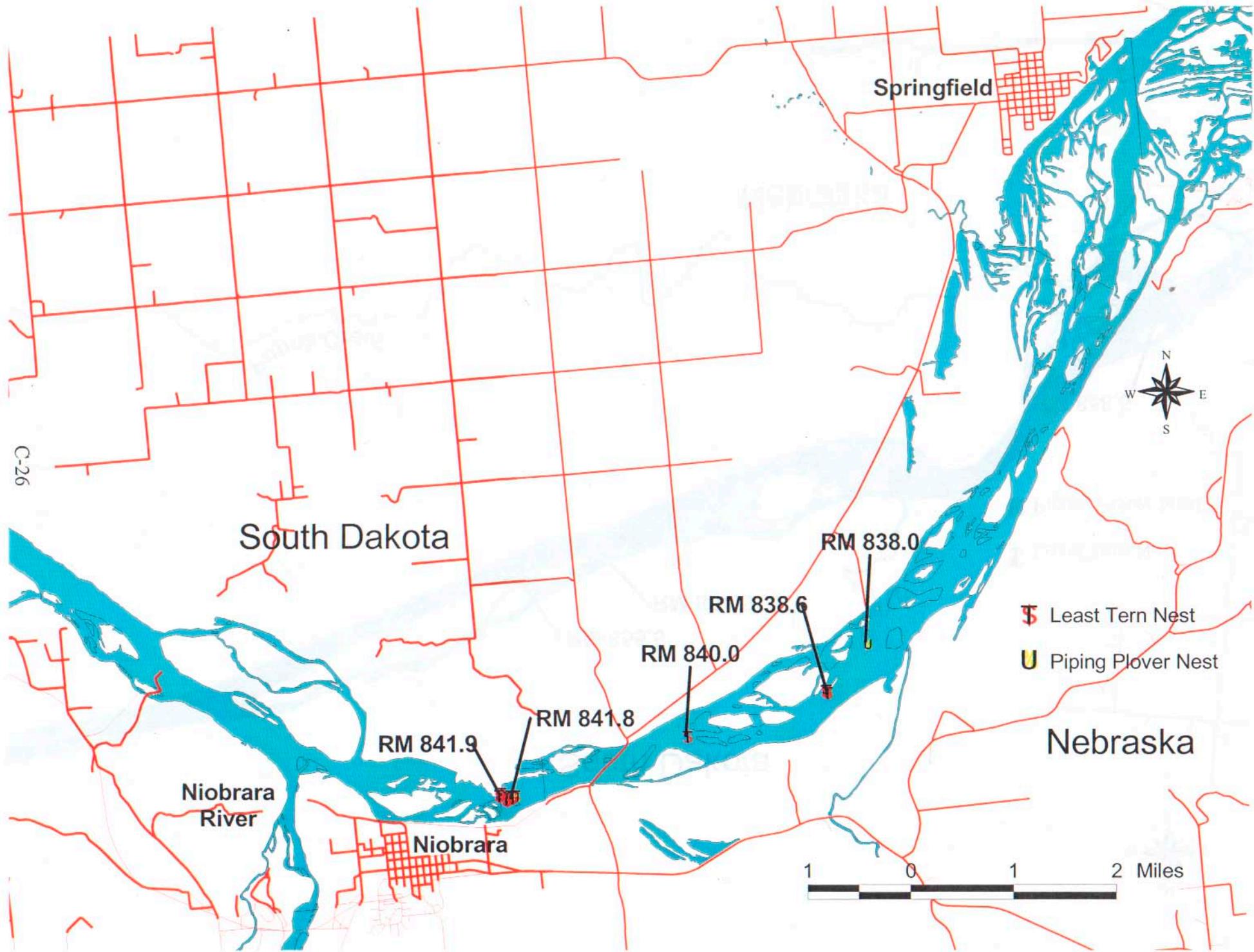
C-25

Ponca Creek

RM 848.5

Nebraska











C-29



APPENDIX D

Historical Mortality Report

Historical Mortality Report

The U.S. Fish and Wildlife Service (USFWS) completed a Biological Opinion (BiOp) in November 2000 on the operation of the Missouri River Mainstem Reservoir System (System), operation and maintenance of the Missouri River Bank Stabilization and Navigation Project (BSNP), and operation of the Kansas River reservoir system (2000 BiOp). In Reasonable and Prudent Measure (RPM) 2 of the 2000 BiOp, the USFWS requested the U.S. Army Corps of Engineers (Corps) to compile and evaluate all previous information on impacts of take from release changes below dams, changes in releases due to maintenance or other isolated causes, and release changes to prevent downstream flood impacts.

The Corps has collected nest fate information from over 11,000 least tern and piping plover nests since 1986 and has implemented an annual standardized least tern and piping plover monitoring program, inclusive of all known nesting areas on the Missouri River since 1993. This nesting information was compiled in a database and maintained by the Corps' Omaha District Threatened and Endangered Species Section. The Corps evaluated the nesting information during 2003 and a report of findings was completed following the 2003 least tern and piping plover nesting season. This report includes a summary of nest fates from 1988-2003; an analysis of flooded, collected, and destroyed-unknown nest fates to determine nests lost from System operations; and a summary of take associated with implementation of the Reasonable and Prudent Alternative (RPA) and the RPM's of the 1990 and 2000 BiOps.

Nest Fates 1988 - 2003

Least terns and piping plovers are known to annually nest on eight areas or "reaches" of the Missouri River. These include Fort Peck Lake in eastern Montana, the Missouri River below Fort Peck Dam to the headwaters of Lake Sakakawea (Fort Peck reach), Lake Sakakawea, the Missouri River below Garrison Dam to the headwaters of Lake Oahe (Garrison reach), Lake Oahe, the Missouri River below Fort Randall Dam to the headwaters of Lewis and Clark Lake (Fort Randall reach), Lewis and Clark Lake, and the Missouri River below Gavins Point Dam to Ponca State Park, Nebraska (Gavins Point reach). Additionally, least terns nested on Lake Francis Case above Fort Randall Dam in 2003.

From 1993 to the present, the Corps has annually monitored the productivity of least terns and piping plovers on these eight reaches on a weekly basis; recorded nest locations, nest fates, and fledging success; and conducted a breeding adult census. Additionally, the Corps contracted with the USFWS or state game and fish agencies to monitor productivity on the Fort Randall, Lewis and Clark Lake, and Gavins Point reaches from 1988 through 1992. This historic information is maintained in a robust database that contains 6,379 least tern and 4,964 piping plover nest records totaling 11,343 nests (14,635 least tern and 17,002 piping plover eggs). Nest records include year, reach, species, nest location, nest initiation date, number of eggs, nest fate, and number of eggs hatched.

Each nest located on the Missouri River is assigned a fate once the nest has been determined to no longer be active. The six nest fates include: Hatched, Destroyed, Abandoned, Nonviable Eggs, Collected, and Undetermined. Listed below is a description of each nest fate and how the nest fate is determined.

Hatched Nest: A nest hatching at least one egg in the clutch. There are several methods to determine if the nest has hatched. The following are described as hatched nests in the Corps techniques manual for productivity monitoring.

Chicks in the Nest Bowl: Chick or chicks observed in the nest bowl.

Chicks on Site: Chicks are observed on the nest site and can be reasonably attributed back to the nest of question.

Hatched Egg Shells: There are egg shells showing the characteristics of hatched shells in the nest bowl or located in close proximity to the nest bowl.

Pipping Shell Fragments: A shell fragment, resulting from the pipping of the egg is found in the remnants of the nest bowl.

Chick Droppings: Chick fecal material is found concentrated in or near the nest bowl (for least terns only).

Hatched Other: Sometimes there is evidence of hatching that is not covered by the above cases. If the surveyor believes the nest is hatched, but none of the above applies, the surveyor will list the nest as hatched and explain the rationale in the comments section. For example, no piping plover chicks are observed, but the adults are performing a broken wing display in the vicinity of the nest. The chicks may be hiding and the parents are trying to lure the threat away from the area.

Destroyed Nest: Nest is lost before hatching. There are several events that can cause the destruction of a nest premature to hatching. The following are described as causes of destroyed nests in the Corps' techniques manual for productivity monitoring.

Flooded: Eggs washed from the nest bowl. Nesting on sandbars and reservoir beaches makes least tern and piping plover nests susceptible to loss from flooding. On the reservoirs this occurs with the reservoir rising as spring runoff is captured or as water is held back to prevent downstream seasonal flooding. Long fetches and a propensity for wind on Missouri River reservoirs also contribute to nest flooding through wave action. On the river reaches, flood loss can occur from increased releases out of the dams or from uncontrolled tributary runoff. Indicators used to determine if a nest has been flooded:

1. Nest bowl inundated at the time of the survey.
2. Eggs found a short distance from the nest bowl floated out by rising water or being washed out by wave action. Obvious washing of the nest bowl.
3. Flood debris or rack line above the nest bowl showing the high water mark of a temporary rise of the reservoir or river.

Weather: Eggs destroyed by hail, rain storms, or high winds. Indicators used to determine if a nest has been destroyed by weather:

1. Supersaturated sand coalesced around the eggs from heavy rain.
2. Eggs blown out of the nest bowl from high winds.
3. Eggs smashed in the nest bowl from hailstones.
4. Dead adult near nest killed by hailstone(s).
5. Weather reports to confirm heavy rain, hail or wind in the area.

Predation: Eggs consumed at the nest or removed from the nest by a predator. Indicators used to determine if a nest has been predated:

1. Visual observation of the predator onsite.
2. Tracks left by a predator; tracks found within 6 feet of a nest are a good indicator of predation.
3. Destroyed eggs/egg shells in or near the nest bowl. Eggs destroyed by a predator will have puncture marks or will be fractured inward.
4. Yolk concentration in bottom of the nest bowl.

Sandbar Erosion: Previous nest location on the sandbar is in the river or reservoir.

Livestock: The area around the nest trampled by livestock or livestock have lain on the nest, thus destroying the eggs.

Human Disturbance: Eggs destroyed by incidental or intentional human activities. Indicators used to determine if a nest has been destroyed by human disturbance:

1. Human footprints or evidence of other human activity around the nest, eggs missing.
2. Vehicle tracks destroying a nest.
3. Removal of eggs from one nest and putting in another nest or mixing of intraspecific clutches.
4. Placement of man-made objects such as volleyball courts, fire rings, boats, etc. within close proximity to nests; nest abandoned or eggs subsequently added.
5. Removal of predator cages from plover nests, eggs gone.
6. Accidental destruction of an egg or eggs by monitors or research activity.

Unknown: A nest is listed as destroyed unknown if it meets the following criteria:

1. There is no possibility the nest hatched between site visits, i.e., a least tern nest with 5 days incubation the previous week could not have hatched.
2. There is not enough evidence or there is conflicting evidence to determine the cause of destruction.
3. The nest was destroyed, but what caused the destruction cannot be determined with any certainty.

Undetermined: The nest fate could not be determined. This occurs when a nest could have hatched, based on the number of days of incubation, but there is no evidence that it did hatch (no chicks, no pipping fragments, etc.). At the same time, there is no obvious clue to indicate that the nest was destroyed (predated, flooded, etc.).

Abandoned Nest: A nest may be abandoned for a variety of reasons. These can range from the adults being harassed away from the nest, to the adults leaving the area to migrate to the wintering grounds. Evidence of an abandoned nest is an unkempt appearance, eggs that are sanded in or a normal appearing nest with no adults around. A nest is never recorded as abandoned the first time abandonment is suspected. The surveyor notes that abandonment is suspected. On subsequent site visits, if conditions have not changed, the nest is recorded as abandoned.

Nonviable Eggs: This nest fate is used for eggs that are infertile or have become addled. The most obvious sign in the field of nonviable eggs is that the eggs continue to be incubated by the adults beyond the predicted hatch date. Least tern eggs that have been incubated more than 30 days and piping plover eggs that have been incubated more than 40 days are recorded as nonviable.

Collected Nest: This nest fate is for eggs that are collected and incubated at the captive rearing facility to prevent their loss to inundation from rising reservoir or river levels.

See Appendix G.

Historical Mortality Analysis

For the historical mortality analysis, the nest records from nests with the fate of flooded, destroyed unknown, and collected were sorted from the database. This limited suite of nest fates is all inclusive of those fates that could potentially be impacted by operations. This search resulted in 1,820 nests containing 4,540 eggs, as shown in the tables below.

Nests	Collected	Flooded	Des-Unknown	Total
Piping Plovers	167	282	415	864
Least Terns	216	353	387	956
Total	383	635	802	1,820

Eggs	Collected	Flooded	Des-Unknown	Total
Piping Plovers	524	858	1,271	2,653
Least Terns	435	679	773	1,887
Total	959	1,537	2,044	4,540

These nest records were compiled in a spreadsheet containing the following fields: nest identification, reach, year, species, location, nest fate (collected, flooded, destroyed unknown), number of eggs, and a notation if the nest had 18 inches of elevation above water. For the collected nests, there was one additional field; the date the nest was collected. Flooded and destroyed unknown nests had two additional fields; the last survey date the nest was known to be viable and the survey date when the nest was discovered to have been flooded or destroyed by an unknown cause. In addition, if the surveyors recorded any comments on the date the nest was found destroyed, these were included to assist in the analysis. This spreadsheet (Appendix H) was then used to evaluate the historic loss of nests and their eggs from “operational” and “non-operational causes.”

To determine the cause for a nest being assigned a flooded fate, the nest site location was first identified as to its proximity to a Project (e.g., between Fort Randall reach or Gavins Point reach). The nearest Missouri River and/or tributary gaging locations were then identified and gage height plotted for the interval between the dates. Next, Project releases and elevations (if applicable) were plotted for the same time period.

If the river stage or pool elevation was observed to rise between the “begin” to “end” period, the project releases and tributary inflows were observed to determine if the cause of the rising stage or pool elevation was due to operational or non-operational purposes.

Operational caused egg loss is defined as a river stage rise resulting from increased releases from an upstream project or a rising reservoir pool resulting from the storage of inflow that inundates a nest site. (Pool rises were generally operational except at Lewis and Clark Lake, where some were non-operational due to large inflows from the Niobrara River.) All collected eggs included in the analysis were recorded as operational. Eggs collected for research, including the Piping Plover Post Release Survival Study conducted by the University of Wisconsin – Madison, were not included in the analysis.

Non-operational caused egg loss is defined as a rain event either on the Missouri River or tributary basins resulting in uncontrolled runoff that caused localized river stage increases or a reservoir pool to rise, inundating a nest site.

If there was no recorded rise observed during the time period the nest loss was recorded as “flooded-undetermined.” This may result from localized fetch action or wake overwash from passing watercraft. Results of the analysis of nests with fate recorded as flooded are shown in the tables below.

Nests Flooded*	Operational	Non-Operational	Undetermined	Total
Piping Plovers	357	79	13	449
Least Terns	412	145	12	569
Total	769	224	25	1,018

Eggs Flooded*	Operational	Non-Operational	Undetermined	Total
Piping Plovers	1,090	261	31	1,382
Least Terns	816	274	24	1,114
Total	1,906	535	55	2,496

*Includes nests/eggs collected.

To determine if any of the nests assigned a destroyed-unknown nest fate were actually flooded by operational causes, the same methodology was followed. Nest destruction by flooding, as described above, is one of the more evident causes of nest termination. Since implementation of the Corps monitoring program in 1993 with its weekly nest site visits and standardized techniques, it is very unlikely that a flooded nest would be recorded as a destroyed-unknown fate. Therefore, only those destroyed-unknown fate nests from 1988 to 1993 (with longer intervals between nest visits and subsequent erosion of nest site evidence to indicate cause of fate) were checked for any correlations with river stage or reservoir pool fluctuations.

If the river stage or pool elevation was observed to rise during the time period specified and a significant change in operation could be correlated, the cause for the destroyed-unknown nest fate was indicated as operational and a note was made "likely operational". If several flooded fate nests were previously identified in the same area during the same time, destroyed-unknown nests were more likely to be noted as operational if there was any change in operation.

If the river stage or pool elevation was not observed to rise during the time period, the cause for the destroyed-unknown nests remained as destroyed-unknown fate with an undetermined cause. Results of the analysis of nests with fate recorded as destroyed unknown are shown in the tables below. Two figures are also included below that show the results of the total analysis and the flooded nests analysis, respectively.

Nests Des/Unknown	Operations	Non-Operations	Undetermined	Total
Piping Plovers	11	3	401	415
Least Terns	2	13	372	387
Total	13	16	773	802

Eggs Des/Unknown	Operations	Non-Operations	Undetermined	Total
Piping Plovers	28	9	1,234	1,271
Least Terns	3	30	740	773
Total	31	39	1,974	2,044

Analysis Summary:

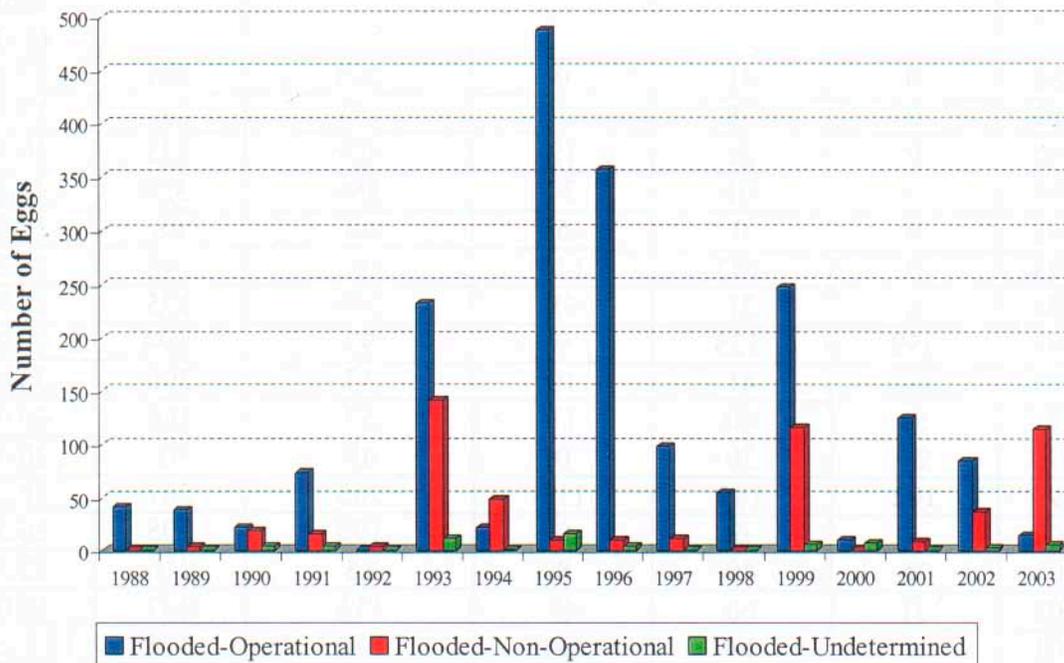
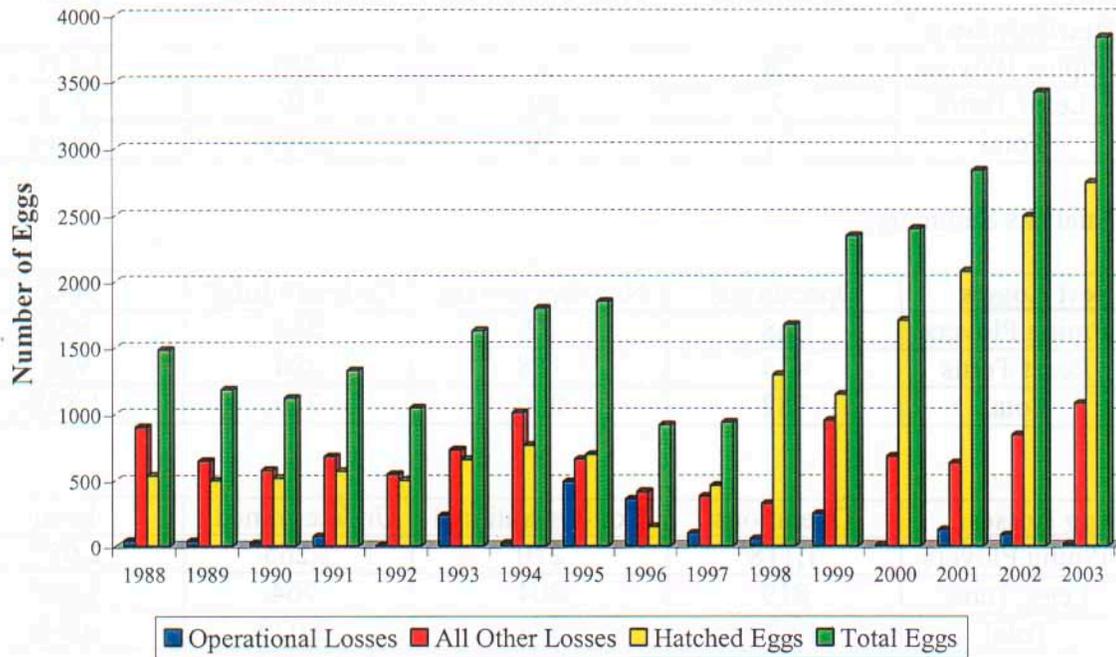
Nest Losses	Operational	Non-Operational	Undetermined*	Total
Piping Plovers	368	82	385	835
Least Terns	414	158	394	966
Total	782	240	779	1,801

Egg Losses	Operations	Non-Operational	Undetermined*	Total
Piping Plovers	1,118	270	1,265	2,653
Least Terns	819	304	764	1,887
Total	1,937	574	2,029	4,540

*Destroyed nest fate, undetermined cause.

Year	Collected	Operations	Non-Operations	Undetermined*	Total	Runoff (million acre feet)
1988	0	41	0	263	304	12.4
1989	0	38	3	151	192	17.7
1990	0	21	19	93	133	16.7
1991	0	91	30	199	320	22.3
1992	0	0	5	63	68	16.5
1993	0	242	144	162	548	36.2
1994	0	21	48	106	175	23.9
1995	359	133	9	93	594	37.2
1996	315	41	10	33	399	35.6
1997	58	40	11	57	166	49.0
1998	24	30	0	41	95	26.4
1999	102	145	115	205	567	31.2
2000	4	6	0	195	205	16.5
2001	76	49	8	83	216	22.5
2002	21	66	41	115	243	16.0
2003	0	14	131	170	315	18.5 est.
Total	959	978	574	2,029	4,540	

*Destroyed nest fate, undetermined cause.



It should be noted that in 1995, 16 piping plover chicks were collected from the Missouri River to prevent their loss to flooding. These sixteen chicks were raised in captivity and

then released back into the wild after they fledged. The sixteen are not included in the above tables, but they should be considered take along with collected eggs.

Take Associated with Required Monitoring and Evaluation Activities of the 1990 and 2000 BiOp RPM's

August 8, 2003 – A 20-24 days old piping plover chick on a sandbar at RM. 795.3 below Gavins Point Dam was stepped on by monitoring personnel and killed.

June 29, 2003 – A four-egg piping plover nest located at Steinke Bay on Lake Sakakawea was stepped on by monitoring personnel. All four eggs were destroyed.

May 15, 2002 – A piping plover egg from a nest located on a sandbar at RM 756.7 below Gavins Point Dam was dropped by monitoring personnel while it was being floated to determine the incubation stage. The egg was destroyed.

2001 – Least tern chick on a sandbar below Gavins Point Dam was stepped on by monitoring personnel and killed.

July 11, 1994 – A one-egg least tern nest located at Independence Point on Lake Sakakawea was stepped on by monitoring personnel. The egg was destroyed.

May 29, 1992 – A three-egg piping plover nest located RM 770.3 below Gavins Point Dam was listed as destroyed by observer.

August 15, 1988 – A two egg least tern nest located RM 775.0 below Gavins Point Dam was listed as destroyed by observer.

TOTAL MORTALITY: 9 Piping Plovers
 4 Least Terns

Data is based on nest records and field journals and annual reports compiled by Corps and contractor personnel.

Kansas River Operations

Historically, piping plovers and least terns have not used the Kansas River for breeding purposes. However, high discharges from Corps dams on tributaries of the Kansas River in 1993 and 1995 led to the formation of sandbar habitat on the river that was favorable to both species. In 1995, it was reported that least terns were nesting on the Kansas River. In 1996, USFWS and Kansas Biological Survey personnel discovered one piping plover nest and several least tern adults and chicks on the Kansas River. This was the first confirmed record of nesting by piping plovers in Kansas and the first confirmed nesting of least terns on the Kansas River.

Since 1999, the Corps has contracted with Baker University, Baldwin City, Kansas, to conduct surveys for the two species on the Kansas River. Data is available for 2000 through 2003. Losses to flooding are recorded in the table below.

Nest and Egg Losses Due to Flooding on the Kansas River, 2001-2003

Year	Piping Plover Nests	Piping Plover Eggs	Least Tern Nests	Least Tern Eggs
2000	0	0	5	13
2001	2	5	3	6
2002	0	0	1	2
2003	2	8	6	16
Total	4	13	15	37

The 2000 report did not show any flood losses due to Corps operations. The 2001 report listed one piping plover nest containing one egg that was lost due to planned releases from Tuttle Creek Dam. The other plover nest and three least tern nests lost to flooding in 2001 were due to uncontrolled increases in the river. In 2002, one least tern nest was lost to flooding. This nest was lost due to releases from Milford and Tuttle Creek Dam. None of the 2003 flood losses were due to Corps of Engineers operations.

<u>Nest Losses</u>	Operational	Non-Operational	Undetermined	Total
Piping Plovers	1	3	0	4
Least Terns	1	14	0	15
Total	2	17	0	19

<u>Egg Losses</u>	Operations	Non-Operational	Undetermined	Total
Piping Plovers	1	12	0	13
Least Terns	2	35	0	37
Total	3	47	0	50

Conclusion

Of 31,637 eggs contained within the Corps' historical Missouri River least tern and piping plover database, the Corps was able to determine that 6.17 percent or 1,937 eggs and 16 chicks were lost due to Corps operational activities on the Missouri River.

APPENDIX E

Missouri River Basin Pallid Sturgeon Stocking
for 2002-Year Class

MISSOURI RIVER BASIN PALLID STURGEON STOCKING, 2002-YEAR CLASS

<u>Female</u>	<u>Male</u>	<u>Date</u>	<u>Stocking Location</u>	<u>River</u>	<u>Number</u>	<u>Average Length</u>	<u>Average Weight</u>	<u>Type of Tag</u>	<u>Hatchery</u>
116224546A x	1F477B3A65	7/26/2003	Standing Bear Bridge	MO	60	264 mm	80 g	PIT	Gavins Point
116224546A x	116167123A	7/26/2003	Standing Bear Bridge	MO	60	248 mm	61 g	PIT	Gavins Point
116224546A x	220F107A6F	7/26/2003	Standing Bear Bridge	MO	60	231 mm	49 g	PIT	Gavins Point
116224546A x	7F7D461025	7/26/2003	Standing Bear Bridge	MO	60	256 mm	69 g	PIT	Gavins Point
116224546A x	1F4A27214F	7/26/2003	Standing Bear Bridge	MO	60	240 mm	53 g	PIT	Gavins Point
116224546A x	1F477B3A65	7/26/2003	Sunshine Bottoms	MO	60	253 mm	61 g	PIT	Gavins Point
116224546A x	116167123A	7/26/2003	Sunshine Bottoms	MO	61	234 mm	56 g	PIT	Gavins Point
116224546A x	220F107A6F	7/26/2003	Sunshine Bottoms	MO	60	215 mm	45 g	PIT	Gavins Point
116224546A x	7F7D461025	7/26/2003	Sunshine Bottoms	MO	60	256 mm	67 g	PIT	Gavins Point
116224546A x	1F4A27214F	7/26/2003	Sunshine Bottoms	MO	60	245 mm	56 g	PIT	Gavins Point
116224546A x	116167123A	8/28/2003	Intake	YE	163	258 mm	66 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	8/28/2003	Intake	YE	164	303 mm	110 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	8/28/2003	Intake	YE	163	289 mm	99 g	PIT & Elastomere	Gavins Point
116224546A x	116167123A	8/28/2003	Fairview	YE	163	277 mm	85 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	8/28/2003	Fairview	YE	163	301 mm	110 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	8/28/2003	Fairview	YE	163	290 mm	106 g	PIT & Elastomere	Gavins Point
116224546A x	116167123A	8/28/2003	Wolf Point	MO	163	298 mm	108 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	8/28/2003	Wolf Point	MO	163	294 mm	103 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	8/28/2003	Wolf Point	MO	163	297 mm	111 g	PIT & Elastomere	Gavins Point
116224546A x	116167123A	8/28/2003	Culbertson	MO	156	310 mm	118 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	8/28/2003	Culbertson	MO	163	288 mm	99 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	8/28/2003	Culbertson	MO	164	295 mm	105 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	9/4/2003	Mullberry Bend	MO	125	305 mm	121 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	9/4/2003	Mullberry Bend	MO	85	288 mm	101 g	PIT & Elastomere	Gavins Point
116224546A x	220F107A6F	9/4/2003	Mullberry Bend	MO	175	258 mm	70 g	PIT & Elastomere	Gavins Point
116224546A x	1F4A27214F	9/4/2003	Mullberry Bend	MO	115	271 mm	98 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	9/4/2003	Bellevue	MO	125	290 mm	106 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	9/4/2003	Bellevue	MO	85	287 mm	96 g	PIT & Elastomere	Gavins Point
116224546A x	220F107A6F	9/4/2003	Bellevue	MO	175	266 mm	75 g	PIT & Elastomere	Gavins Point
116224546A x	1F4A27214F	9/4/2003	Bellevue	MO	115	297 mm	102 g	PIT & Elastomere	Gavins Point
116224546A x	1F477B3A65	9/4/2003	Booneville	MO	133	312 mm	130 g	PIT & Elastomere	Gavins Point
116224546A x	7F7D461025	9/4/2003	Booneville	MO	92	288 mm	95 g	PIT & Elastomere	Gavins Point
116224546A x	220F107A6F	9/4/2003	Booneville	MO	179	275 mm	80 g	PIT & Elastomere	Gavins Point
116224546A x	1F4A27214F	9/4/2003	Booneville	MO	131	294 mm	101 g	PIT & Elastomere	Gavins Point

116224546A x	220F107A6F	8/7/2003	Culbertson	MO	550	280 mm	84 g	PIT & Elastomere	Miles City
116224546A x	220F107A6F	8/7/2003	Wolf Point	MO	675	256 mm	NA	PIT & Elastomere	Miles City
116224546A x	220F107A6F	8/7/2003	Intake	YE	550	268 mm	NA	PIT & Elastomere	Miles City
116224546A x	220F107A6F	8/7/2003	Fairview	YE	398	276 mm	NA	PIT & Elastomere	Miles City
116224546A x	1F477B3A65	7/16/2003	Mullberry Bend	MO	500	268 mm	NA	PIT	Garrison Dam
116224546A x	7F7D461025	7/16/2003	Mullberry Bend	MO	380	281 mm	NA	PIT	Garrison Dam
116224546A x	116167123A	7/16/2003	Mullberry Bend	MO	500	298 mm	NA	PIT	Garrison Dam
116224546A x	220F107A6F	7/16/2003	Mullberry Bend	MO	556	280 mm	74 g	PIT	Garrison Dam
116224546A x	1F477B3A65	10/6/2003	Mullberry Bend	MO	78	260 mm	NA	PIT	Garrison Dam
116224546A x	7F7D461025	10/6/2003	Mullberry Bend	MO	16	285 mm	NA	PIT	Garrison Dam
116224546A x	116167123A	10/6/2003	Mullberry Bend	MO	20	277 mm	NA	PIT	Garrison Dam
116224546A x	220F107A6F	10/6/2003	Mullberry Bend	MO	19	245 mm	NA	PIT	Garrison Dam
116224546A x	1F477B3A65	7/16/2003	Bellevue	MO	500	270 mm	76 g	PIT	Garrison Dam
116224546A x	7F7D461025	7/16/2003	Bellevue	MO	382	287 mm	83 g	PIT	Garrison Dam
116224546A x	116167123A	7/16/2003	Bellevue	MO	500	276 mm	71 g	PIT	Garrison Dam
116224546A x	220F107A6F	7/16/2003	Bellevue	MO	556	280 mm	NA	PIT	Garrison Dam
116224546A x	1F477B3A65	7/16/2003	Booneville	MO	245	277 mm	NA	PIT	Garrison Dam
116224546A x	7F7D461025	7/16/2003	Booneville	MO	326	273 mm	NA	PIT	Garrison Dam
116224546A x	116167123A	7/16/2003	Booneville	MO	399	280 mm	NA	PIT	Garrison Dam
116224546A x	220F107A6F	7/16/2003	Booneville	MO	470	277 mm	NA	PIT	Garrison Dam
116224546A x	1F477B3A65	10/24/2003	Mullberry Bend	MO	173	231 mm	51 g	PIT	Neosho
116224546A x	7F7D461025	10/24/2003	Mullberry Bend	MO	199	271 mm	85 g	PIT	Neosho
116224546A x	220F107A6F	10/24/2003	Mullberry Bend	MO	294	266 mm	69 g	PIT	Neosho
116224546A x	1F477B3A65	10/24/2003	Bellevue	MO	288	263 mm	67 g	PIT	Neosho
116224546A x	7F7D461025	10/24/2003	Bellevue	MO	216	262 mm	69 g	PIT	Neosho
116224546A x	220F107A6F	10/24/2003	Bellevue	MO	213	279 mm	77 g	PIT	Neosho
116224546A x	1F477B3A65	10/24/2003	Booneville	MO	332	260 mm	75 g	PIT	Neosho
116224546A x	7F7D461025	10/24/2003	Booneville	MO	313	259 mm	69 g	PIT	Neosho
116224546A x	220F107A6F	10/24/2003	Booneville	MO	231	267 mm	72 g	PIT	Neosho

APPENDIX F

Missouri River Bank Stabilization and Navigation Project,
Fish and Wildlife Mitigation Project,
Annual Implementation Report, January 2003



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



View of the new shallow water habitat under construction at the Overton South mitigation site, Moniteau and Cooper Counties, Missouri

Annual Implementation Report January 2004

TABLE OF CONTENTS

	page
TABLE OF CONTENTS	iii
LIST OF TABLES	v
INTRODUCTION	1
Authority	1
Background	1
Report Purpose and Format.....	3
PAST MITIGATION EFFORTS FOR FY03 AND PRIOR.....	5
Funding.....	5
Real Estate.....	6
Habitat Development.....	16
Operation and Maintenance.....	30
Monitoring and Evaluation.....	34
PLANNED MITIGATION EFFORTS FOR FY04.....	35
Funding.....	35
Real Estate.....	36
Habitat Development.....	37
Operation and Maintenance.....	39
Monitoring and Evaluation.....	40
FUTURE MITIGATION EFFORTS, FY05 TO COMPLETION.....	41
Funding.....	41
Real Estate.....	42
Habitat Development.....	43
Operation and Maintenance.....	43
Monitoring and Evaluation.....	44
APPENDIX 1, SITE LOCATION MAPS.....	45

LIST OF TABLES

TABLE 1. TOTAL COSTS TO DATE (AS OF 30 SEP 03).....	5
TABLE 2. NON-PUBLIC LANDS AUTHORIZED BY WRDA86, DISTRIBUTION BY STATE	6
TABLE 3. EXISTING PUBLIC LANDS AUTHORIZED BY WRDA 86, DISTRIBUTION BY STATE	7
TABLE 4. ALL LANDS AUTHORIZED BY WRDA99, DISTRIBUTION BY STATE	8
TABLE 5. TOTAL LANDS AUTHORIZED FOR PROJECT, DISTRIBUTION BY STATE	9
TABLE 6. LANDS ACQUIRED WITHIN STATE OF IOWA, DISTRIBUTION BY SITE (AS OF 30 SEP 03).....	10
TABLE 7. LANDS ACQUIRED WITHIN STATE OF NEBRASKA, DISTRIBUTION BY SITE (AS OF 30 SEP 03).....	11
TABLE 8. LANDS ACQUIRED WITHIN STATE OF KANSAS, DISTRIBUTION BY SITE (AS OF 30 SEP 03).....	12
TABLE 9. LANDS ACQUIRED WITHIN STATE OF MISSOURI, DISTRIBUTION BY SITE (AS OF 30 SEP 03).....	13
TABLE 10. SUMMARY OF ALL LANDS ACQUIRED (AS OF 30 SEP 03).....	15
TABLE 11. HABITAT TYPES DEVELOPED BY SITE (AS OF 30 SEP 03).....	17
TABLE 12. STATUS OF OPERATION AND MAINTENANCE (FY03 and Prior)	31
TABLE 13. ESTIMATED FUNDING FOR FY04.....	35
TABLE 14. ESTIMATED COSTS FROM REPORT TO CONGRESS	41
TABLE 15. CURRENT BUDGET FOR FY05 TO COMLETION.....	42

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 29,900 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 mitigated 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. 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 occurred due to the Missouri River Bank Stabilization and Navigation Project. Also described in the Report are various measures to mitigate for these losses and a recommended plan to mitigate, preserve, or develop 48,100 acres of habitat. 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.

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, Federal and State fish and wildlife agencies participate in the implementation of the Project. The agency participation is primarily through an Agency Coordination Team that was developed to formulate and decide upon the various acquisition sites and appropriate development plans for the sites. The members of the Agency Coordination Team are the Iowa Department of Natural Resources, the Nebraska Game and Parks Commission, the Kansas Department of Wildlife and Parks, the Missouri

Department of Conservation, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service. Other agencies have also been invited to participate in team meetings.

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.

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 completed. The Reaffirmation Report was approved by the Corps of Engineers' Missouri River Division in August, 1990. 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. 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.

WRDA 99 expanded the amount of acres authorized for the project from 48,100 acres to a new total of 166,750 acres. As directed in the authorization, the Corps of Engineers worked with the Agency Coordination Team to develop a cost estimate to implement the additional acres authorized by WRDA99. In December 2001, the Corps completed a document titled "Missouri River Mitigation Project, Missouri, Kansas, Iowa, and Nebraska, Report to Congress, in Compliance with the Water Resources Development Act of 1999". This document presented a cost range for the modified Project from \$740 million (includes development of 7,000 acres of shallow water habitat) to \$1.33 billion (includes development of 20,000 acres of shallow water habitat). Also included was a ceiling of 5% of the total mitigation efforts to be expended on monitoring efforts.

In November 2000, the US Fish and Wildlife Service issued a Biological Opinion (Bi-Op) to the Corps of Engineers for impacts to the pallid sturgeon by construction and operation of the Bank Stabilization and Navigation Project. 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 mitigate, enhance and conserve shallow water habitat in the amount of 20-30 acres per mile for the 735 mile Project area.

In September 2002, the Corps drafted “Supplement No. 1 to Real Estate Design Memorandum No. 1”. This update included the new acres of the expanded mitigation program. This document stated that the acquisition of additional lands for the project will not reflect a defined amount to be acquired between public or private acres. Also, this document assumed that the additional acres will be equally proportioned by state based on the amount of riverbank miles.

Since the expanded authorization of WRDA99 resulted in a significant change to the project, from August, 2001 to June, 2003 the Corps of Engineers prepared a Supplemental Environmental Impact Statement (SEIS) for the project. The draft SEIS was published in September 2002. The Final SEIS was published March 1, 2003. The Corps of Engineers issued their Record of Decision on June 12, 2003. This decision along with the Final SEIS reflects the programmatic plan for implementation of the expanded mitigation program.

REPORT PURPOSE AND FORMAT

Programmatic updates of the Reaffirmation Report are accomplished through Annual Implementation Reports. This document is the tenth 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.

This report is divided into three main parts: Past Mitigation Efforts for FY03 and Prior, Planned Mitigation Efforts for FY04, and Future Mitigation Efforts FY05 to Completion. Within these three main parts, the four main elements of the Project (Real Estate, Habitat Development, Operation and Maintenance, and Monitoring) are detailed. Thus, this report is a programmatic effort to explain the past activities, current status, and future activities for the entire mitigation effort for both the Omaha and Kansas City Districts.

**PAST MITIGATION EFFORTS
FOR FY03 AND PRIOR**

FUNDING (FY03 and Prior)

From Fiscal Year (FY) 90 to FY91, the project was in a PED phase. Corps of Engineers PED funding was used to fund the mitigation activities during this period. An amount of \$700,000 in GI funds were expended on the project during this period.

Beginning in FY92, the project began to receive Corps of Engineers Construction, General (CG) funds. At this point, the project was considered to have moved into a construction phase. The CG funding for the project is divided into broad categories: Land Acquisition; Planning, Engineering and Design; Habitat Development; Construction Management; O&M During Construction; and Monitoring costs. From FY92 through FY03, the Corps expended a total amount of \$85,329,000 in CG funds on the mitigation efforts. Table 1 gives a breakdown of costs expended by category.

**TABLE 1
TOTAL COSTS TO DATE
(AS OF 30 SEP 03)**

Cost	CENWK (1,000)	CENWO (1,000)	TOTAL (1,000)	% of Total Cost
Land Acquisition	\$21,678	\$13,184	\$34,862	41
Planning, Engineering, and Design	9,238	4,752	13,990	16
Habitat Development	13,066	18,005	31,071	36
Construction Management	1,329	1,902	3,231	4
O&M During Construction	1,078	937	2,015	2
Monitoring (1)	160	0	160	1
TOTAL	\$46,549	\$38,780	\$85,329	100

(1) Prior to FY03, monitoring was considered a very limited part of the therefore any funds expended on monitoring were provided using Design and Construction Management categories. In the future, monitoring funds will not exceed 5% of annual appropriations.

REAL ESTATE (FY03 and Prior)

Non-Public Lands Authorized by WRDA86.

Section 334(a) of the Water Resources Development Act of 1986 (WRDA86) authorized 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, once the project got 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 2.

TABLE 2
NON-PUBLIC LANDS AUTHORIZED BY WRDA86,
DISTRIBUTION BY STATE

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

Existing Public Lands Authorized by WRDA86

In addition to the acquisition of mitigation sites on non-public lands, the WRDA86 authorization allowed for 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 authorized under WRDA86 is indicated in Table 3.

TABLE 3

EXISTING PUBLIC LANDS AUTHORIZED BY WRDA 86, DISTRIBUTION BY STATE

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

All Lands Authorized in WRDA99.

The project authorization was expanded in Section 661(a) of the Water Resources Development Act of 1999 (WRDA99). The amount of acres authorized for the Project was expanded from 48,100 acres to a new total of 166,750 acres. This is an increase of 118,650 acres. Because this was an extensive change to the authorization, a Supplement to the Environmental Impact Statement (SEIS) was completed. During the completion of the SEIS, decisions on how to distribute the new authorized total of acres were made.

First, the Preferred Alternative in the SEIS did not reflect a defined amount to be acquired between public or private acres. This allows the project to move forward without this limitation and be able to take advantage of any lands that are available from willing sellers, either private or public. Also, the preferred alternative assumed that the additional acres will be acquired proportionally by state based on the amount of riverbank miles. If acquisitions are completed in this manner, the breakdown of the additional acreage authorized under WRDA99 is displayed in Table 4, below.

TABLE 4
ALL LANDS AUTHORIZED BY WRDA99,
DISTRIBUTION BY STATE

State	Riverbank miles	Number of Affected Counties	All Lands Authorized WRDA99 (ac)	Percentage of WRDA99
Iowa	175	6	14,125	12
Nebraska	241	10	19,452	16
Kansas	115	4	9,282	8
Missouri	939	25	75,791	64
TOTAL	1,470	45	118,650	100

The current distribution of lands authorized in both WRDA86 and WRDA99 is reflected in Table 5. Throughout the remainder of the project, the Corps will be working with the Agency Coordination Team to track acquisitions. As the acquisitions progress over the life of the project, changes to this distribution of the authorized acres may be necessary. Any changes will be approved by the Agency Coordination Team and presented annually in future annual reports prior to implementation.

TABLE 5

**TOTAL LANDS AUTHORIZED FOR PROJECT,
DISTRIBUTION BY STATE**

State	Non-Public Lands Authorized WRDA86 (ac)	Existing Public Lands Authorized WRDA86 (ac)	All Lands Authorized WRDA99 (ac)	Total Authorized (ac)
Iowa	7,200	2,400	14,125	23,725
Nebraska	7,150	50	19,452	26,652
Kansas	2,350	0	9,282	11,632
Missouri	13,200	15,750	75,791	104,741
TOTAL	29,900	18,200	118,650	166,750

Current Status of Acquisition.

The current process for acquiring lands begins with working with the Agency Coordination Team to identify sites that have potential for wildlife mitigation. The Corps completes a survey of willing sellers (both public and private) near the priority areas. These planning efforts have led to the acquisition of lands at 32 sites for the project.

As of 30 Sep 03, 40,080 acres have been acquired for the project. This consists of fee title on 26,935 acres of non-public land and no cost easements and/or licenses on 13,145 acres of public land. A total of 24% of the authorized 166,750 acres has been acquired. Tables 6, 7, 8, 9 reflect the acreage distribution by site for the States of Iowa, Nebraska, Kansas and Missouri, respectively. Table 10 is a summary of the entire acquisition program to date.

Locations of the 32 sites established to date are shown on the Location Maps included in this report as a part of Appendix 1.

TABLE 6
LANDS ACQUIRED WITHIN STATE OF IOWA,
DISTRIBUTION BY SITE
(AS OF 30 SEP 03)

Site	Location	Non-Public Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Winnebago Bend	Woodbury County, RM 711 – 708, Left Bank	0	1,300 (1)	1,300
Blackbird Bend	Monona County, RM 697 – 694, Left Bank	223	799 (2)	1,022
Tieville-Decatur Bends (3)	Monona County, RM 698 – 686, Left Bank	91	964 (2)	1,055
Louisville Bend	Monona County, RM 685 – 682, Left Bank	84	1,012 (2)	1,096
Soldier Bend	Harrison County, RM 664 – 660, Left Bank	0	248 (2)	248
California Bend	Harrison County, RM 652 – 649, Left Bank	0	420 (2)	420
Noddleman Island	Mills County, RM 587 – 583, Left Bank	1,232	0	1,232
Auldon Bar	Harrison County, RM 580 – 577, Left Bank	588	0	588
Copeland Bend	Fremont County, RM 571 – 565, Left Bank	1,481	625 (2)	2,106

TABLE 6, Continued

Site	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Lower Hamburg Bend (4)	Fremont County, RM 554 – 546, Left Bank	321	0	321
TOTAL		4,020	5,368	9,388

- (1) Reflects amount of lands mitigated on previously held Corps land.
- (2) No cost easement obtained from State of Iowa.
- (3) Only Iowa acres shown here (this site extends into Nebraska, see Table 8)
- (4) Only Iowa acres shown here (this site extends into Missouri, see Table 10)

TABLE 7

**LANDS ACQUIRED WITHIN STATE OF NEBRASKA,
DISTRIBUTION BY SITE
(AS OF 30 SEP 03)**

Site	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Tieville-Decatur Bends (1)	Burt County, RM 698 – 686, Left Bank	1,890	133 (2)	2,023
Tobacco Island	Cass County, RM 589 – 586 Right Bank	1,604	0	1,604
Hamburg Bend	Otoe County, RM 556 – 552, Right Bank	1,544	0	1,544

Table 7, Continued

Site	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Kansas Bend	Nemaha County, RM 547 – 544 Right Bank	1,056	0	1,056
Nishnabotna (3)	Nemaha County, RM 545 – 537, Left Bank	2	0	2
Langdon Bend	Nemaha County, RM 532 – 528, Right Bank	1,312	0	1,312
TOTAL		7,408	133	7,541

- (1) Only Nebraska acres shown here (this site extends into Iowa, see Table 6)
- (2) No cost easement obtained from State of Nebraska.
- (3) Only Nebraska acres shown here (this site extends into Missouri, see Table 9)

TABLE 8

**LANDS ACQUIRED WITHIN STATE OF KANSAS,
DISTRIBUTION BY SITE
(AS OF 30 SEP 03)**

Site	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Benedictine Bottoms	Atchison County, RM 429 – 424 Right Bank	2,111	0	2,111
TOTAL		2,111	0	2,111

TABLE 9

**LANDS ACQUIRED WITHIN STATE OF MISSOURI,
DISTRIBUTION BY SITE
(AS OF 30 SEP 03)**

Site	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Lower Hamburg Bend (1)	Atchison County, RM 554 – 546 Left Bank	2,265	0	2,265
Nishnabotna (2)	Atchison County, RM 545 – 537, Left Bank	1,282	0	1,282
Deroin Bend	Atchison, Holt Counties, RM 520 – 517, Left Bank	0	1,082 (3)	1,082
Corning	Holt County, RM 518 - 512 Left Bank	1,193	695 (4)	1,888
Thurnau	Holt County, RM 512 – 508, Left Bank	1,372	0	1,372
Rush Bottoms	Holt County, RM 502 – 499, Left Bank	774	37 (5)	811
Monkey Mountain	Holt, Andrew Counties, RM 466 – 464, Left Bank	657	0	657
Worthwine Island	Andrew County, RM 460 – 456, Left Bank	0	585 (3)	585
Grand Pass	Saline County, RM 273 – 266, Right Bank	0	5 (3)	5
Overton Bottoms - North	Cooper County, RM 188 – 185 Right Bank	1,355	332 (6)	1,687

TABLE 9 Continued

Name	Location	Private Lands Acquired (ac)	Public Lands Acquired (ac)	Total Acquired (ac)
Overton Bottoms - South	Cooper, Moniteau Counties, RM 185 - 178, Right Bank	3,662	0	3,662
Rocheport Cave	Boone County, RM 183, Left Bank	0	51 (3)	51
Eagle Bluffs	Boone County, RM 174 - 170, Left Bank	0	571 (3)	571
Plowboy Bend	Moniteau County, RM 172 - 169, Right Bank	0	0 (5)	0
Marion Bottoms	Cole County, RM 164 - 158, Right Bank	0	0 (5)	0
Tate Island	Callaway County, RM 113 - 110	422	0	422
Berger Bend	Franklin County, RM 93 - 90, Right Bank	414	60 (4)	474
Columbia Bottom	St. Louis County, RM 4 - 0, Right Bank	0	4,226 (3)	4,226
TOTAL		13,396	7,644	21,040

- (1) Only Missouri acres shown here (this site extends into Iowa, see Table 6).
- (2) Only Missouri acres shown here (this site extends into Nebraska, see Table 7).
- (3) No cost easement obtained from State of Missouri.
- (4) Acquisition reflects residual fee purchased from private landowner on lands that already have existing public NRCS-WRP easement.
- (5) Acreage includes lands considered 'Navigational Servitude'.
- (6) No cost license obtained from USFWS.

TABLE 10

SUMMARY OF ALL LANDS ACQUIRED
(AS OF 30 SEP 03)

State	Non-Public Lands Acquired (ac)	Public Lands Acquired (ac)	Total Lands Acquired (ac)	Authorized Amount (ac)	Percentage of Authorized Amount (%)
Iowa	4,020	5,368	9,388	23,725	40
Nebraska	7,408	133	7,541	26,652	28
Kansas	2,111	0	2,111	11,632	18
Missouri	13,396	7,644	21,040	104,741	20
TOTAL	26,935	13,145	40,080	166,750	24

HABITAT DEVELOPMENT (FY03 and Prior)

The intent of this Project is to mitigate 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 mitigation. The habitat development has been of an "ecosystem" approach where all habitat types are considered into development decisions.

Development of shallow water aquatic habitat has been accomplished at numerous mitigation sites. This effort has emphasized development of side channels and chutes and completing within-river improvements. This was accomplished primarily by dike notching, river structure modifications, excavation and dredging. Through 30 Sep 03, shallow water habitats have been created, or work has been started, at 14 mitigation sites.

Reconnecting the floodplain habitats to the river during springtime flood pulses is also a mitigation effort that has been emphasized. Several mitigation sites had levees that were close to the river channel. In some cases, the levee was moved landward from the Missouri River. At some locations, such as Overton North, an existing levee was breached in several places to allow high flows to inundate terrestrial habitats and provide valuable organic matter to the river's water. As of 30 Sep 03, reconnecting floodplain habitats to the river have been completed, or work started, at 5 mitigation sites.

Increasing the amount of wetlands within the Missouri River floodplain is a Project goal. Development of migratory waterfowl habitat has been accomplished by construction of low dikes, berms, wells, pumps, water delivery systems, and drainage control structures. Through 30 Sep 03, wetland habitats have been created, or work has been started, at 9 mitigation sites.

Development of terrestrial habitat such as bottomland hardwood and prairie grassland habitats has been a key to the restoration of the ecosystem of the Missouri River. 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 and land grading. Through 30 Sep 03, bottomland hardwood and prairie grassland habitats have been developed at 16 and 14 mitigation sites, respectively.

Table 11 displays the different habitat types created at each of the mitigation sites established to date. Following Table 11 is a summary of the habitat development efforts at specific mitigation sites. If a particular site is listed in Table 11 as "Undeveloped", then a detailed description is not included. Location maps for all of the mitigation sites can be found in Appendix 1.

TABLE 11

HABITAT TYPES DEVELOPED BY SITE
(AS OF 30 SEP 03)

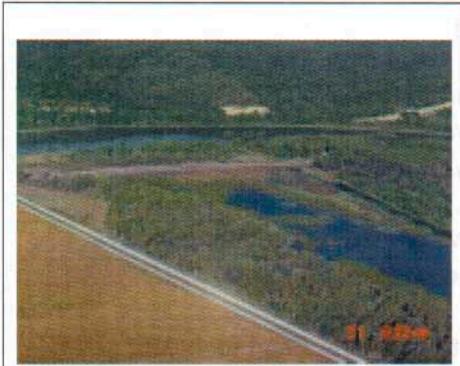
Site Name	SW	FR	W	P	BH	O	U
Winnebago Bend, IA	X			X	X		
Blackbird Bend, IA							X
Tieville-Decatur Bends, IA/NE	X			X	X		
Louisville Bend, IA	X			X	X		
Soldier Bend, IA							X
California Bend, IA	X		X		X		
Tobacco Island, NE	X			X	X		
Noodleman Island, IA							X
Auldon Bar, IA							X
Copeland Bend, IA							X
Hamburg Bend, NE	X		X	X			
Lower Hamburg Bend, IA/MO				X (1)	X (1)		
Kansas Bend, NE							X
Nishnabotna, NE/MO			X (1)	X (1)	X (1)		
Langdon Bend, NE	X			X	X		
Deroin Bend, MO	X			X	X		
Corning, MO			X (1)	X (1)	X (1)		
Thurnau, MO			X (1)	X (1)	X (1)		
Rush Bottoms, MO				X (1)	X (1)		

TABLE 11, Continued

Site Name	SW	FR	W	P	BH	O	U
Monkey Mountain, MO							X
Worthwine Island, MO							X
Benedictine Bottoms, KS	X		X	X	X		
Grand Pass, MO	X						
Overton Bottoms – North, MO	X	X	X	X	X		
Overton Bottoms – South, MO	X	X	X		X		
Rocheport Cave, MO						X (2)	
Eagle Bluffs, MO		X	X				
Plowboy Bend, MO	X						
Marion Bottoms, MO	X						
Tate Island, MO	X	X			X		
Berger Bend, MO							X
Columbia Bottom, MO		X					
Number of Sites	14	5	9	14	16	1	9

SW=Shallow Water, FR=Floodplain Reconnected, W=Wetland, P=Prairie, BH=Bottomland Hardwood, O=Other, U=Undeveloped

- (1) Habitat developed by MDC through the annual management plan process.
- (2) Bat hibernaculum



Winnebago Bend, IA
View of the developed side channel

Winnebago Bend, Iowa

The Winnebago Bend mitigation site is located just south of Sioux City, Iowa at river miles 713 to 708 on the left descending bank. The site was established on 1,300 acres of land owned by the Corps of Engineers.

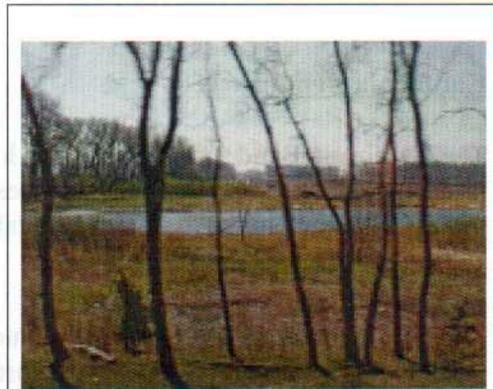
Using Project funds, habitat development at the Winnebago Bend site was completed in 2001. The mitigation features a reopened side channel with control structures at the inlet, outlet and middle of the site. At the upstream end of the site, river pumps are used to assure the area is inundated seasonally for waterfowl migration. The area is also allowed to have backwater move up from the downstream end during periods of high river stages.

This area has been turned over to Iowa Department of Natural Resources (IDNR) for their management as a fish and wildlife area.

Tieville-Decatur Bends, Iowa and Nebraska

The Tieville-Decatur Bends mitigation site is located west of Onawa, Iowa at river miles 694 to 686 on the left descending bank. The area is on lands that lie in both Iowa and Nebraska.

Habitats at the site are currently being developed under a single construction contract. Construction, started in the summer of 2002, includes development of backwater and wetland areas within an old oxbow of the Missouri River. At the upstream end of the site, river pumps will be used to assure the area is seasonally inundated for waterfowl. The area will also be allowed to have backwater from the downstream end during periods of high river stages.



Tieville-Decatur Bends, IA, NE
Existing oxbow lake area will have permanent water source from either pumps or backwater

This area will eventually establish floodplain connectivity to the river and create additional wetland habitat. Construction is expected to be completed in FY04. At that time, the improvements will be turned over to NGPC and IDNR for their joint management.



Louisville Bend, IA
View of backwater in the developed side channel

Louisville Bend, Iowa

The Louisville Bend mitigation site is 1,096 acres in size. It is located near Onawa, IA at river miles 685 to 682 on the left descending bank. This site was developed on lands owned by IDNR. This site was developed primarily as a wetland and backwater area. There are over 270 acres of permanent, open water at the site.

Habitat development at Louisville Bend included installing controlled openings at the upstream and downstream end of a large side channel area. A pump was installed at the upstream end to pump water into the area as needed for waterfowl migration. The outflow at the downstream end can be regulated so as to hold water pumped into the area, or allow backwater to flow up into the area during high river stages.

In FY03, the Corps completed modification of the inlet area and construction of an embankment in the middle of the site. These were made to improve the water management of the side channel. This area has been turned over to IDNR for their management as a fish and wildlife area.

California Bend, Iowa

The California Bend mitigation site is located across the river from Blair, Nebraska at river miles 652 to 649 on the left descending bank. The site was established on 420 acres of land owned by IDNR.

The mitigation at California Bend included opening a side channel and backwater area. This effort has developed connectivity to the river and shallow water aquatic habitat. The area is directly connected to the Missouri River and is a fine backwater wetland area for lots of different waterfowl.

In FY03, the O&M Manual for the site was completed. The improvements have been turned over to be managed by IDNR.



California Bend, IA
Aerial view of the meandering floodplain and backwater areas



Tobacco Island, NE
Aerial view of the entire site and the developed side channel

Tobacco Island, Nebraska

Tobacco Island is located south of Plattsmouth, Nebraska at river miles 590 to 586 on the right descending bank of the river. The site consists of 1,604 acres of former agricultural land that was purchased from willing sellers by the Corps for the mitigation project.

The mitigation at Tobacco Island included construction of a new side channel for additional shallow water aquatic habitat and Missouri River aquatic diversity. The side channel is three miles long with a 10-foot bottom width and is designed to open up to a wider cross section as the area scours out during high flows.

Native grasses and trees were planted at the site to improve the floodplain terrestrial habitats. During FY03, efforts to complete a survey of the boundary and the O&M Manual for the site were undertaken. This area has been turned over to NGPC for their management.

Hamburg Bend, Nebraska

The Hamburg Bend mitigation site is located at river miles 556 to 552 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.

During FY03, several changes were undertaken in the Missouri River adjacent to the site. The Corps started notching existing river structures and installed a new chevron at this site to improve the riverine diversity at this location. New shallow water areas were created to compliment the deeper water in the navigation channel.



Hamburg Bend, NE
New chevron installed to create shallow water riverine habitat downstream of the river structure

This site has been turned over to the NGPC to be managed as a wildlife area. NGPC plans to undertake converting some existing open areas to wetland areas in the near future.



Lower Hamburg Bend, IA, MO
Aerial view of the Lower Hamburg Bend of the Missouri River

Lower Hamburg Bend, Iowa and Missouri

The Lower Hamburg Bend mitigation site is located at river miles 553 to 547n the left descending bank near the town of Hamburg, Iowa. The site consists of 2,265 acres of formerly farmed lands purchased from willing sellers.

Short term management of the site was turned over to the Missouri Department of Conservation (MDC). MDC took the agricultural lands out of production and planted native grasses and trees. There is some minor agricultural crop production to keep several areas open.

In FY03, the Corps awarded a construction contract to install a side channel at this site. The channel will have a 70 foot bottom width and will be allowed to scour itself out to a 200 foot width. Construction of the side channel will be completed by Fall 2004.

Nishnabotna, Nebraska and Missouri

This mitigation site is located at river mile 545 to 537, on the left descending bank of the river. The site currently contains 1,283 acres of land purchased by the Corps from willing sellers.

The Nishnabotna site was turned over to MDC for short term management while additional lands are acquired in the area. Through the annual management plan process, MDC has planted native grasses and trees. In the future, the Corps plans to modify the existing structures along the bank of the river to improve aquatic diversity in the river.



Nishnabotna, NE, MO
1999 aerial photo of the mouth of the Nishnabotna River



Langdon Bend, NE
Wintertime view of the outlet of the backwater area to the Missouri River

Langdon Bend, Nebraska

The Langdon Bend mitigation site is located at river miles 532 to 529 on the right descending bank near the town of Nemaha, Nebraska. The site consists of 1,312 acres of formerly farmed lands purchased from willing sellers.

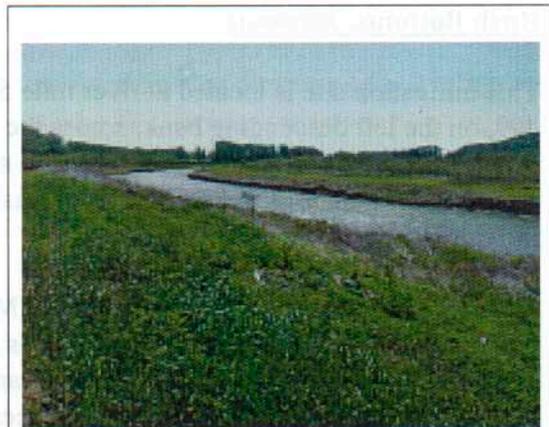
At this site, a 10-foot bottom width pilot channel and backwater area was constructed. The channel is connected to the river at the outlet, but stops before meeting the river at the upstream end. Flow into this area occurs by water from the Missouri River backing up the channel and will allow overland flow at the times when the Missouri River is at high water.

In FY03, an additional 391 acres was purchased at this site. The Corps also corrected sedimentation problems at the inlet pumps and completed an O&M Manual for the site. This site has been turned over to the Nebraska Game and Parks Commission (NGPC) for their management as a wildlife area.

Deroin Bend, Missouri

This mitigation site is located at river mile 520 to 516, on the left descending bank of the river. The site contains 1,082 acres of land belonging to MDC. It is located across the Missouri River from Indian Cave Nebraska State Park.

At Deroin Bend, the Corps completed development of a side channel, planting of several hundred native hardwood trees and cover crop, and connected two existing scour holes to the river. The side channel is approx. three miles long with a 70 foot bottom width. The site has been turned over to MDC for their management as a fish and wildlife area.



Deroin Bend, MO
View of the new side channel and native plantings



Thurnau, MO
1999 aerial photo of the Thurnau, Missouri area

Thurnau, Missouri

This mitigation site is located at river mile 512 to 508, on the left descending bank of the river. The site currently contains 1,372 acres of land purchased by the Corps from willing sellers.

The Thurnau site was turned over to MDC for short term management while additional lands are acquired in the area. Through the annual management plan process, MDC has planted native grasses and trees. In the future, the Corps plans to modify the existing structures along the bank of the river to improve aquatic diversity in the river.

Rush Bottoms, Missouri

This mitigation site is located at river mile 502 to 499, on the left descending bank, across the Missouri River from Rulo, Nebraska. The site currently contains 811 acres of land purchased by the Corps from willing sellers.

The Rush Bottoms site was turned over to MDC for short term management while the Corps attempts to acquire additional lands in the area. Through the annual management plan process, MDC has planted native grasses and trees. In the future, the Corps plans to modify the existing structures along the bank of the river to improve aquatic diversity in the river.



Rush Bottoms, MO
1999 aerial photo of the Rush Bottoms mitigation site



Benedictine Bottoms, KS
Wet prairie habitat during spring high water

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 429 to 424 on the right descending bank at the Rushville Bend of the river.

In 1998, the Corps completed installation of seasonal wetlands, planting of native hardwood trees and prairie grasses, and within river structural changes for shallow water habitat. There is a total of 550 acres of upland hardwood trees, 750 acres of grasslands, and 450 acres of wetlands at the site.

In FY03, an amendment was disked and compacted into the soils to improve retention in the wetland areas. The areas are now filling completely and the amount of pumping to keep the wetland areas filled for the fall waterfowl migration is expected to be reduced.

Benedictine Bottoms has been turned over to the Kansas Department of Wildlife and Parks for their management as a wildlife refuge and conservation area.

Grand Pass, Missouri

This mitigation site is 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 266 to 263.

At this site, the Corps of Engineers constructed shallow water habitat by re-opening a river chute. Development 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 developed chute is now approximately 50 feet wide and has developed 10 acres of high quality shallow water habitat.



Grand Pass, MO
Upstream view of the developed chute

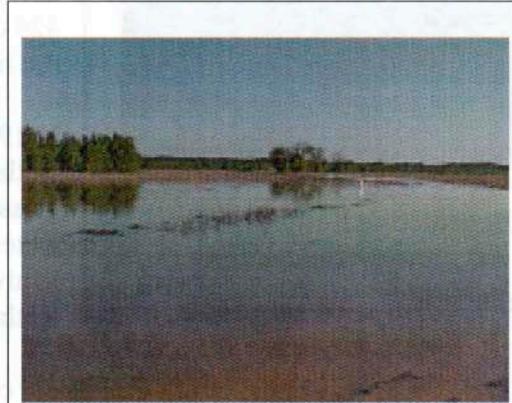
Overton Bottoms North, Missouri

Overton Bottoms North (OBN) is approximately 1,687 acres in size. It is located at river miles 189 to 185, approximately 15 miles west of Columbia, Missouri. OBN is made up of formerly farmed lands purchased from private willing sellers by both the Corps of Engineers and US Fish and Wildlife Service (USFWS).

The mitigation at this site included taking the agricultural lands out of production and planting native grasses and trees. An existing levee was breached to allow high flows in the spring to spread out over the floodplain and introduce valuable organic nutrients to the river.

In 2000, the Corps designed and constructed a river 3000-foot long chute at the OBN site. The chute was constructed at higher elevations so that it was only inundated on a seasonal basis. The Corps deepened the chute in FY03 so that the chute would flow year-round. The chute has created new shallow water aquatic habitat for a diversity of native fish.

OBN has been turned over to the USFWS to manage as part of their Big Muddy Wildlife Refuge system. 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.



Overton Bottoms - North
View looking across habitat area inundated during high spring flows.



Rocheport Cave, MO
Biologists at the gated cave entrance

Rocheport Cave, Missouri

This mitigation site is 51 acres in size and is located up a side drainage at river mile 183. The mitigation at this site consisted of completing a cave gating across the entrance to an existing cave. The cave is a summer home to maternal colonies of endangered Gray bats. In the wintertime, the cave also serves as an important hibernaculum.

The gating project prevents human disturbance. The work was completed in July 2002 and has been turned over to MDC for their management.

Overton Bottoms South, Missouri

The Overton Bottoms South (OBS) site is 3,662 acres in size and is located just to the south of I-70 from the OBN site. This is at river miles 185 to 178 on the right bank.

The main project element for the mitigation at the OBS site was setback of an existing agricultural levee. The levee setback reconnected approximately 1,200 acres of floodplain to the Missouri River. The borrow area for the construction of the new levee was constructed so as to allow opportunistic wetlands to form. Additionally, the OBS site contains about 500 acres of bottom land forest areas that will be maintained along the river corridor.

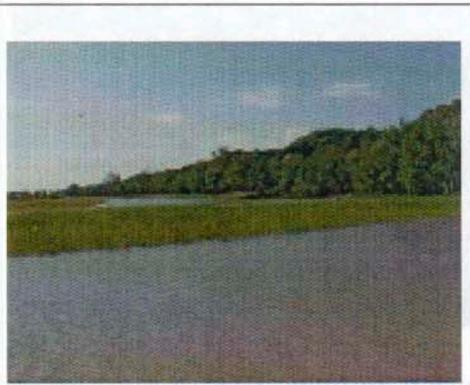


Overton Bottoms – South, MO
Opportunistic wetlands forming in borrow areas for new levee.

In FY03, the Corps notched multiple dikes along the banks of OBS. Additionally, several small chutes were also constructed. This effort will improve the riverine diversity at this location, providing a great mix of shallow and deep water. MDC has assumed operation and management of the area.

Eagle Bluffs, Missouri

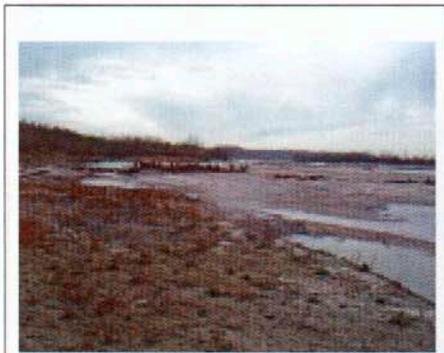
This mitigation site is located at river mile 174 to 170 on the left descending bank of the river. The site is on 571 acres of existing public land owned and operated by MDC. The area is bounded by the Missouri River to the west and Perche Creek to the East.



Eagle Bluffs, MO
One of two new wetland cells and backwater areas.

The area had been historically used for row crop production. The mitigation at this site included converting the farmed lands to seasonally flooded wetlands, and reconnecting the floodplain area to the river. Two wetland pools and additional riparian areas were constructed using new levees, berms, and water control structures.

The work also included installation of two "fish friendly" structures specifically designed to allow high flows during the spring to back up into the area to allow fish to spawn within the wetland area and then safely return to the Missouri River. The work at Eagle Bluffs was completed in January, 2002. Additional improvements along the bank line may be undertaken in the future.



Plowboy Bend, MO
Diverse and shallow water habitat created within river by structure modification

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 at river mile 172 to 169 on land that is owned and operated by the MDC.

The work at Plowboy included notching and lowering an existing dike 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 have created an area of diverse shallow and deep water fish habitat.

Marion Bottoms, Missouri

This mitigation site is located at river mile 164 to 158, on the right descending bank of the river, northwest of Jefferson City. Mitigation at this location was undertaken within the river channel along the banks of the Marion Bottoms Conservation Area, land owned and operated by MDC.

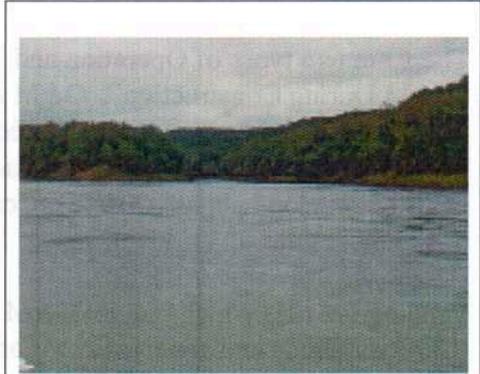
Work at this location consisted of modification to existing river structures so that shallow water habitat could be formed in the river channel. The work was completed in spring 2001.



Marion Bottoms, MO
1999 aerial photo of Marion Bottoms

Tate Island, Missouri

This mitigation site is located at river miles 113 to 110 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 to boat during most times of the year. The site is located two miles east of Portland, MO. The island is being preserved in its' heavily timbered state. 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.



Tate Island, MO

Outlet of chute, downstream end of timbered island

Columbia Bottom, Missouri

After acquiring an additional 118 acres during FY02, this mitigation site is now 4,226 acres in size. It is located just North of St. Louis at the confluence of the Missouri and Mississippi Rivers, RM 4 - 0. The site is on existing public land owned and operated by the Missouri Department of Conservation (MDC). 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 will be installed where agricultural lands once predominated. 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, setback of an 8000 linear foot existing levee, was completed in Summer of 2002. The setback moved 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 II, development of approx. 800 acres of wetlands, is currently underway. Construction of 15 low dikes and a water delivery system has been installed. A river pump station is currently under design that will feed water through the delivery system to the wetland areas. Native plantings will take place in Spring 2004.

OPERATION AND MAINTENANCE (FY03 and Prior)

There are two types of Operation and Maintenance (O&M) activities for this Project. The first is "O&M During Construction". O&M During Construction takes place at sites that have not yet had habitat developed on them, yet require O&M activities such as weed control to be performed. Typically, these sites are waiting for additional funds to be appropriated to purchase adjacent lands or develop habitats. There are currently nine sites under O&M During Construction, but this number goes up or down.

Funding for sites which require O&M During Construction is made with Construction, General (CG) type funds and are accounted for against Project funding. The work is usually performed by contract or by the agency that is interested in managing the site once habitat development has occurred. If funds are needed by an agency other than the Corps of Engineers for O&M During Construction, the funds are requested and approved from the Corps on an annual basis via an Annual Management Plan process. Requests are usually made in the summer for work planned for the following fiscal year (Oct through Sep).

The second type of O&M is straight Operation and Maintenance. Sites are considered to be in an O&M phase once constructed features have been completed and are accepted as complete by all parties. Sites can also be considered in an O&M phase when areas have been planted and are in a healthy growing condition. The constructed features and habitat lands must be operated and maintained to assure that maximum habitat value is achieved. Therefore, O&M funds are provided for this purpose. O&M type funds are not a part of CG funding and do not count against the Project costs.

On a typical site, O&M requirements are estimated initially during the design phase. An O&M manual is then developed during the construction phase with the party responsible for administering the O&M at the particular site. An O&M manual will define the entity that will do the maintenance, the degree of Corps responsibility, schedule and procedure requirements, monitoring, etc. After construction of features or habitats at a site, a cooperative agreement will be executed between the Corps and the party responsible for administering the O&M. The cooperative agreement will document the O&M responsibilities. If funds are needed by an agency other than the Corps of Engineers for O&M, the funds are requested and approved from the Corps on an annual basis via an Annual Management Plan process.

To date, the Corps has funded 100 percent of the O&M of the mitigation features and habitat lands developed under this project, whether the sites are in O&M During Construction or straight O&M status. The funding of O&M at 100% Federal cost will continue for the life of the Project. For mitigation that has occurred on properties not owned by the Corps, O&M will only be conducted on those portions of the property in which mitigation occurred and only for those features that were constructed by the Project. In most instances, the funds are forwarded to the land managing agency for the work to be accomplished by their existing work force.

As of 30 Sep 03, there were thirty-two mitigation sites that have been established. Seven of these sites have not had any O&M performed on them to date. There are nine sites that are undergoing land management using O&M During Construction funds. Also, there are sixteen sites which have had habitat developed or preserved and are now considered to be in an O&M phase. The status of the O&M of all mitigation sites is described in Table 12 on the following three pages.

TABLE 12
STATUS OF OPERATION AND MAINTENANCE
(FY03 and Prior)

Site	Current Funding	Description of O&M	Responsible Party
Winnebago Bend, IA	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation. Pump maintenance.	IDNR
Blackbird Bend, IA	--	None (to be started in FY06)	COE
Tieville-Decatur Bends, IA - NE	--	None (to be started in FY05)	COE
Louisville Bend, IA	O&M	Maintain all structures, fences, signs and roadways. Provide law enforcement. Land management and habitat preservation. Pump maintenance.	IDNR
Soldier Bend, IA	--	None (to be started in FY08)	COE
California Bend, IA	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation.	IDNR
Tobacco Island, NE	O&M	Basic land management, monitoring chute development.	NGPC
Noodleman Island, IA	CG	Land management and habitat preservation.	IDNR
Auldon Bar, IA	CG	Land management and habitat preservation	IDNR
Copeland Bend, IA	CG	Land management and habitat preservation.	IDNR

TABLE 12 Continued

Site	Current Funding	Description of O&M	Responsible Party
Hamburg Bend, NE	O&M	Maintain structures, fences, signs and roadways. Land management and habitat preservation.	NGPC
Lower Hamburg, IA/MO	CG	Land management, tree planting, existing habitat preservation	MDC
Kansas Bend, NE	--	None (to be started in FY06)	COE
Nishnabotna, NE/MO	CG	Land management, existing habitat preservation, vegetative plantings	MDC
Langdon Bend, NE	O&M	Maintain all structures, fences, signs and roadways. Land management and habitat preservation, pumping.	NGPC
Deroin Bend, MO	CG/O&M	Monitoring constructed chute and tree plantings, access road improvements, scour hole channel re-work	MDC
Corning, MO	CG	Basic land management, weed control, vegetative plantings	MDC
Thurnau, MO	CG	Land management, weed control, vegetative plantings.	MDC
Rush Bottom Bend, MO	CG	Land management, weed control, vegetative plantings.	MDC
Monkey Mountain, MO	--	None (to be started FY05)	COE
Worthwine Island, MO	--	None (to be started FY05)	MDC
Benedictine Bottoms, KS	CG/O&M	Wetland management, infiltration control, tree planting, weed control, pumping	KDWP

TABLE 12 Continued

Site	Current Funding	Description of O&M	Responsible Party
Grand Pass, MO	O&M	Management and surveillance of the constructed chute (no cost to date due to ag leasing program)	MDC
Overton Bottoms North, MO	CG/O&M	Native grass and tree plantings, weed control, surveillance of constructed chute, signage, monitoring	USFWS
Rocheport Cave, MO	O&M	Monitoring, debris removal	MDC
Overton Bottoms South, MO	CG/O&M	Basic land management, monitoring shallow water and wetland habitat development	MDC
Eagle Bluffs, MO	O&M	Management of wetland pool elevations, water control structures, weed control, mowing, food plots	MDC
Plowboy Bend, MO	O&M	Monitoring dike notching and shallow water habitat development	COE
Marion Bottoms, MO	O&M	Monitoring dike notching and shallow water habitat development	COE
Tate Island, MO	O&M	Habitat preservation, signage	MDC
Berger Bend, MO	CG	Habitat preservation, weed control, and food plots (through ag-lease)	COE
Columbia Bottom, MO	--	None (to be started in FY04)	COE

CG = Construction General Funding, O&M = O&M Funding, COE = Corps of Engineers, MDC = Missouri Department of Conservation, KDWP = Kansas Department of Wildlife and Parks, IDNR = Iowa Department of Natural Resources, NGPC = Nebraska Game and Parks Commission.

MONITORING AND EVALUATION (FY03 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). By monitoring the mitigation sites and collecting basic habitat data, the Agency Coordination Team can determine whether the mitigation sites are performing as expected.

However, this project is a construction effort intended to purchase lands and convert them into fish and wildlife habitats. The project is not intended to complete studies or research programs. Therefore, funding for M&E has been limited prior to FY03. In the future, the Cost Report to Congress allowed for a 5% total amount to be appropriated for monitoring efforts.

As of 30 Sep 03, only minimal M&E activities have been completed. This includes periodic inspections of completed habitats. Some site specific data has been collected. This includes a three-year fisheries study performed under contract with the State of Nebraska, limited funding of efforts at Benedictine Bottoms through the Benedictine University, pallid sturgeon micro model studies with the St. Louis District, USFWS studies on songbirds and turtles at the Overton North site, and benthic fish population assessments within the Missouri River.

Beginning in FY03, the Corps worked with the Agency Coordination Team to begin development of an M&E plan. This plan is still being drafted. The plan will outline that during the planning and design phase, specific goals and objectives will be determined for each site and monitoring criteria for meeting these objectives will be established. After construction, monitoring will be conducted on the various aspects of each site in order to assess the degree of success of the habitat development. M&E will be performed by utilizing teams with representatives from the Agency Coordination Team, the USGS, contractors, and academic institutions. Monitoring results will be collected at some sites on an annual basis and at others at a less frequent interval, depending on the objectives of the specific site. Project performance will be reported in future Annual Implementation Reports.

PLANNED MITIGATION EFFORTS FOR FY04

FUNDING (FY04)

As of the writing of this Annual Implementation Report, a final FY04 budget for the project has not been approved. The Federal government started FY04 operating under a continuing resolution authority. The Federal Budget was finally passed in late November 2003. Congress appropriated \$18,000,000 for the project. Since that time, the Headquarters of the Corps of Engineers (HQUSACE) has been determining the amount of "savings and slippage" that will be applied. Therefore, the FY04 budget is uncertain. The following information in Table 13 assumes that the savings and slippage amount will be the same as in FY03, equal to 20%.

TABLE 13

ESTIMATED FUNDING FOR FY04

Task	CENWK (1,000)	CENWO (1,000)	TOTAL (1,000)
Land Acquisition	\$2,350	\$2,300	\$4,650
Planning, Engineering, and Design	1,550	230	1,780
Habitat Development (Construction)	2,940	3,260	6,200
Construction Management	300	300	600
O&M During Construction	300	150	450
Monitoring and Evaluation ⁽¹⁾	400	320	720
TOTAL	\$7,840	\$6,650	\$14,400

(1) M&E is limited to 5% of the annual appropriation.

REAL ESTATE (FY04)

As of September 30, 2003, there remains a total of 126,670 acres of lands authorized for acquisition. These acres are authorized in all four states. Therefore, real estate efforts will be of primary interest during FY04. The goal for FY04 is to acquire 4,000 new acres for the project.

During FY04, the Corps will undertake several efforts to purchase additional land from non-public owners. Willing seller efforts will continue in Iowa, Nebraska and Kansas. A new effort will be started in Missouri. Current ownership information will be updated and many landowners will be contacted to see if they are willing to sell their property. An amount of \$4,650,000 is estimated to be available in FY04 for real estate activities (pending final savings and slippage amount by HQUSACE).

In Iowa, 250 letters were sent to owners during FY03 to gauge their interest in selling lands to the project. The list was coordinated with IDNR and USFWS. This willing seller effort will be continuously tracked during FY04. And, in addition to the willing seller effort, the Corps will be focused on acquiring lands in several specific areas. Additional non-public lands are being sought at Copeland Bend to compliment the lands that are already owned there. The Corps will be working with NRCS and IDNR at this location. Additional efforts will be undertaken to obtain additional lands at Auldon Bar, Noddleman Island, Soldier Bend and Blackbird Bend.

In Nebraska, 245 letters were sent to owners during FY03 to gauge their interest in selling lands to the project. The list was coordinated with NGPC and USFWS. This willing seller effort will be continuously tracked during FY04. And, in addition to the willing seller effort, the Corps will be attempting additional acquisitions at Langdon Bend, Kansas Bend, and Tobacco Island. The Corps will also pursue real estate agreements with the Omaha Tribe at Hole in the Rock and the Winnebago Tribe at Glovers Point to complete projects on their lands.

In Kansas, the willing seller effort will continue at several locations in Doniphan and Atchison Counties. The Corps will continue to work with the Kansas Department of Wildlife and Parks and the USFWS to prioritize lands. Additional opportunities to expand the area at Benedictine Bottoms will be included.

In Missouri, a willing seller effort will begin. The Corps anticipates use of a contractor to help in this effort. Focused efforts will be placed on acquiring lands at several new sites. This includes the Church Farms property near Jefferson City, an area near Wolf Creek Bend, lands adjacent to the Diana Bend Conservation Area, and lands at Providence Bend. Additional acquisitions adjacent to the existing sites at Berger Bend, Corning, Nishnabotna, and Thurnau sites will be pursued. Additionally, the Corps will continue working with US Bureau of Prisons to obtain the Federal prison farm land on the Missouri side of the river opposite Leavenworth, KS. The Corps will also be seeking to obtain more easements on existing public property at the Franklin Island, Diana Bend, and Thurnau Conservation Areas.

During FY04, the Corps will also focus on obtaining strips of land along the bank of the Missouri River. This would be for the specific purpose of completing structural modifications to the existing bank protection and navigation dikes. The changes will encourage the river to widen and create more shallow water habitat in the dike fields. In FY03, the Corps obtained approval to utilize "sloughing" easements. This real estate interest allows the Corps to erode portions of the bank while the current land owner maintains ownership to the land. The areas for riverine diversity will be sought in either fee or easement from private and public owners.

HABITAT DEVELOPMENT (FY04)

In FY04, an amount of \$8,580,000 is estimated to be available for habitat development (pending final savings and slippage amount by HQUSACE). This includes \$2,380,000 for engineering and management activities and \$6,200,000 for construction. The following is a summary of habitat development activities to be completed by site during FY04.

Hole in the Rock, NE - Plans and specifications for installation of several backwater areas at this mitigation site will be completed in FY04. The Corps will continue to work with the Omaha Indian Tribe to obtain a real estate easement to complete the construction. Pending available funds, a construction contract will be advertised and awarded in summer 2004. The construction will extend into FY05.

Glovers Point, NE - Plans and specifications for installation of a side channel and backwater area at this mitigation site will be completed in FY04. The Corps will continue to work with the Winnebago Indian Tribe to obtain a real estate easement to complete the construction. Pending available funds, a construction contract will be advertised and awarded in spring 2004. The construction will extend into FY05.

Tieville-Decatur Bends, IA and NE - The on-going construction contract to install backwater and side channel areas at this site will continue in FY04. This construction will finish in Spring 2004.

Tobacco Island, NE - The Corps will be fencing the boundary at this site during FY04 per agreement with Cass County.

Noodleman Island, NE - Acquisition at this site is not complete. However, during FY04, the Corps will be working with IDNR on a proposed project to install opportunistic wetlands on the available lands at this site. The soil will be removed off site, leaving a low area that will collect local drainage.

Copeland Bend, IA - Acquisition at this site is not complete. However, on the lands already owned, the Corps and IDNR will continue to work at creation of opportunistic wetlands at this

site. This effort was started in FY03 and will continue through FY04. A private contractor will remove soil off site, leaving a low area that will collect local drainage.

Hamburg Bend, NE – The Corps will be undertaking additional improvements along the river at this site during FY04. Existing river structures will continue to be modified and some new dikes may be installed to establish additional shallow water habitat and floodplain connectivity. The Corps will be working with NGPC on conversion of some open lands to opportunistic wetlands using funding obtained through an existing ag-lease.

Lower Hamburg, MO - The construction of the side channel will continue in FY04. The contract was awarded September, 2003 and will continue through to Fall, 2004. The Corps will also be modifying the existing river structures along the bank at this site using the Omaha District river contract that was awarded in FY03.

Kansas Bend, NE – Pending available funds, a construction contract will be advertised and awarded in FY04. The contract will be for construction of two side channels at this site. The construction will extend into FY05. The Corps will also be modifying the existing river structures along the bank at this site using the Omaha District river contract that was awarded in FY03.

Nishnabotna, NE, MO – Although acquisitions are not complete, the Corps will be completing an environmental assessment of this site in FY04. Additionally, MDC will continue to plant native grasses and trees. The Corps will also be modifying the existing river structures along the bank at this site using the Omaha District river contract that was awarded in FY03.

Langdon Bend, NE – The additional acquisition of land at this site will finally enable adequate access to the site. In FY04, the Corps will complete an improved access road and parking area.

Deroin Bend, MO – In FY04, the Corps will be working with MDC on modifying the channels connecting the new side channel to the existing scour holes on this site. The work will allow MDC to control flow into and out of the scour holes.

Corning, MO – Although acquisitions are not complete, the Corps will be working with MDC to continue to plant native grasses and trees in FY04. The Corps will also be working with NRCS on a project to complete land grading and vegetative plantings on the WRP lands.

Thurnau, MO – Although acquisitions are not complete, the Corps will be completing an environmental assessment of this site in FY04. Additionally, MDC will continue to plant native grasses and trees on the lands already owned at this area.

Rush Bottoms, MO – Although acquisitions are not complete, the Corps will be completing an environmental assessment of this site in FY04. Additionally, MDC will continue to plant native grasses and trees on the lands already owned at this area.

Worthwine Island, MO – The design to re-open a chute at this site will continue. Plans and specifications will be completed during FY04. Depending on available funds, a construction contract for this project may be awarded very late in FY04. The current working estimate for the project is \$3.5M and will continue into FY05.

Franklin Island, MO – The Corps anticipates obtaining a no cost easement from MDC at this site. The easement will be along the river frontage and allow the Corps to modify the river structures along the bank at this site to improve riverine diversity.

Overton Bottoms North, MO – In FY04, the Corps will modify the river structures along the bank at this site to improve riverine diversity. The surveying and marking the boundary of this mitigation site will continue in FY04.

Overton Bottoms South, MO – The levee set back will be made operational and turned over to the Overton-Woolridge levee district for O&M beginning in FY04. Also at this site, the Corps of Engineers will continue efforts to surveying and marking the boundary of this mitigation.

Berger Bend, MO – CG Funding in FY04 will be used to continue habitat improvements at this site. The existing barn on one of the sites will be torn down. Approximately 50 acres of hardwood trees will be planted in the Spring 04. Goal is to turn the property over to MDC by Dec 05.

Columbia Bottom, MO – The plans and specifications for installation of one or more river pumps will be completed in FY04. If funds are available at the end of the fiscal year, a construction contract for installation of the river pump(s) will be awarded in Summer 04 with the construction extending into FY05. Funds will be made available to MDC to pay for planting of approximately 1,300 acres of native trees and grasses during FY04.

OPERATION AND MAINTENANCE (FY04)

In FY04, an amount of \$450,000 of Construction, General (CG) funds is estimated to be available for O&M During Construction (pending final savings and slippage amount by HQUSACE). The following is a summary of how the CG funds will be spent in FY04.

At sites that have not been placed in an O&M status, O&M During Construction funds will be provided for basic land management, habitat preservation, tree plantings, weed control, and signage. This will occur at the following mitigation sites in FY04: Noddleman Island, IA; Auldon Bar, IA; Copeland Bend, IA; Lower Hamburg, MO; Nishnabotna, MO; Corning, MO; Thurnau, MO; Rush Bottom Bend, MO; Overton Bottoms North, MO; Overton Bottoms South, MO; and Berger Bend, MO.

For those sites that have been placed in an "Operations" status, CG funds will not be used. The Corps must provide O&M type funds for these mitigation sites and the funding for this does not get counted toward overall project costs. The types of work that this would include is 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. Pending available funds, O&M will continue during FY04 at the following mitigation sites: Winnebago Bend, IA; Louisville Bend, IA; California Bend, IA; Tobacco Island, NE; Hamburg Bend, NE; Langdon Bend, NE; Deroin Bend, MO; Benedictine Bottoms, KS; Grand Pass, MO; Overton Bottoms North, MO; Rocheport Cave, MO; Overton Bottoms South, MO; Eagle Bluffs, MO; Plowboy Bend, MO; Marion Bottoms, MO; and Tate Island, MO.

MONITORING AND EVALUATION (FY04)

In FY04, an amount of \$720,000 of Construction, General (CG) funds is estimated to be available for Monitoring and Evaluation (M&E) This amount is pending final savings and slippage amount by HQUSACE. In FY04, M&E funds will be spent on periodic and/or annual inspections at the mitigation sites that have been placed in an Operation phase. Some site specific data will be collected to support baseline conditions for shallow water habitat. USFWS studies on song birds, turtles, and native fish will again be funded at the Overton North site. Additionally, an M&E plan for the project will be drafted for review and acceptance by the Agency Coordination Team.

**FUTURE MITIGATION EFFORTS,
FY05 TO COMPLETION**

FUNDING (FY05 to completion)

In accordance with the requirements of WRDA99, the Corps of Engineers worked with the Agency Coordination Team to develop a Cost Report to Congress. The Cost Report estimated the amount of funds needed to complete mitigation of the additional 118,650 acres authorized by WRDA99. The cost to complete the project was estimated to be \$740 million (includes 7,000 acres of shallow water habitat) to \$1.33 billion dollars (includes 20,000 acres of shallow water habitat). These costs were at October 2001 price levels.

It is important to note that all future funding for the mitigation efforts is subject to annual appropriation. Due to increasing pressures to focus mitigation efforts on maximizing riverine diversity, the Corps has created budgets based upon the higher goal of 20,000 additional acres of shallow water habitat. When seeking annual appropriations in FY05 through completion, the Corps will request funding to meet the higher, \$1.33 billion, total project cost. The cost information from the Report to Congress is displayed in Table 14 below.

TABLE 14

ESTIMATED COSTS FROM REPORT TO CONGRESS

Task	CENWK (1,000,000)	CENWO (1,000,000)	TOTAL (1,000,000)
Land Acquisition	\$230	\$120	\$350
Planning, Engineering, and Design	110	70	180
Habitat Development (Construction)	350	270	620
Construction Management	30	20	50
O&M During Construction	30	20	50
Monitoring and Evaluation	50	30	80
TOTAL	\$800	\$530	\$1,330

The life of the project is currently projected to last until the year 2042. After inflation is applied, the cost to implement the mitigation program with 20,000 additional shallow water habitat acres is estimated to be \$3.1 billion. The Corps has input this funding stream into project budgetary data. The budget data for the next 5 years is displayed in Table 15.

TABLE 15

CURRENT BUDGET FY05 TO COMPLETION

District	FY05 (1,000)	FY06 (1,000)	FY07 (1,000)	FY08 (1,000)	FY09 (1,000)	FY10 – FY42 (1,000)
Omaha	10,000	10,000	15,000	15,000	15,000	1,052,423
Kansas City	13,500	15,000	17,500	22,000	22,000	1,749,141
TOTAL	23,500	25,000	32,500	37,000	37,000	2,801,564

The budget data in table 15 is subject to change. For instance, while the Corps will request \$23,500,000 in funding in FY05, Congress may appropriate only a portion of that. Therefore, this table will be updated annually and changes will be reflected in future Annual Implementation reports.

REAL ESTATE (FY05 to completion)

In June 2003, the SEIS process was completed. With the NEPA documentation complete, the Corps is now able to acquire the additional acres authorized by WRDA99. As displayed in Table 10, there are 126,670 acres remaining to be acquired for the project. If the acquisition program is successful in meeting the FY04 goal of 4,000 acres, then there will be in excess of 120,000 acres left to be acquired from FY05 to completion.

There are currently 32 mitigation sites established which amount to just over 40,000 acres in lands. This is an average of 1,250 acres per site. Using this average, the Corps will need to establish approx. 100 new sites from FY05 to completion.

Authority to purchase additional lands is available in all four states. It is hoped that the concerted effort to inform the public of the project and the update of the willing seller surveys may produce additional willing sellers. Also, during FY05 and beyond, the Corps will continue

to work with the Agency Coordination Team to identify existing public in which mitigation projects can be implemented.

As willing sellers, both private and public, come forward, acquisitions of their properties will be of top priority. Real estate acquisitions will take priority over awarding all construction contracts for habitat development. If funds are provided, it is estimated that the acquisition effort will last for at least 20 years before enough willing sellers are found. In order to meet the authorized amount of lands to mitigate, 6,000 acres of land will need to be acquired per year for the next 20 years.

HABITAT DEVELOPMENT (FY05 to completion)

For all future years, if funds are provided, continued modifications to the river structures will be a priority for riverine diversity and habitat development. Additional opportunities for reconnecting the floodplain with the river will be undertaken at all possible locations. Set back and breaching of existing levees will be undertaken. Vegetative plantings and other land management practices to develop native habitats to terrestrial areas will also continue. The Corps will focus efforts on self-sustaining habitat designs for all habitat types.

Based upon the estimates above, an additional 100 sites will be established for the project in order to complete the mitigation on the Missouri River from Souix City, IA to the mouth. Since the project is estimated to last until FY42, habitat must be developed on at least three mitigation sites per year to complete the mitigation efforts.

Provided funds are appropriated as budgeted above for FY05, the Corps has specific plans for habitat development at several sites. The habitat development that had been started in FY04 will continue to completion. This will be at the Glovers Point, NE; Hole in the Rock, NE; Kansas Bend, NE; Tieville-Decatur Bends, IA/NE; Lower Hamburg Bend, IA/MO; Worthwine Island, MO; and Columbia Bottom, MO mitigation sites.

OPERATION AND MAINTENANCE (FY05 to completion)

If funds are provided in FY05 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.

It was estimated in the Cost Report to Congress that the O&M requirements would incrementally increase over time to reach an amount estimated to be \$5 million per year by the time the project

was fully constructed. This amount was estimated based on only passive, self sustaining habitat areas being constructed by this project.

MONITORING AND EVALUATION (FY05 to completion)

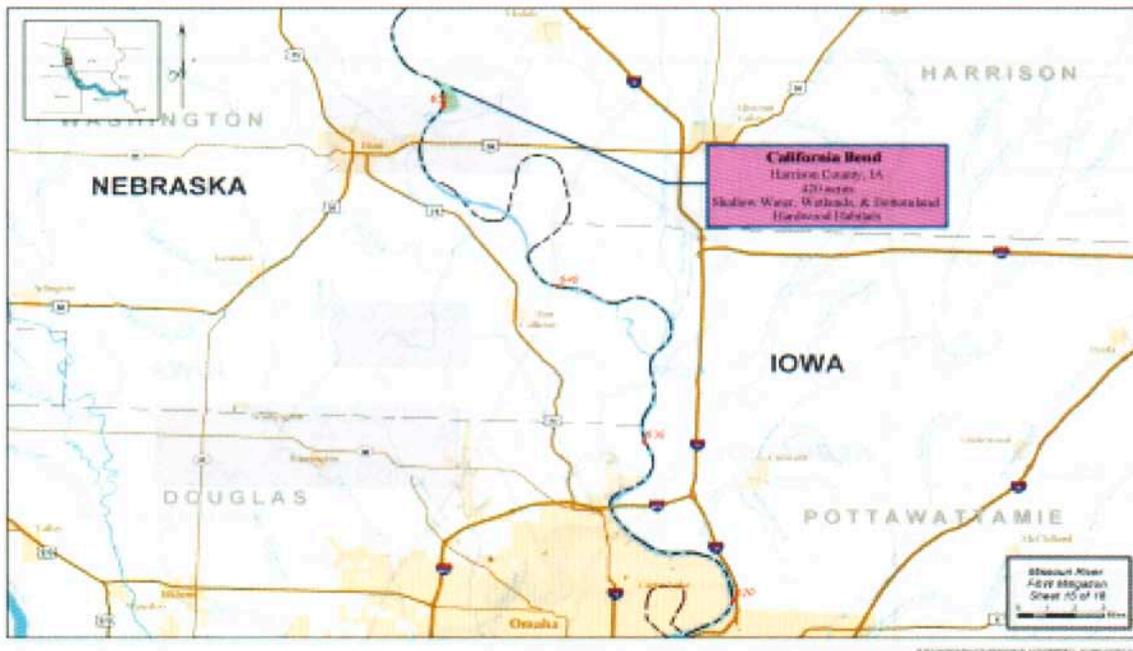
The SEIS calls for a detailed Monitoring and Evaluation (M&E) effort to be funded by the mitigation project. The M&E effort will be used to support adaptive management of established mitigation sites. Participation of the Agency Coordination Team is considered essential to understanding and agreeing upon adaptive management needed to keep established mitigation sites healthy and productive.

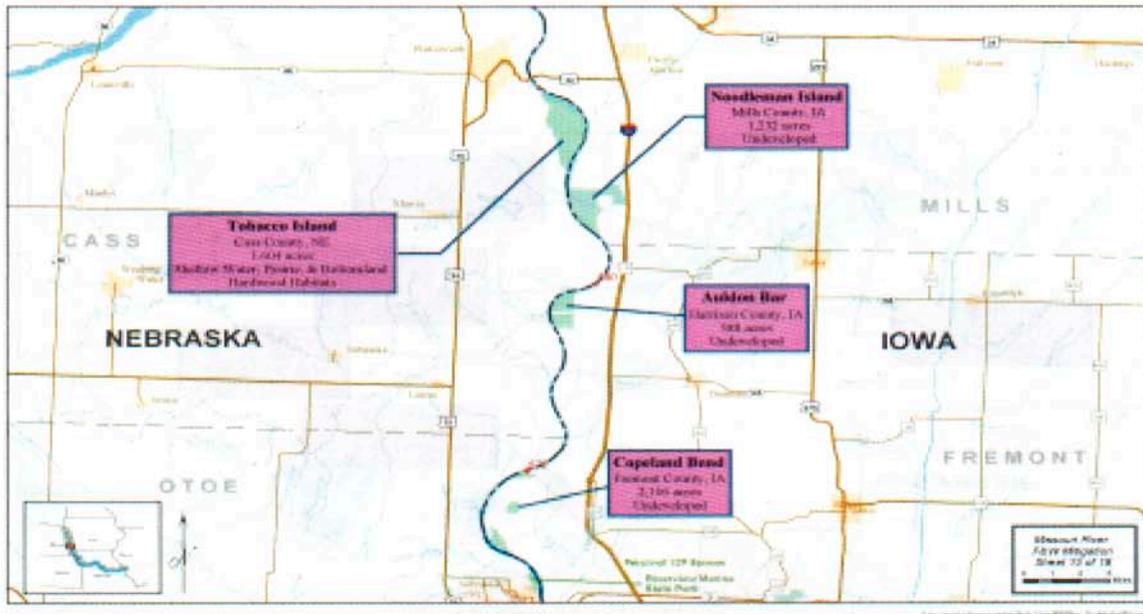
If funds are provided in FY05 to completion, M&E efforts will be based on the entire Missouri River floodplain ecosystem. No one species will be concentrated upon. Rather, a holistic approach must be taken to assure a portion of the form and function of the river is restored. It was estimated in the Cost Report to Congress that an amount of 5% of each annual appropriation will be budgeted for M&E activities.

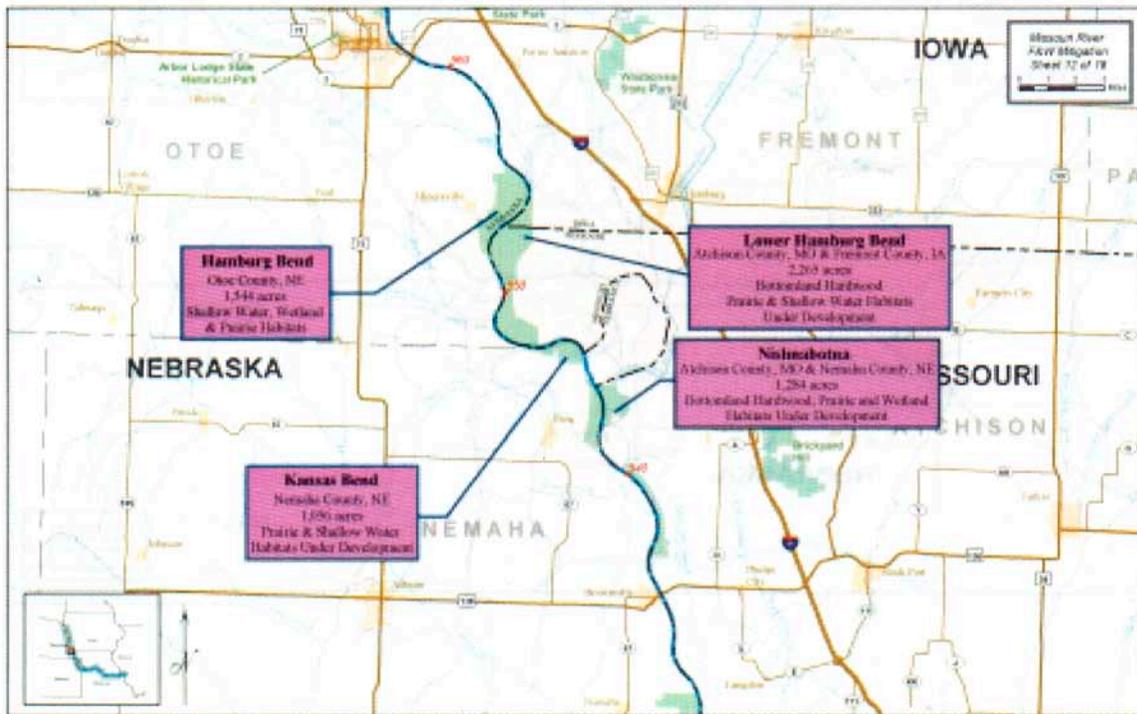
During the planning and design phase of new mitigation sites, the Corps plans to outline specific monitoring goals and objectives. The Corps, working with the Agency Coordination Team, will determine the monitoring criteria for meeting these objectives. On typical sites, after construction, monitoring will be conducted on the various aspects of each site in order to assess the degree of success of the habitat development. The monitoring will be performed by utilizing teams with representatives from the Agency Coordination Team, the USGS, contractors, and academic institutions. Monitoring results will be collected at some sites on an annual basis and at others at a less frequent interval, depending on the objectives of the specific site. Project performance will be reported in future Annual Implementation Reports.

**APPENDIX 1
SITE LOCATION MAPS**





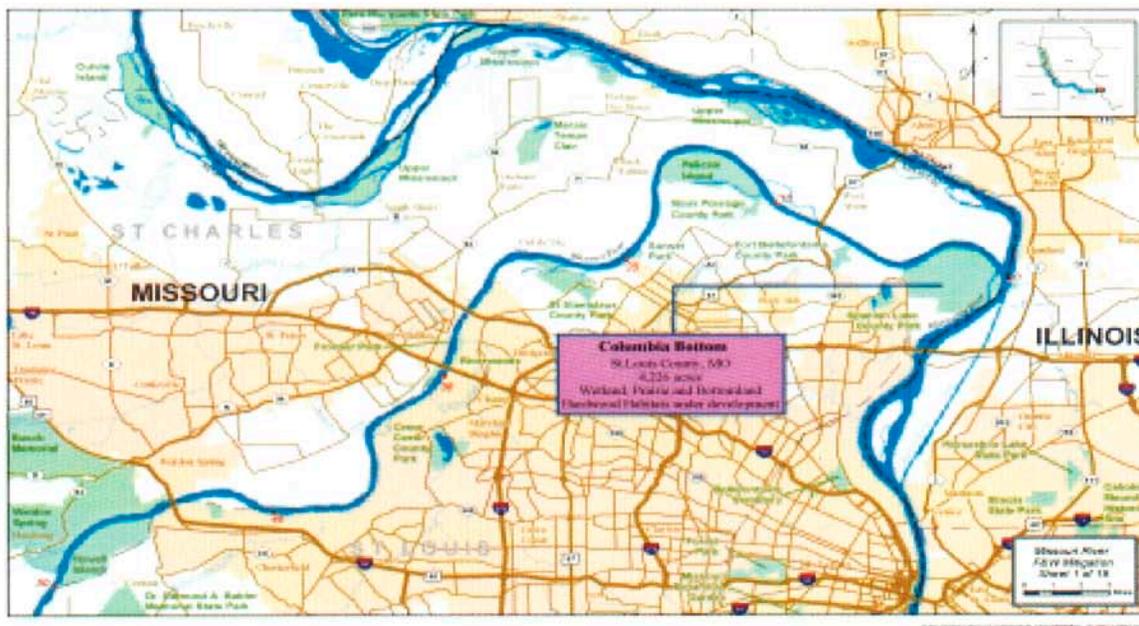














**US Army Corps
of Engineers** ®

**US Army Corps of Engineers
Omaha District
215 North 17th Street
Omaha, Nebraska 68102
402-221-4605**



**US Army Corps
of Engineers** ®

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

APPENDIX G

Mainstem Missouri River
Least Tern Productivity Monitoring,
1986 - 2003

MAINSTEM MISSOURI RIVER LEAST TERN PRODUCTIVITY MONITORING 1986-2003

REACH	NESTS	NEST HAT.	NEST COLL.	NEST SUCC.	EGGS	EGGS HAT.	EGGS COLL.	COLL. HAT.	FLOOD	FATE DESTROYED PRED.	H. DIST.	BANK E.	WTHR.	LIVESTOCK	DES. UNKN.	FATE UNKN.	ABAN.	NON VIABLE	ADULT CENSUS	CHICKS FLEDGE	FLEDGE RATIO	COLL. CH. RELEASED
Fort Peck Lake																						
1987*	1	0	0	0.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	4	0	0.00	0
1988*	0	0	0	0.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	3	0	0.00	0
1989	2	2	0	100.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	4	6	3.00	0
1990	2	1	0	50.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	6	0	0.00	0
1991	4	2	0	50.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	10	2	0.40	0
1992	0	0	0	0.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	0	0	0.00	0
1993	3	0	0	0.0	7	0	0	0	3	0	0	0	0	0	0	0	0	0	7	0	0.00	0
1994	8	3	0	37.5	14	6	0	0	1	0	0	0	0	0	1	3	0	0	9	2	0.44	0
1995	5	0	0	0.0	6	0	0	0	5	0	0	0	0	0	0	0	0	0	2	0	0.00	0
1996	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
1997	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
1998	2	1	0	50.0	6	3	0	0	0	0	0	0	1	0	0	0	0	0	4	0	0.00	0
1999	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
2000	3	2	0	66.7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1.00	0
2001	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
2002	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
2003	1	0	0	0.0	3	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	0.00	0
TOTAL	31	11	0	35.5	36	9	0	0	9	0	0	0	1	0	1	4	0	0	55	12	0.50	0
Missouri below Fort Peck																						
1988	1	1	0	100.0	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	18	3	0.33	0
1989*	24	10	0	41.7	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	48	0	0.00	0
1990	26	4	0	15.4	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	92	8	0.17	0
1991	16	6	0	37.5	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	66	18	0.55	0
1992	16	10	0	62.5	38	25	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	110	14	0.25	0
1993*	14	8	0	57.1	37	19	0	0	0	0	0	0	0	0	5	1	0	0	31	7	0.45	0
1994*	23	14	0	60.9	46	31	0	0	0	0	0	0	0	0	2	3	4	0	58	41	1.41	0
1995*	31	20	0	64.5	76	51	0	0	1	2	0	0	7	0	0	0	1	0	95	47	0.99	0
1996*	28	11	0	39.3	62	25	0	0	2	0	0	1	0	0	0	6	2	0	128	21	0.33	0
1997*	17	11	0	64.7	41	26	0	0	0	0	0	0	2	0	1	2	1	0	162	43	0.53	0
1998*	11	8	0	72.7	28	20	0	0	0	1	0	0	0	0	0	2	0	0	25	19	1.52	0
1999*	12	7	0	58.3	28	18	0	0	0	0	0	0	2	0	0	3	0	0	40	34	1.70	0
2000*	7	1	0	14.3	19	2	0	0	1	1	0	1	0	0	0	2	1	0	33	1	0.06	0
2001*	20	13	0	65.0	42	25	0	0	1	0	0	0	2	0	1	3	0	0	39	20	1.03	0
2002	23	10	0	43.5	50	24	0	0	0	0	3	2	0	0	0	6	2	0	34	10	0.59	0
2003	19	10	0	52.6	50	26	0	0	0	1	0	0	1	0	0	6	0	1	38	12	0.63	0
TOTAL	288	144	0	50.0	517	292	0	0	3	7	0	5	16	0	9	34	11	1	1017	298	0.62	0
Lake Sakakawea																						
1988#	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0.00	0
1989#	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	0.00	0
1990#	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0.00	0
1991#	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0.00	0
1992*	2	2	0	100.0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	29	12	0.83	0
1993*	10	2	0	20.0	15	3	0	0	0	0	0	0	1	0	0	1	0	0	17	1	0.12	0
1994	18	3	0	16.7	41	4	0	0	4	2	0	0	1	0	0	0	1	0	0	0	0.00	0
1995	2	0	0	0.0	5	0	0	0	2	0	0	0	0	0	0	0	0	0	7	0	0.00	0
1996	19	4	9	21.1	39	6	23	22	5	0	0	0	0	0	1	0	0	0	27	2	0.15	21
1997	14	6	5	42.9	27	12	10	9	0	0	1	0	0	0	0	0	0	2	2	0	0.00	7
1998	20	15	0	75.0	50	32	0	0	0	0	0	0	2	0	0	3	0	0	23	12	1.04	0
1999	23	2	15	8.7	57	6	35	30	5	0	0	0	0	0	0	1	0	0	9	3	0.67	22
2000	3	1	0	33.3	6	1	0	0	1	0	0	0	0	0	0	1	0	0	10	1	0.20	0
2001	19	14	0	73.7	38	25	0	0	0	1	0	0	0	0	0	3	0	1	34	13	0.76	0
2002	17	12	0	70.6	38	25	0	0	0	0	0	0	3	0	0	1	1	0	21	9	0.86	0
2003	15	13	0	66.7	33	26	0	0	0	0	0	0	0	0	0	0	1	1	25	7	0.56	0
TOTAL	162	74	29	45.7	353	144	68	61	17	4	2	0	7	1	1	20	3	4	275	60	0.50	50
Missouri below Garrison																						
1986#	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	147	0	0.00	0
1987*	18	12	0	66.7	0**	0**	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	166	30	0.36	0
1988	42	26	0	61.9	114	71	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	142	66	0.93	0
1989	52	29	0	55.8	105	59	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	121	26	0.43	0
1990	39	26	0	66.7	89	58	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	174	38	0.44	0
1991	73	37	0	50.7	170	89	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	195	57	0.58	0
1992	59	37	0	62.7	145	81	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	198	48	0.48	0
1993	66	23	0	34.8	120	45	0	0	14	4	0	0	6	0	10	8	1	0	145	20	0.28	0
1994	132	60	0	45.5	270	131	0	0	1	3	1	3	10	0	15	36	3	0	217	59	0.54	0
1995	159	72	15	45.3	403	193	28	16	5	4	0	0	6	0	19	38	0	0	284	129	0.91	13
1996	88	8	30	9.1	155	14	57	53	9	0	1	0	32	0	0	6	2	0	105	4	0.08	51
1997	26	14	7	53.8	53	27	14	10	0	0	3	1	0	1	0	0	0	0	41	8	0.39	9
1998	73	57	0	78.1	181	140	0	0	0	0	0	0	0	0	0	11	2	0	141	107	1.52	0
1999	59	51	0	86.4	150	126	0	0	0	1	0	0	0	0	0	4	3	0	105	79	1.50	0
2000	57	49	0	86.0	153	128	0	0	0	1	1	0	1	0	0	5	0	0	105	54	1.03	0
2001	55	48	0	87.3	144	122	0	0	1	0	0	0	5	0	0	0	1	0	125	79	1.26	0
2002	77	64	0	83.1	186	161	0	0	0	0	0	0	2	0	7	1	2	1	126	115	1.83	0
2003	92	63	0	68.5	216	143	0	0	2	5	0	0	0	0	11	9	2	0	144	92	1.28	0
TOTAL	1167	676	52	57.9	2656	1588	99	79	32	21	4	3	66	0	62	118	16	1	2681	1011	0.80	73

REACH	NESTS	NEST HAT.	NEST COLL.	NEST SUCC.	EGGS	EGGS HAT.	EGGS COLL.	COLL. HAT.	FLOOD	FATE DESTROYED PRED.	H. DIST.	BANK E.	WTHR.	LIVESTOCK	DES. UNKN.	FATE UNKN.	ABAN.	NON VIABLE	ADULT CENSUS	CHICKS FLEDGE	FLEDGE RATIO	COLL. CH. RELEASED
Lake Oshe																						
1986	15	0	0	0.0	26	8	0	0	0	0	0	0	0	0	0	0	0	0	38	6	0.75	0
1987	15	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	30	17	1.62	0
1988	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	0	0.00	0
1989	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	0	0.00	0
1990	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	100	0	0.00	0
1991	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	143	0	0.00	0
1992*	39	0**	0	0.0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	124	26	0.42	0
1993*	81	8	0	9.9	148	10	0	0	59	1	0	0	6	0	5	2	0	0	125	0	0.00	0
1994	71	14	0	19.7	173	32	0	0	0	4	0	0	7	5	2	35	4	0	160	5	0.06	0
1995	35	13	0	37.1	78	27	0	0	0	7	0	0	2	0	1	5	7	0	84	0	0.00	0
1996	43	10	0	23.3	93	22	0	0	0	0	0	0	8	0	0	20	5	0	74	9	0.24	0
1997	83	35	0	42.2	193	82	0	0	4	1	0	0	13	1	2	18	5	4	101	8	0.16	0
1998	48	40	0	83.3	126	102	0	0	1	0	1	0	0	0	0	4	1	1	110	71	1.29	0
1999	49	23	0	46.9	127	58	0	0	6	0	0	0	9	1	2	8	0	0	57	25	0.88	0
2000	49	34	0	69.4	122	86	0	0	0	4	0	0	0	0	2	7	2	0	85	43	1.01	0
2001	66	42	0	63.6	155	104	0	0	5	3	0	0	4	2	1	7	2	0	94	63	1.34	0
2002	58	42	0	72.4	146	108	0	0	0	2	0	0	2	0	6	2	4	0	106	70	1.32	0
2003	51	35	0	68.6	116	78	0	0	0	2	0	0	1	1	4	5	1	2	70	42	1.20	0
TOTAL	703	296	0	46.7	1503	717	0	0	75	24	1	0	52	10	25	113	31	7	1680	385	0.63	0
Missouri below Ft. Randall																						
1986	4	0	0	0.0	8	0	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	11	0	0.00	0
1987	28	0**	0	0.0	59	13	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	32	6	0.38	0
1988	3	0	0	0.0	4	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0.00	0
1989	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0.00	0
1990*	14	8	0	57.1	31	15	0	0	4	0	0	0	0	0	0	1	1	0	26	4	0.31	0
1991	20	8	0	40.0	40	16	0	0	5	0	1	0	0	0	4	1	1	0	32	10	0.63	0
1992	10	9	0	90.0	20	18	0	0	0	0	0	0	0	0	0	1	0	0	13	3	0.46	0
1993	15	6	0	40.0	32	13	0	0	0	0	0	0	1	0	0	8	0	0	38	0	0.00	0
1994	27	15	0	55.6	63	37	0	0	4	0	1	0	5	0	0	2	0	0	43	0	0.00	0
1995	26	0	11	0.0	32	0	17	10	11	4	0	0	0	0	0	0	0	0	10	0	0.00	0
1996	1	0	0	0.0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0.00	0
1997	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.00	0
1998	33	31	0	93.9	83	76	0	0	0	0	0	0	0	0	0	1	1	0	64	30	0.94	0
1999	79	61	0	77.2	204	148	0	0	1	1	2	0	8	0	1	3	2	0	124	64	1.03	0
2000	72	52	0	72.2	176	132	0	0	0	1	1	0	4	0	5	3	3	3	106	67	1.26	0
2001	58	30	0	51.7	143	80	0	0	2	1	0	0	5	0	12	5	3	0	71	5	0.14	0
2002	71	25	6	35.2	161	63	12	12	11	14	0	0	3	0	1	8	0	3	84	30	0.71	10
2003	39	30	0	76.9	102	82	0	0	3	1	0	0	2	0	1	1	0	1	50	23	0.92	0
TOTAL	500	275	17	58.3	1165	693	29	22	45	22	5	0	28	0	24	34	11	7	710	242	0.68	10
Lewis & Clark Lake																						
1986	19	0**	0	0.0	60	11	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	14	6	0.86	0
1987	40	0**	0	0.0	82	16	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	28	7	0.50	0
1988	17	2	0	11.8	38	4	0	0	6	0	0	0	0	0	0	7	0	0	45	3	0.13	0
1989	30	11	0	36.7	73	22	0	0	12	1	0	0	0	0	0	5	1	0	29	9	0.62	0
1990*	56	9	0	16.1	131	23	0	0	6	18	3	1	1	0	2	14	3	0	63	11	0.35	0
1991	27	0	0	0.0	50	0	0	0	14	3	0	0	0	0	7	2	1	0	55	0	0.00	0
1992	23	11	0	47.8	45	25	0	0	0	2	0	0	0	0	7	1	2	0	29	23	1.59	0
1993	54	20	0	37.0	107	42	0	0	9	13	0	0	0	0	10	2	0	0	76	37	0.97	0
1994	21	0	0	0.0	32	0	0	0	11	10	0	0	0	0	0	0	0	0	44	0	0.00	0
1995	17	0	12	0.0	31	0	23	14	3	0	0	0	0	0	0	2	0	0	16	0	0.00	6
1996	7	0	7	0.0	16	0	16	13	0	0	0	0	0	0	0	0	0	0	28	0	0.00	13
1997	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0.00	0
1998	72	60	0	83.3	176	145	0	0	0	0	0	0	0	0	0	7	5	0	118	140	2.37	0
1999	64	17	0	26.6	150	45	0	0	8	11	1	0	5	0	9	11	2	0	76	8	0.21	0
2000	36	11	0	30.6	93	32	0	0	0	5	0	0	0	0	12	6	2	0	10	3	0.60	0
2001	30	15	9	50.0	75	40	22	22	3	0	0	0	0	0	0	2	0	1	46	34	1.48	20
2002	37	13	0	35.1	87	35	0	0	2	2	1	0	5	0	0	10	3	1	42	24	1.14	0
2003	41	13	0	31.7	101	32	0	0	8	0	0	0	14	0	0	1	3	2	46	9	0.39	0
TOTAL	591	182	28	34.2	1347	472	61	49	84	65	5	1	25	0	47	70	22	4	771	314	0.81	39

REACH	NESTS	NEST HAT.	NEST COLL.	NEST SUCC.	EGGS	EGGS HAT.	EGGS COLL.	COLL. HAT.	FLOOD	FATE DESTROYED PRED.	H. DIST.	BANK E.	WTHR.	LIVESTOCK	DES. UNKN.	FATE UNKN.	ABAN.	NON VIABLE	ADULT CENSUS	CHICKS FLEDGE	FLEDGE RATIO	COLL. CH. RELEASED
Missouri below Gavins Point																						
1986	173	0**	0	0.0	414	47	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	181	14	0.15	0
1987	189	0**	0	0.0	441	153	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	232	80	0.69	0
1988	248	81	0	32.7	577	202	0	0	0	30	3	3	7	0	51	52	21	0	252	62	0.49	0
1989	181	91	0	50.3	457	234	0	0	2	42	1	4	7	0	19	15	0	0	210	58	0.55	0
1990	134	71	0	53.0	327	179	0	0	2	15	1	0	0	0	12	26	7	0	167	38	0.46	0
1991	192	66	0	34.4	430	165	0	0	5	21	1	1	0	0	44	35	19	0	193	25	0.26	0
1992	130	45	0	34.6	269	106	0	0	0	53	0	2	3	0	7	8	12	0	187	20	0.21	0
1993	183	85	0	46.4	435	216	0	0	30	1	0	0	4	0	18	39	6	0	272	113	0.83	0
1994	218	75	0	34.4	513	179	0	0	13	69	0	5	11	0	14	21	10	0	211	51	0.48	0
1995	118	26	42	22.0	253	55	92	72	6	31	1	1	0	0	0	10	1	0	93	23	0.49	50
1996	96	6	56	6.3	179	9	108	95	0	2	0	0	0	0	12	16	4	0	82	11	0.27	91
1997	106	49	0	46.2	266	132	0	0	9	7	0	4	2	0	17	7	10	1	115	52	0.90	0
1998	83	70	0	84.3	214	178	0	0	0	0	0	0	0	0	0	8	5	0	144	168	2.33	0
1999	113	85	0	75.2	293	227	0	0	2	1	0	0	5	0	13	6	1	1	161	194	2.41	0
2000	149	123	0	82.6	388	318	0	0	0	3	1	0	0	0	8	6	7	1	206	176	1.71	0
2001	116	104	0	89.7	309	269	0	0	0	0	0	0	0	0	1	5	3	3	232	127	1.09	0
2002	216	157	0	72.7	538	409	0	0	2	25	0	0	4	0	7	5	14	2	314	207	1.32	0
2003	247	178	0	72.1	635	460	0	0	17	17	1	0	7	0	8	8	10	1	366	138	0.75	0
TOTAL	2892	1312	98	51.9	6938	3538	200	167	88	317	9	20	50	0	218	274	135	9	3618	1557	0.86	141
GR. TOTAL	6334	2970	224	51.1	14515	7453	457	378	353	460	26	29	245	11	387	667	229	33	10807	3879	0.77	313
# = Census only & = Fledge data for Lake Oahe/SD only * = Subsample results ** = Data not available																						
1986*	211	0**	0	0.0	508	66	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	391	26	0.23	0
1987*	291	12	0	63.2	582	182	0	0	0**	0**	0**	0**	0**	0**	0**	0**	0**	0**	492	140	0.58	0
1988**	311	110	0	35.4	738	277	0	0	11	30	3	3	7	0	51	59	21	0	549	134	0.59	0
1989**	289	143	0	49.5	635	315	0	0	14	43	1	4	7	0	19	20	1	0	528	99	0.54	0
1990**	271	119	0	43.9	578	275	0	0	12	33	4	1	1	0	14	41	11	0	634	99	0.38	0
1991**	332	119	0	35.8	690	270	0	0	24	24	2	1	0	0	55	38	21	0	702	112	0.41	0
1992	279	114	0	47.5	521	259	0	0	0	55	0	2	3	0	14	10	14	0	690	146	0.42	0
1993	426	152	0	35.7	901	348	0	0	119	21	0	0	18	0	48	61	7	0	711	178	0.50	0
1994	518	184	0	35.5	1152	420	0	0	30	87	3	8	34	6	34	110	22	0	777	158	0.41	0
1995	393	131	80	33.3	884	326	160	112	33	48	1	1	15	0	20	55	9	0	591	199	0.67	69
1996	282	39	102	13.8	546	76	204	183	15	4	1	1	40	0	13	48	13	0	446	47	0.21	176
1997	246	115	12	46.7	580	279	24	19	13	11	2	4	18	1	20	27	16	7	427	111	0.52	16
1998	342	282	0	82.5	864	696	0	0	1	1	1	0	6	0	0	36	14	1	629	547	1.74	0
1999	399	246	15	61.7	1009	628	35	30	22	14	3	0	29	1	12	43	13	1	572	407	1.42	22
2000	376	273	0	72.6	957	699	0	0	2	15	3	1	5	0	27	30	15	4	559	347	1.24	0
2001	364	266	9	73.1	906	665	22	22	12	5	0	0	16	2	15	25	9	5	641	341	1.06	20
2002	499	323	6	64.7	1206	825	12	12	15	43	1	3	21	0	21	33	26	7	727	465	1.28	10
2003	505	342	0	67.7	1258	847	0	0	30	26	1	0	25	1	24	31	17	8	741	323	0.87	0
GR. TOTAL	6334	2970	224	51.1	14515	7453	457	378	353	460	26	29	245	11	387	667	229	33	10807	3879	0.77	313

*Fledge ratio for South Dakota only
 **Lake Sakakawea and Lake Oahe census only

APPENDIX H

Historical Record

Historical_Record

Nest_ID	Species	Year	Reach	River_Mile	Site_Name	Eggs	Cause	A18	Date1	Date2	Comments	Operations	Op_Comments
002005	plover	2000	Peck	1687.3		4	flooded - eggs washed out	N	7/3/2000	7/12/2000	high water ev	U	
002006	tern	2000	Peck	1687.4		2	flooded - eggs washed out	N	7/3/2000	7/12/2000	high water ev	U	
003214	tern	2000	Sakakawea	1451	Van Hook Arm	2	flooded - eggs washed out	N	6/8/2000	6/14/2000	nest destroye	O	Rising pool
003225	plover	2000	Sakakawea	1451	Van Hook Arm	4	collected	Y	6/14/2000		collected due	C	
003260	plover	2000	Sakakawea	1451	Van Hook Arm	4	flooded - eggs washed out	Y	7/4/2000	7/10/2000	nest destroye	O	Likely wind-wave - steady/rising pool
004250	plover	2000	Garrison	1339.3		4	unknown	Y	7/12/2000	7/19/2000		U	
004258	plover	2000	Garrison	1333.6		3	unknown	Y	7/12/2000	7/19/2000		U	
006009	plover	2000	Oahe	1111.5	Little Bend	3	unknown	Y	6/3/2000	6/12/2000	eggs gone - r	U	
006023	tern	2000	Oahe	1096.1	Okobojo Island	3	unknown	Y	6/13/2000	6/23/2000	found many s	U	
006027	plover	2000	Oahe	1111.5	Little Bend	4	unknown	Y	6/29/2000	7/7/2000	bowt still ther	U	
006101	plover	2000	Oahe	1230.5	Kenel	4	unknown	Y	6/1/2000	6/8/2000	no eggs in bo	U	
006110	plover	2000	Oahe	1231.2	Demery Island	4	unknown	Y	6/22/2000	6/29/2000	no eggs in bo	U	
006211	plover	2000	Oahe	1295.5	Graners	4	unknown	Y	6/2/2000	6/12/2000	nest filled witi	U	
006212	plover	2000	Oahe	1295.5	Graners	4	unknown	Y	6/2/2000	6/12/2000		U	
006213	plover	2000	Oahe	1294	Tombolo	4	unknown	Y	6/3/2000	6/12/2000		U	
006214	plover	2000	Oahe	1294	Tombolo	3	unknown	Y	6/3/2000	6/12/2000		U	
006230	plover	2000	Oahe	1294.1	Little Joe Flats	3	unknown	Y	6/12/2000	6/23/2000		U	
006245	tern	2000	Oahe	1275	Fort Rice	2	unknown	Y	6/28/2000	7/5/2000		U	
007009	plover	2000	Randall	866.7		4	unknown	Y	6/9/2000	6/17/2000		U	
007015	tern	2000	Randall	866.6		2	unknown	Y	5/31/2000	6/9/2000		U	
007022	plover	2000	Randall	866.7		2	unknown	Y	6/9/2000	6/17/2000		U	
007024	tern	2000	Randall	866.7		3	unknown	Y	6/17/2000	6/26/2000		U	
007028	plover	2000	Randall	866.7		2	unknown	Y	6/9/2000	6/17/2000		U	
007032	plover	2000	Randall	866.6		1	unknown	Y	6/9/2000	6/17/2000		U	
007036	plover	2000	Randall	852		2	unknown	Y	6/17/2000	6/29/2000		U	
007046	plover	2000	Randall	866.7		4	unknown	Y	6/17/2000	6/26/2000		U	
007069	plover	2000	Randall	851.5		4	unknown	Y	6/17/2000	6/27/2000		U	
007095	plover	2000	Randall	866.7		3	unknown	Y	7/16/2000	7/24/2000		U	
007098	plover	2000	Randall	851.5		4	unknown	Y	7/8/2000	7/16/2000		U	
007099	tern	2000	Randall	851.5		2	unknown	Y	7/8/2000	7/16/2000		U	
007103	tern	2000	Randall	866.6		1	unknown	Y	7/8/2000	7/16/2000		U	
007104	tern	2000	Randall	866.6		2	unknown	Y	7/8/2000	7/16/2000		U	
007105	plover	2000	Randall	866.6		1	unknown	Y	7/8/2000	7/16/2000		U	
008007	plover	2000	Lewis & Clark	842		4	unknown	N	6/12/2000	6/22/2000		U	
008008	tern	2000	Lewis & Clark	842		1	unknown	N	6/2/2000	6/12/2000		U	
008009	plover	2000	Lewis & Clark	842		1	unknown	N	6/2/2000	6/12/2000		U	
008010	tern	2000	Lewis & Clark	842		1	unknown	N	6/2/2000	6/12/2000		U	
008014	tern	2000	Lewis & Clark	842		2	unknown	N	6/2/2000	6/12/2000		U	
008021	plover	2000	Lewis & Clark	842		4	unknown	N	6/12/2000	6/22/2000		U	
008023	tern	2000	Lewis & Clark	842		3	unknown	Y	6/12/2000	6/22/2000		U	
008025	tern	2000	Lewis & Clark	842		3	unknown	N	6/12/2000	6/22/2000		U	
008034	tern	2000	Lewis & Clark	842		1	unknown	N	6/12/2000	6/22/2000		U	
008042	tern	2000	Lewis & Clark	842		2	unknown	N	6/22/2000	7/3/2000		U	
008043	tern	2000	Lewis & Clark	842		2	unknown	N	6/22/2000	7/3/2000		U	
008045	tern	2000	Lewis & Clark	842		2	unknown	N	6/22/2000	7/3/2000		U	
008049	tern	2000	Lewis & Clark	842		3	unknown	N	6/22/2000	7/3/2000		U	
008050	tern	2000	Lewis & Clark	842		3	unknown	N	6/22/2000	7/3/2000		U	
008055	tern	2000	Lewis & Clark	842		1	unknown	N	7/17/2000	7/25/2000		U	
009009	plover	2000	Gavins	781.5		2	unknown	Y	5/12/2000	5/24/2000		U	
009030	plover	2000	Gavins	797		4	unknown	Y	5/22/2000	5/31/2000		U	
009031	plover	2000	Gavins	799		2	unknown	Y	5/22/2000	5/30/2000		U	
009033	plover	2000	Gavins	799		4	unknown	N	5/22/2000	5/30/2000		U	
009057	plover	2000	Gavins	770		4	unknown	N	5/25/2000	6/5/2000		U	
009058	plover	2000	Gavins	770		2	unknown	Y	5/25/2000	6/5/2000		U	
009059	plover	2000	Gavins	770		4	unknown	Y	5/25/2000	6/5/2000		U	
009060	plover	2000	Gavins	770		4	unknown	Y	5/25/2000	6/5/2000		U	
009063	plover	2000	Gavins	801.5		4	unknown	Y	6/8/2000	6/15/2000		U	
009064	plover	2000	Gavins	801.5		1	unknown	Y	5/30/2000	6/8/2000		U	
009067	tern	2000	Gavins	799		3	unknown	Y	6/8/2000	6/17/2000		U	
009068	tern	2000	Gavins	799		3	unknown	N	6/8/2000	6/15/2000		U	
009146	tern	2000	Gavins	799		3	unknown	Y	6/15/2000	6/23/2000		U	
009151	plover	2000	Gavins	799		4	unknown	N	6/15/2000	6/23/2000		U	
009153	tern	2000	Gavins	799		3	unknown	N	6/8/2000	6/15/2000		U	
009154	tern	2000	Gavins	799		3	unknown	N	6/15/2000	6/23/2000		U	
009155	plover	2000	Gavins	799		4	unknown	N	6/15/2000	6/23/2000		U	
009195	plover	2000	Gavins	770		4	unknown	N	6/20/2000	6/26/2000		U	
009200	tern	2000	Gavins	777.5		3	unknown	Y	6/27/2000	7/6/2000		U	
009211	tern	2000	Gavins	796		1	unknown	Y	6/23/2000	6/29/2000		U	
009222	plover	2000	Gavins	777.5		2	unknown	Y	6/27/2000	7/6/2000		U	
009223	plover	2000	Gavins	777.5		4	unknown	Y	6/27/2000	7/6/2000		U	
009246	tern	2000	Gavins	790		1	unknown	Y	7/13/2000	7/19/2000		U	
009251	plover	2000	Gavins	801.5		1	unknown	N	6/20/2000	6/28/2000		U	
009264	plover	2000	Gavins	777.5		4	unknown	N	7/19/2000	7/26/2000		U	

H-1

Historical_Record

012001	tern	2001	Peck	1881	2	flooded - eggs washed out	Y	6/14/2001	6/20/2001	NO	Rainfall - see WPMT gage.	
012007	tern	2001	Peck	1587.5	3	unknown	Y	7/2/2001	7/12/2001	U		
013034	plover	2001	Sakakawea	1392.5	3	unknown	Y	6/21/2001	7/2/2001	U		
013209	plover	2001	Sakakawea	1451	2	unknown	Y	6/7/2001	6/15/2001	U		
013237	plover	2001	Sakakawea	1505	4	flooded - debris	N	6/23/2001	7/14/2001	nest under w	O	Rising pool
013273	plover	2001	Sakakawea	1505	1	unknown	Y	7/13/2001	7/19/2001	U		
014049	plover	2001	Garrison	1356	4	unknown	Y	6/26/2001	7/3/2001	U		
014265	plover	2001	Garrison	1348	4	unknown	Y	7/3/2001	7/10/2001	U		
014269	tern	2001	Garrison	1308	3	flooded - nest filled	Y	7/20/2001	7/27/2001	NO	Rainfall-see BIS, Heart River at Mandan	
016002	plover	2001	Oahe	1110	4	unknown	Y	5/12/2001	5/19/2001	U		
016025	tern	2001	Oahe	1110.5	3	flooded - nest filled	Y	6/12/2001	6/18/2001	wave action f	O	Wind-wave with steady/slightly rising pool
016026	tern	2001	Oahe	1110.5	1	flooded - nest filled	Y	6/12/2001	6/18/2001	O	Wind-wave with steady/slightly rising pool	
016027	tern	2001	Oahe	1110.5	1	flooded - nest filled	Y	6/12/2001	6/18/2001	wave action f	O	Wind-wave with steady/slightly rising pool
016049	tern	2001	Oahe	1123	3	flooded - nest filled	Y	6/27/2001	7/5/2001	O	Wind-wave with steady/slightly rising pool	
016059	tern	2001	Oahe	1110.5	2	flooded - nest filled	Y	7/16/2001	7/23/2001	nest destroye	O	Wind-wave with steady/slightly rising pool
016105	plover	2001	Oahe	1189.6	4	flooded - nest filled	N	5/14/2001	5/16/2001	nest flooded	O	Rising pool Rising pool
016107	plover	2001	Oahe	1189.6	4	collected	N	5/17/2001		C		
016108	plover	2001	Oahe	1189.6	4	collected	N	5/17/2001		C		
016109	plover	2001	Oahe	1189.6	2	flooded - nest filled	N	5/14/2001	5/17/2001	nest flooded	O	Rising pool
016110	plover	2001	Oahe	1189.6	1	collected	N	5/17/2001		C		
016111	plover	2001	Oahe	1189.6	2	collected	N	5/17/2001		C		
016116	plover	2001	Oahe	1231.2	4	collected	N	5/24/2001		C		
016119	plover	2001	Oahe	1189.6	2	collected	N	5/24/2001		C		
016120	plover	2001	Oahe	1189.6	2	collected	N	5/24/2001		C		
016124	plover	2001	Oahe	1230.5	4	collected	N	6/1/2001		C		
016125	plover	2001	Oahe	1230.5	4	collected	N	5/28/2001		C		
016127	plover	2001	Oahe	1189.6	3	collected	N	5/31/2001		C		
016128	plover	2001	Oahe	1189.6	4	collected	N	5/31/2001		C		
016214	plover	2001	Oahe	1248.9	3	collected	N	6/1/2001		C		
016215	plover	2001	Oahe	1248.9	4	collected	N	6/1/2001		C		
016232	plover	2001	Oahe	1248.9	1	unknown	Y	6/7/2001	6/15/2001	U		
016246	plover	2001	Oahe	1293	4	unknown	Y	6/29/2001	7/6/2001	U		
016260	tern	2001	Oahe	1284	3	unknown	Y	6/29/2001	7/6/2001	U		
017002	plover	2001	Randall	866.7	2	unknown	Y	5/31/2001	6/7/2001	U		
017006	tern	2001	Randall	851.7	2	unknown	Y	6/13/2001	6/19/2001	U		
017007	plover	2001	Randall	854	2	unknown	Y	5/31/2001	6/13/2001	U		
017008	tern	2001	Randall	854	1	unknown	Y	5/31/2001	6/13/2001	U		
017023	tern	2001	Randall	848	3	unknown	Y	6/19/2001	6/27/2001	U		
017024	plover	2001	Randall	848	4	flooded - other	Y	6/27/2001	7/2/2001	O	Increase in FTRA peak release	
017027	tern	2001	Randall	848	3	unknown	Y	6/19/2001	6/27/2001	U		
017028	tern	2001	Randall	848	1	unknown	Y	6/27/2001	7/2/2001	U		
017029	plover	2001	Randall	851.6	3	flooded - eggs washed out	Y	6/27/2001	7/2/2001	O		
017037	plover	2001	Randall	851.7	4	flooded - other	Y	6/27/2001	7/2/2001	O	Increase in FTRA peak release	
017043	tern	2001	Randall	869	3	unknown	Y	6/28/2001	7/3/2001	U		
017050	tern	2001	Randall	848	3	unknown	Y	6/19/2001	6/27/2001	U		
017052	plover	2001	Randall	851.6	4	flooded - other	Y	6/27/2001	7/2/2001	O	Increase in FTRA peak release	
017053	tern	2001	Randall	851.6	2	flooded	Y	6/27/2001	7/2/2001	O	Increase in FR daily avg	
017060	tern	2001	Randall	851.7	3	flooded - eggs washed out	N	7/16/2001	7/23/2001	O	Increase in FTRA peak release	
017068	tern	2001	Randall	851.6	2	unknown	Y	7/9/2001	7/16/2001	U		
017070	plover	2001	Randall	851.7	2	flooded - nest filled	Y	7/16/2001	7/23/2001	O	Increase in FTRA peak release	
017071	plover	2001	Randall	851.6	3	unknown	Y	7/9/2001	7/16/2001	U		
017072	tern	2001	Randall	851.6	2	unknown	Y	7/9/2001	7/16/2001	U		
017074	tern	2001	Randall	851.6	3	unknown	N	7/9/2001	7/16/2001	U		
017077	tern	2001	Randall	869.5	2	unknown	Y	7/10/2001	7/17/2001	U		
017079	tern	2001	Randall	848	2	unknown	Y	7/16/2001	7/23/2001	U		
018003	tern	2001	Lewis & Clark	841.5	2	collected	N	6/29/2001		C		
018004	tern	2001	Lewis & Clark	841.5	3	collected	Y	6/29/2001		C		
018005	tern	2001	Lewis & Clark	841.5	2	collected	N	6/29/2001		C		
018006	tern	2001	Lewis & Clark	841.5	3	collected	N	6/29/2001		C		
018007	plover	2001	Lewis & Clark	841.5	4	collected	N	6/29/2001		C		
018008	plover	2001	Lewis & Clark	841.5	4	collected	N	6/29/2001		C		
018009	tern	2001	Lewis & Clark	841.5	3	collected	Y	6/29/2001		C		
018011	tern	2001	Lewis & Clark	841.5	3	collected	Y	6/29/2001		C		
018013	tern	2001	Lewis & Clark	841.5	2	collected	Y	6/29/2001		C		
018014	tern	2001	Lewis & Clark	842.2	2	collected	N	6/29/2001		C		
018015	tern	2001	Lewis & Clark	842.2	3	collected	N	6/29/2001		C		
018016	plover	2001	Lewis & Clark	841.5	4	collected	N	6/29/2001		C		
018017	tern	2001	Lewis & Clark	842.2	1	flooded - eggs washed out	N	6/27/2001	6/29/2001	10 inches no	O	Increase in FTRA peak release
018018	tern	2001	Lewis & Clark	842.2	2	flooded - eggs washed out	N	6/27/2001	6/29/2001	10 inches no	O	Increase in FTRA peak release
018019	plover	2001	Lewis & Clark	842.2	2	flooded - eggs washed out	N	6/27/2001	6/29/2001	10 inches no	O	Increase in FTRA peak release
018020	tern	2001	Lewis & Clark	842.2	2	flooded - eggs washed out	N	6/27/2001	6/29/2001	O	Increase in FTRA peak release	
018027	plover	2001	Lewis & Clark	841.5	3	flooded - eggs washed out	N	7/19/2001	7/20/2001	less than 4 in	NO	Rainfall-4000 cfs increase on Niobrara
019003	plover	2001	Gavins	777.7	3	unknown	Y	5/16/2001	5/25/2001	U		
019012	plover	2001	Gavins	795.3	1	unknown	Y	5/17/2001	5/29/2001	U		

H-2

Historical_Record

019013	plover	2001	Gavins	795.3	2	unknown	Y	5/17/2001	5/29/2001	U	
019017	plover	2001	Gavins	756.7	4	unknown	Y	5/31/2001	6/8/2001	U	
019027	plover	2001	Gavins	768	4	unknown	Y	5/31/2001	6/15/2001	U	
019028	plover	2001	Gavins	767.5	4	unknown	Y	5/18/2001	5/31/2001	U	
019210	tern	2001	Gavins	777.7	2	unknown	Y	7/2/2001	7/9/2001	U	
023005	plover	2002	Sakakawea	1392.5	4	flooded - other	Y	6/5/2002	6/12/2002	O	Pool rose all month
023012	plover	2002	Sakakawea	1400	1	flooded - other	Y	6/3/2002	6/11/2002	O	Pool rose all month
023052	plover	2002	Sakakawea	1443.5	4	unknown	Y	6/7/2002	6/17/2002	U	egg shell piec U
023082	plover	2002	Sakakawea	1444	4	flooded - other	N	6/24/2002	7/1/2002	O	nest located O
023141	plover	2002	Sakakawea	1441.5	2	flooded - other	Y	6/26/2002	7/1/2002	O	Pool rose all month
023203	plover	2002	Sakakawea	1482.5	4	flooded - other	N	6/27/2002	7/3/2002	O	rise in lake de O
023226	plover	2002	Sakakawea	1451	2	unknown	Y	6/13/2002	6/24/2002	U	
023227	plover	2002	Sakakawea	1505	4	flooded - other	N	6/28/2002	7/5/2002	O	below 12 inct O
023238	plover	2002	Sakakawea	1451	4	unknown	Y	7/2/2002	7/9/2002	U	
024001	plover	2002	Garrison	1377.3	4	unknown	Y	5/29/2002	6/5/2002	U	could not find U
024002	plover	2002	Garrison	1376	4	flooded - other	Y	5/29/2002	6/5/2002	O	eggs missing NO
024003	plover	2002	Garrison	1356	2	flooded - other	Y	5/31/2002	6/5/2002	O	eggs gone, rx NO
024006	plover	2002	Garrison	1361	4	unknown	Y	5/31/2002	6/5/2002	U	
024011	plover	2002	Garrison	1361	4	flooded - eggs washed out	Y	6/5/2002	6/15/2002	NO	
024013	plover	2002	Garrison	1367.5	4	flooded - nest filled	Y	6/5/2002	6/14/2002	NO	Knife River
024018	plover	2002	Garrison	1367.5	3	flooded - nest filled	Y	6/5/2002	6/14/2002	NO	Knife River
024030	tern	2002	Garrison	1364	3	unknown	Y	6/14/2002	6/20/2002	U	
024032	tern	2002	Garrison	1364	2	unknown	Y	6/14/2002	6/20/2002	U	
024045	tern	2002	Garrison	1367.5	3	unknown	Y	6/28/2002	7/5/2002	U	
024201	plover	2002	Garrison	1319.5	3	unknown	Y	5/24/2002	5/31/2002	O	
024202	plover	2002	Garrison	1308	2	flooded - other	Y	5/24/2002	5/31/2002	O	
024203	plover	2002	Garrison	1308	4	flooded - other	Y	5/24/2002	5/31/2002	O	
024205	plover	2002	Garrison	1301.5	1	unknown	N	5/31/2002	6/6/2002	O	nest is not ab U
024228	tern	2002	Garrison	1301.5	2	unknown	Y	6/11/2002	6/19/2002	U	
024231	tern	2002	Garrison	1348	1	unknown	Y	6/10/2002	6/17/2002	U	
024232	tern	2002	Garrison	1348	1	unknown	Y	6/10/2002	6/17/2002	U	
024240	plover	2002	Garrison	1319.5	2	unknown	Y	6/10/2002	6/18/2002	U	
024246	tern	2002	Garrison	1308	1	unknown	Y	6/11/2002	6/19/2002	U	
024267	plover	2002	Garrison	1302.5	4	unknown	Y	7/2/2002	7/9/2002	U	
026014	plover	2002	Oahe	1091	4	unknown	Y	5/30/2002	6/6/2002	U	all 4 eggs gor U
026016	plover	2002	Oahe	1090.5	4	unknown	Y	6/3/2002	6/10/2002	U	no eggs in ca U
026022	tern	2002	Oahe	1102.5	3	unknown	Y	6/11/2002	6/17/2002	U	
026070	tern	2002	Oahe	1110.5	3	unknown	Y	7/5/2002	7/16/2002	U	no eggs, no a U
026131	plover	2002	Oahe	1197	2	flooded - eggs washed out	Y	7/23/2002	7/31/2002	NO	Reservoir elevation dropped
026204	plover	2002	Oahe	1291.7	4	flooded - debris	Y	5/28/2002	6/6/2002	NO	
026206	plover	2002	Oahe	1270	4	unknown	Y	5/29/2002	6/5/2002	NO	
026218	tern	2002	Oahe	1248.9	3	unknown	Y	6/13/2002	6/21/2002	U	
026227	tern	2002	Oahe	1282	2	unknown	Y	6/20/2002	6/26/2002	U	
026228	tern	2002	Oahe	1270	1	unknown	Y	6/20/2002	6/26/2002	U	
026229	tern	2002	Oahe	1270	2	unknown	Y	6/20/2002	6/26/2002	U	
027001	plover	2002	Randall	869	4	flooded - other	Y	5/29/2002	6/4/2002	O	nest washed O
027003	plover	2002	Randall	866.6	3	unknown	N	5/24/2002	5/29/2002	U	
027005	plover	2002	Randall	851.6	1	unknown	N	5/28/2002	6/3/2002	U	
027007	plover	2002	Randall	848.5	1	unknown	N	5/28/2002	6/3/2002	U	
027009	plover	2002	Randall	869	1	flooded - debris	Y	5/29/2002	6/4/2002	O	high water lin O
027014	tern	2002	Randall	848.5	1	unknown	N	6/24/2002	7/8/2002	U	suspect high U
027021	tern	2002	Randall	866.6	1	flooded - nest filled	Y	6/4/2002	6/12/2002	NO	Stage did not exceed that on the 4th.
027022	tern	2002	Randall	866.6	2	flooded - nest filled	N	6/4/2002	6/12/2002	NO	Stage did not exceed that on the 4th.
027023	plover	2002	Randall	866.6	1	flooded - nest filled	N	6/4/2002	6/12/2002	U	
027024	tern	2002	Randall	866.6	1	flooded - nest filled	N	6/4/2002	6/12/2002	NO	Stage did not exceed that on the 4th.
027025	plover	2002	Randall	866.6	2	unknown	Y	6/4/2002	6/12/2002	U	
027026	tern	2002	Randall	866.6	1	flooded - nest filled	Y	6/4/2002	6/12/2002	NO	Stage did not exceed that on the 4th.
027059	tern	2002	Randall	869	2	collected	N	7/1/2002		C	
027068	tern	2002	Randall	869	2	collected	N	7/1/2002		C	
027073	plover	2002	Randall	869	4	collected	N	7/1/2002		C	
027074	tern	2002	Randall	869	2	collected	N	7/1/2002		C	
027075	tern	2002	Randall	869	3	collected	N	7/1/2002		C	
027076	tern	2002	Randall	854	2	flooded - eggs washed out	Y	6/24/2002	7/1/2002	O	
027077	tern	2002	Randall	854	2	collected	N	7/1/2002		C	
027078	tern	2002	Randall	854	3	flooded - eggs washed out	Y	6/24/2002	7/1/2002	O	high discharg O
027079	tern	2002	Randall	854	3	flooded	N	6/24/2002	7/1/2002	O	Increase in FR daily avg
027080	tern	2002	Randall	851.6	3	flooded	N	6/24/2002	7/8/2002	O	Increase in FR daily avg
027081	plover	2002	Randall	851.6	4	flooded - other	N	6/24/2002	7/8/2002	O	
027082	plover	2002	Randall	851.6	2	flooded - other	N	6/24/2002	7/8/2002	O	collected O
027083	tern	2002	Randall	851.6	3	flooded	N	6/24/2002	7/8/2002	O	Increase in FR daily avg
027086	tern	2002	Randall	869	1	collected	N	7/1/2002		C	
027090	plover	2002	Randall	854	3	collected	N	7/1/2002		C	
027091	plover	2002	Randall	851.6	2	collected	N	7/1/2002		C	
027097	plover	2002	Randall	854.5	3	unknown	N	7/15/2002	7/22/2002	U	

H-3

Historical_Record

027098	tern	2002	Randall	854.6	3	flooded	N	6/24/2002	7/8/2002	O	Increase in FR daily avg
027102	plover	2002	Randall	854	1	flooded - eggs washed out	N	7/22/2002	7/29/2002	O	
027103	tern	2002	Randall	854	1	flooded	N	7/15/2002	7/22/2002	NO	Stages decreasing, Niobrara rain 7/10-11
028031	tern	2002	Lewis & Clark	837.2	2	flooded	N	6/13/2002	6/20/2002	NO	
028090	tern	2002	Lewis & Clark	827	2	flooded - eggs washed out	N	7/22/2002	7/30/2002	O	.2-.3 ft rise in pool
029001	plover	2002	Gavins	756.7	3	unknown	Y	6/3/2002	6/11/2002	U	
029019	plover	2002	Gavins	788.5	1	unknown	Y	5/24/2002	6/5/2002	U	
029088	plover	2002	Gavins	793.8	1	flooded - eggs washed out	N	6/5/2002	6/13/2002	NO	No change in release - .1 rise at GASD
029167	plover	2002	Gavins	756.7	4	unknown	Y	6/11/2002	6/19/2002	O	
029172	plover	2002	Gavins	756.8	4	flooded - other	N	6/11/2002	6/19/2002	U	Increase in GP release
029176	plover	2002	Gavins	759.2	4	unknown	N	6/11/2002	6/19/2002	U	
029180	tern	2002	Gavins	759.2	3	unknown	N	6/11/2002	6/19/2002	U	
029217	tern	2002	Gavins	801.3	3	unknown	Y	6/17/2002	6/24/2002	U	
029243	tern	2002	Gavins	770.5	2	unknown	N	6/18/2002	6/25/2002	U	
029247	plover	2002	Gavins	770.5	4	unknown	N	6/25/2002	7/2/2002	U	
029295	tern	2002	Gavins	770.5	3	flooded	N	6/25/2002	7/2/2002	O	Increase in GP release
029306	tern	2002	Gavins	793.6	3	unknown	Y	6/27/2002	7/5/2002	U	
029315	tern	2002	Gavins	801.3	3	unknown	Y	7/1/2002	7/11/2002	U	
029318	plover	2002	Gavins	759.2	3	unknown	N	7/2/2002	7/8/2002	U	
029320	plover	2002	Gavins	759.2	4	flooded - other	N	7/8/2002	7/15/2002	NO	No change in release
029336	tern	2002	Gavins	793.6	1	unknown	Y	7/5/2002	7/12/2002	U	
029345	tern	2002	Gavins	756.7	2	unknown	N	7/8/2002	7/15/2002	U	
029349	tern	2002	Gavins	759.2	1	flooded - eggs washed out	N	7/8/2002	7/15/2002	NO	No change in release
029351	plover	2002	Gavins	767	3	unknown	N	7/8/2002	7/15/2002	U	
029353	plover	2002	Gavins	770.5	3	unknown	N	7/8/2002	7/15/2002	U	
033021	plover	2003	Sakakawea	1382.5	4	flooded-other	Y	6/6/2003	7/1/2003	O	Rising pool
033055	plover	2003	Sakakawea	1394	4	unknown	N	6/30/2003	7/14/2003	U	
033057	plover	2003	Sakakawea	1394	4	flooded-other	Y	6/23/2003	7/2/2003	O	Rising pool
033066	plover	2003	Sakakawea	1394.5	4	unknown	Y	6/23/2003	7/7/2003	U	
033100	plover	2003	Sakakawea	1394	3	unknown	Y	6/30/2003	7/15/2003	U	
033131	plover	2003	Sakakawea	1382.5	4	flooded-flood debris	N	6/16/2003	7/1/2003	O	Rising pool
033248	plover	2003	Sakakawea	1451	4	unknown	Y	6/26/2003	7/3/2003	U	
034003	plover	2003	Garrison	1364	4	unknown	Y	5/22/2003	6/4/2003	U	
034017	tern	2003	Garrison	1364	2	flooded-nest filled	Y	6/27/2003	7/3/2003	NO	Rainfall
034035	plover	2003	Garrison	1364	4	flooded-nest filled	Y	6/18/2003	6/27/2003	NO	Possible wind/wave
034037	plover	2003	Garrison	1364	4	flooded-nest filled	Y	6/27/2003	7/3/2003	NO	
034038	plover	2003	Garrison	1364	3	flooded-nest filled	Y	6/27/2003	7/3/2003	NO	
034039	tern	2003	Garrison	1364	1	flooded-nest filled	Y	6/27/2003	7/3/2003	NO	Rainfall
034200	plover	2003	Garrison	1352.5	2	flooded-other	N	5/21/2003	5/29/2003	NO	nest was dest
034216	plover	2003	Garrison	1302.5	4	unknown	N	6/10/2003	6/17/2003	U	
034226	plover	2003	Garrison	1347.5	4	unknown	N	6/5/2003	6/12/2003	U	
034233	tern	2003	Garrison	1319.3	2	unknown	Y	6/6/2003	6/13/2003	U	
034235	tern	2003	Garrison	1319.3	3	unknown	Y	6/13/2003	6/24/2003	U	
034255	tern	2003	Garrison	1333.8	2	unknown	N	6/13/2003	6/24/2003	U	
034258	tern	2003	Garrison	1333.8	1	unknown	N	6/13/2003	6/24/2003	U	
034263	tern	2003	Garrison	1319.3	2	unknown	Y	6/13/2003	6/24/2003	U	
034269	tern	2003	Garrison	1312	2	unknown	Y	6/17/2003	6/28/2003	U	
034270	tern	2003	Garrison	1312	3	unknown	Y	6/26/2003	7/2/2003	U	
034287	tern	2003	Garrison	1333.8	1	unknown	Y	6/24/2003	7/1/2003	U	
034282	tern	2003	Garrison	1301.5	2	unknown	N	7/9/2003	7/15/2003	U	
034302	plover	2003	Garrison	1334	1	unknown	N	7/1/2003	7/8/2003	U	
034304	tern	2003	Garrison	1327	1	unknown	Y	7/1/2003	7/8/2003	U	
034308	tern	2003	Garrison	1319.3	3	unknown	Y	7/8/2003	7/15/2003	U	
036038	plover	2003	Oahe	1083	4	unknown	Y	6/9/2003	6/19/2003	U	
036039	plover	2003	Oahe	1083	4	unknown	Y	6/2/2003	6/9/2003	U	
036047	plover	2003	Oahe	1145	4	unknown	Y	6/10/2003	6/19/2003	U	
036070	tern	2003	Oahe	1150	3	unknown	Y	6/16/2003	6/26/2003	U	
036083	plover	2003	Oahe	1083	3	flooded-nest filled	N	6/19/2003	6/28/2003	NO	Wind
036090	plover	2003	Oahe	1110	4	unknown	Y	7/8/2003	7/17/2003	U	
036116	plover	2003	Oahe	1231.5	4	unknown	Y	5/28/2003	6/4/2003	U	
036130	plover	2003	Oahe	1231.5	4	unknown	Y	6/4/2003	6/11/2003	U	
036200	plover	2003	Oahe	1248.9	4	unknown	Y	5/22/2003	5/30/2003	U	
036201	plover	2003	Oahe	1248.9	4	unknown	Y	5/22/2003	5/30/2003	U	
036202	plover	2003	Oahe	1248.9	4	unknown	Y	5/22/2003	5/30/2003	U	
036203	plover	2003	Oahe	1248.9	4	unknown	Y	5/30/2003	6/7/2003	U	
036204	plover	2003	Oahe	1248.9	4	unknown	Y	6/7/2003	6/15/2003	U	
036207	plover	2003	Oahe	1292	2	unknown	Y	6/4/2003	6/10/2003	U	
036212	tern	2003	Oahe	1273	2	unknown	Y	6/16/2003	6/27/2003	U	
036217	plover	2003	Oahe	1291.7	4	unknown	Y	6/27/2003	7/2/2003	U	
036221	tern	2003	Oahe	1291.7	3	unknown	Y	7/2/2003	7/9/2003	U	
036222	plover	2003	Oahe	1291.7	4	unknown	Y	6/27/2003	7/2/2003	U	
036223	plover	2003	Oahe	1291.7	1	unknown	Y	6/27/2003	7/2/2003	U	
036226	tern	2003	Oahe	1291.7	2	unknown	Y	7/2/2003	7/9/2003	U	
037002	plover	2003	Randall	869.5	3	unknown	Y	5/22/2003	5/29/2003	U	

Historical_Record

037005	plover	2003	Randall	854.5	4	unknown	Y	5/23/2003	5/29/2003	U	
037006	plover	2003	Randall	869.5	1	unknown	Y	5/28/2003	6/4/2003	U	
037007	plover	2003	Randall	869.5	4	unknown	Y	5/28/2003	6/4/2003	U	
037008	plover	2003	Randall	855.5	1	flooded-flood debris	Y	5/29/2003	6/5/2003	O	Slight change in pattern & daily avg
037037	tern	2003	Randall	870	1	flooded-nest filled	Y	6/18/2003	6/26/2003	O	Slight change in pattern & daily avg
037044	tern	2003	Randall	869.5	2	unknown	Y	7/2/2003	7/8/2003	U	
037051	tern	2003	Randall	869.5	1	flooded-eggs washed out	Y	7/2/2003	7/8/2003	NO	Rainfall
037052	tern	2003	Randall	869.5	2	flooded-nest filled	N	7/2/2003	7/8/2003	NO	Rainfall
038002	tern	2003	Lewis & Clark	842.5	3	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038024	plover	2003	Lewis & Clark	842.7	5	flooded-flood debris	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038028	tern	2003	Lewis & Clark	842.7	3	flooded-nest filled	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038029	tern	2003	Lewis & Clark	842.7	1	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038033	tern	2003	Lewis & Clark	842.5	1	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038035	tern	2003	Lewis & Clark	842.5	1	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038036	tern	2003	Lewis & Clark	842.5	1	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038038	tern	2003	Lewis & Clark	842.5	3	flooded-eggs washed out	N	6/23/2003	7/1/2003	NO	Rainfall - increase on Niobrara
038041	tern	2003	Lewis & Clark	842.7	1	flooded-eggs washed out	N	7/1/2003	7/7/2003	NO	Rainfall - increase on Niobrara
039026	plover	2003	Gavins	759	4	flooded-other	N	6/23/2003	6/30/2003	NO	Rainfall
039031	plover	2003	Gavins	804.5	3	unknown	Y	5/22/2003	6/3/2003	U	
039062	plover	2003	Gavins	790	4	flooded-nest filled	Y	5/28/2003	6/10/2003	NO	Rainfall
039074	tern	2003	Gavins	778.7	1	unknown	Y	5/30/2003	6/9/2003	NO	Rainfall
039082	plover	2003	Gavins	804.5	4	unknown	Y	6/3/2003	6/11/2003	U	
039101	tern	2003	Gavins	801.5	3	unknown	Y	6/3/2003	6/11/2003	NO	Rainfall
039103	plover	2003	Gavins	795.3	4	unknown	Y	5/15/2003	5/21/2003	U	
039115	plover	2003	Gavins	757	4	flooded-other	N	6/4/2003	6/12/2003	NO	Rainfall
039120	tern	2003	Gavins	759	3	flooded-other	N	6/4/2003	6/12/2003	U	
039121	plover	2003	Gavins	759	4	flooded-other	N	6/4/2003	6/12/2003	NO	Rainfall
039122	plover	2003	Gavins	781.5	1	unknown	Y	5/20/2003	5/20/2003	NO	Rainfall
039124	plover	2003	Gavins	799	4	unknown	Y	5/15/2003	5/21/2003	U	
039125	tern	2003	Gavins	786.6	3	flooded-other	N	6/6/2003	6/12/2003	NO	Rainfall
039126	plover	2003	Gavins	786.6	4	flooded-other	N	6/6/2003	6/12/2003	NO	Rainfall
039139	plover	2003	Gavins	770.5	2	flooded-eggs washed out	N	6/23/2003	6/30/2003	NO	Rainfall
039140	tern	2003	Gavins	770.5	1	flooded-eggs washed out	N	6/23/2003	6/30/2003	NO	Rainfall
039141	plover	2003	Gavins	770.5	4	flooded-other	N	6/6/2003	6/16/2003	NO	Rainfall
039142	tern	2003	Gavins	770.5	2	flooded-other	N	6/23/2003	6/30/2003	NO	Rainfall
039144	plover	2003	Gavins	795.3	3	unknown	Y	5/15/2003	5/21/2003	U	
039163	tern	2003	Gavins	788.5	1	unknown	Y	6/9/2003	6/17/2003	NO	Rainfall
039198	plover	2003	Gavins	793.6	4	unknown	Y	6/19/2003	6/26/2003	U	
039201	tern	2003	Gavins	793.6	3	flooded-other	Y	6/19/2003	6/26/2003	NO	Rainfall
039209	tern	2003	Gavins	793.6	1	flooded-eggs washed out	Y	6/19/2003	6/26/2003	NO	Rainfall
039212	plover	2003	Gavins	793.5	4	unknown	Y	5/21/2003	5/23/2003	U	
039232	plover	2003	Gavins	793.5	3	unknown	Y	5/21/2003	5/23/2003	U	
039254	plover	2003	Gavins	759	2	flooded-eggs washed out	N	6/30/2003	7/7/2003	NO	Rainfall
039256	tern	2003	Gavins	770.5	3	flooded-other	Y	6/23/2003	6/30/2003	NO	Rainfall
039257	tern	2003	Gavins	770.5	3	unknown	N	6/23/2003	6/30/2003	U	
039261	plover	2003	Gavins	770.5	2	flooded-other	N	6/16/2003	6/16/2003	NO	Rainfall
039283	tern	2003	Gavins	756.7	2	flooded-eggs washed out	Y	6/18/2003	6/23/2003	NO	Rainfall
039290	plover	2003	Gavins	759	4	flooded-eggs washed out	N	6/23/2003	6/30/2003	NO	Rainfall
039293	tern	2003	Gavins	761.3	2	flooded-eggs washed out	N	6/30/2003	7/7/2003	NO	Rainfall
039295	tern	2003	Gavins	761.3	3	flooded-other	N	6/23/2003	6/30/2003	NO	Rainfall
039296	tern	2003	Gavins	761.3	1	flooded-other	N	6/30/2003	7/7/2003	NO	Rainfall
039302	tern	2003	Gavins	761.3	3	flooded-other	N	6/23/2003	6/30/2003	NO	Rainfall
039304	plover	2003	Gavins	766.6	4	flooded-other	N	6/23/2003	6/30/2003	NO	Rainfall
039309	tern	2003	Gavins	793.6	3	unknown	N	6/19/2003	6/26/2003	NO	Rainfall
039310	tern	2003	Gavins	793.6	3	unknown	Y	6/19/2003	6/26/2003	NO	Rainfall
039312	tern	2003	Gavins	793.6	3	unknown	Y	6/19/2003	6/26/2003	NO	Rainfall
039330	plover	2003	Gavins	756.7	4	unknown	Y	6/30/2003	7/7/2003	U	
039337	tern	2003	Gavins	759	2	flooded-eggs washed out	Y	6/23/2003	6/30/2003	U	
039339	tern	2003	Gavins	770.5	1	flooded-eggs washed out	N	6/23/2003	6/30/2003	NO	Rainfall
039341	tern	2003	Gavins	770.5	1	flooded-other	Y	6/23/2003	6/30/2003	NO	Rainfall
039347	tern	2003	Gavins	778.7	1	flooded-other	Y	6/24/2003	7/1/2003	NO	Rainfall
039355	tern	2003	Gavins	759	2	unknown	N	6/23/2003	6/30/2003	NO	Rainfall
039372	plover	2003	Gavins	756.8	4	flooded-eggs washed out	Y	7/7/2003	7/14/2003	NO	Rainfall
039373	tern	2003	Gavins	758.9	2	flooded-nest filled	Y	7/7/2003	7/14/2003	NO	Rainfall
887001	plover	1988	Randall	866	4	flooded		6/7/1988	6/21/1988	O	
887002	tern	1988	Randall	866	3	flooded		6/7/1988	6/21/1988	O	
887003	tern	1988	Randall	866	3	flooded		6/7/1988	6/21/1988	O	
887004	tern	1988	Randall	866	3	flooded		6/7/1988	6/21/1988	O	
888001	plover	1988	Lewis & Clark	833	1	flooded		5/31/1988	6/21/1988	O	
888006	plover	1988	Lewis & Clark	833	1	unknown		6/21/1988	7/12/1988	U	
888007	plover	1988	Lewis & Clark	834	4	flooded		5/31/1988	6/21/1988	O	
888008	plover	1988	Lewis & Clark	842	4	unknown		6/6/1988	6/21/1988	U	
888009	plover	1988	Lewis & Clark	842	3	unknown		6/21/1988	7/12/1988	U	
888017	tern	1988	Lewis & Clark	833	2	flooded		7/12/1988	7/13/1988	O	Increase in FTRA...Increase in FTRA

Historical_Record

888018	tern	1988 Lewis & Clark	833	1	flooded	7/13/1988	7/22/1988	O	Increase in FTRA
888019	tern	1988 Lewis & Clark	833	1	flooded	7/13/1988	7/22/1988	O	Increase in FTRALL_Increase in FTRA
888020	tern	1988 Lewis & Clark	833	2	flooded	7/12/1988	7/13/1988	O	Increase in FTRA
888021	tern	1988 Lewis & Clark	833	2	flooded	7/13/1988	7/22/1988	O	Increase in FTRA
888022	tern	1988 Lewis & Clark	833	1	flooded	7/13/1988	7/22/1988	O	Increase in FTRA
888023	tern	1988 Lewis & Clark	833	1	flooded	7/12/1988	7/13/1988	O	Increase in FTRA
888024	tern	1988 Lewis & Clark	833	2	flooded	7/12/1988	7/13/1988	O	Increase in FTRA
889007	plover	1988 Gavins	759	4	unknown	6/19/1988	6/25/1988	U	
889008	plover	1988 Gavins	759	1	unknown	6/25/1988	7/2/1988	U	
889010	plover	1988 Gavins	759	4	unknown	6/2/1988	6/16/1988	U	
889011	plover	1988 Gavins	759	4	unknown	6/2/1988	6/16/1988	U	
889016	plover	1988 Gavins	759	3	unknown	6/2/1988	6/16/1988	U	
889022	plover	1988 Gavins	759	3	unknown	6/2/1988	6/16/1988	U	
889026	plover	1988 Gavins	759	4	unknown	6/8/1988	6/16/1988	U	
889034	plover	1988 Gavins	759	2	unknown	6/24/1988	7/2/1988	U	
889036	plover	1988 Gavins	759	1	unknown	6/8/1988	6/16/1988	U	
889039	plover	1988 Gavins	759	3	unknown	6/25/1988	7/2/1988	U	
889046	plover	1988 Gavins	759	2	unknown	6/24/1988	7/2/1988	U	
889050	plover	1988 Gavins	759	4	unknown	6/25/1988	7/2/1988	U	
889057	plover	1988 Gavins	759	1	unknown	7/2/1988	7/6/1988	U	
889058	plover	1988 Gavins	759	4	unknown	7/14/1988	7/20/1988	U	
889059	plover	1988 Gavins	766	2	flooded	5/16/1988	6/1/1988	O	increase in GAPT spill
889063	plover	1988 Gavins	770	3	unknown	6/1/1988	6/15/1988	U	
889064	plover	1988 Gavins	770	4	unknown	6/15/1988	6/23/1988	U	
889067	plover	1988 Gavins	770	4	unknown	6/15/1988	6/23/1988	U	
889069	plover	1988 Gavins	770	3	unknown	6/15/1988	6/23/1988	U	
889070	plover	1988 Gavins	770	4	unknown	6/15/1988	6/23/1988	U	
889075	plover	1988 Gavins	770	2	unknown	6/15/1988	6/23/1988	U	
889076	plover	1988 Gavins	770	4	unknown	6/23/1988	7/5/1988	U	
889077	plover	1988 Gavins	770	4	unknown	6/15/1988	6/23/1988	U	
889078	plover	1988 Gavins	770	4	unknown	7/1/1988	7/5/1988	U	
889079	plover	1988 Gavins	770	2	unknown	6/23/1988	7/1/1988	U	
889080	plover	1988 Gavins	770	4	unknown	7/5/1988	7/15/1988	U	
889081	plover	1988 Gavins	770	1	unknown	7/5/1988	7/15/1988	U	
889085	plover	1988 Gavins	770	4	unknown	7/5/1988	7/15/1988	U	
889088	plover	1988 Gavins	773	1	unknown	5/29/1988	6/20/1988	U	
889092	plover	1988 Gavins	778	4	unknown	7/1/1988	7/16/1988	U	
889097	plover	1988 Gavins	781	4	unknown	7/1/1988	7/9/1988	U	
889098	plover	1988 Gavins	781	4	unknown	6/20/1988	7/1/1988	U	
889108	plover	1988 Gavins	791	1	unknown	5/26/1988	6/18/1988	U	
889109	plover	1988 Gavins	794	4	unknown	5/26/1988	6/17/1988	U	
889124	plover	1988 Gavins	796	3	unknown	6/17/1988	6/22/1988	U	
889125	plover	1988 Gavins	796	3	unknown	7/7/1988	7/18/1988	U	
889126	plover	1988 Gavins	796	4	unknown	7/7/1988	7/18/1988	U	
889132	plover	1988 Gavins	799	4	flooded	5/24/1988	5/25/1988	destroyed on O	ncrease in GAPT spill
889133	plover	1988 Gavins	799	1	flooded	5/24/1988	5/25/1988	O	ncrease in GAPT spill
889136	plover	1988 Gavins	800	3	unknown	6/17/1988	6/22/1988	U	
889137	plover	1988 Gavins	801	3	unknown	6/22/1988	6/27/1988	U	
889138	plover	1988 Gavins	802	3	unknown	6/27/1988	7/8/1988	U	
889138	plover	1988 Gavins	802	4	unknown	6/27/1988	7/8/1988	U	
889140	plover	1988 Gavins	802	3	unknown	6/27/1988	7/8/1988	U	
889141	plover	1988 Gavins	802	3	unknown	6/27/1988	7/8/1988	U	
889144	plover	1988 Gavins	803	4	unknown	5/23/1988	6/3/1988	U	
889148	plover	1988 Gavins	804	4	flooded	5/23/1988	6/3/1988	O	ncrease in GAPT spill
889149	plover	1988 Gavins	804	4	unknown	6/10/1988	6/22/1988	U	
889152	plover	1988 Gavins	804	4	unknown	6/3/1988	6/10/1988	U	
889157	plover	1988 Gavins	804	4	unknown	6/17/1988	6/22/1988	U	
889160	plover	1988 Gavins	804	3	unknown	6/27/1988	7/7/1988	U	
889167	tern	1988 Gavins	756	1	unknown	6/25/1988	7/2/1988	U	
889168	tern	1988 Gavins	756	3	unknown	6/25/1988	7/2/1988	U	
889169	tern	1988 Gavins	756	1	unknown	6/25/1988	7/2/1988	U	
889173	tern	1988 Gavins	756	2	unknown	6/25/1988	7/2/1988	U	
889187	tern	1988 Gavins	759	3	unknown	6/2/1988	6/16/1988	U	
889187	tern	1988 Gavins	759	2	unknown	6/16/1988	6/24/1988	U	
889190	tern	1988 Gavins	759	2	unknown	6/2/1988	6/16/1988	U	
889194	tern	1988 Gavins	759	1	unknown	6/2/1988	6/16/1988	U	
889195	tern	1988 Gavins	759	1	unknown	6/2/1988	6/16/1988	U	
889196	tern	1988 Gavins	759	3	unknown	6/2/1988	6/16/1988	U	
889197	tern	1988 Gavins	759	2	unknown	6/8/1988	6/16/1988	U	
889200	tern	1988 Gavins	759	2	unknown	6/8/1988	6/16/1988	U	
889214	tern	1988 Gavins	759	2	unknown	6/24/1988	7/2/1988	U	
889220	tern	1988 Gavins	759	3	unknown	7/2/1988	7/6/1988	U	
889222	tern	1988 Gavins	759	1	unknown	7/5/1988	7/14/1988	U	
889223	tern	1988 Gavins	759	3	unknown	7/2/1988	7/15/1988	U	
889224	tern	1988 Gavins	759	2	unknown	7/6/1988	7/15/1988	U	
889227	tern	1988 Gavins	759	3	unknown	7/6/1988	7/14/1988	U	

Historical_Record

889228	tern	1988	Gavins	759	3	unknown	7/14/1988	7/26/1988	U	
889230	tern	1988	Gavins	759	1	unknown	7/14/1988	7/26/1988	U	
889231	tern	1988	Gavins	759	2	unknown	7/14/1988	7/20/1988	U	
889237	tern	1988	Gavins	766	1	unknown	7/2/1988	7/15/1988	U	
889238	tern	1988	Gavins	770	3	unknown	6/15/1988	6/23/1988	U	
889242	tern	1988	Gavins	770	3	unknown	6/1/1988	6/15/1988	U	
889243	tern	1988	Gavins	770	3	unknown	6/1/1988	6/15/1988	U	
889257	tern	1988	Gavins	770	2	unknown	6/23/1988	7/5/1988	U	
889262	tern	1988	Gavins	770	3	unknown	7/5/1988	7/15/1988	U	
889266	tern	1988	Gavins	770	2	unknown	7/5/1988	7/15/1988	U	
889267	tern	1988	Gavins	770	3	unknown	7/5/1988	7/15/1988	U	
889268	tern	1988	Gavins	770	3	unknown	7/5/1988	7/15/1988	U	
889272	tern	1988	Gavins	770	2	unknown	7/5/1988	7/15/1988	U	
889278	tern	1988	Gavins	770	2	unknown	7/15/1988	7/20/1988	U	
889292	tern	1988	Gavins	778	2	unknown	7/1/1988	7/16/1988	U	
889305	tern	1988	Gavins	781	3	unknown	7/1/1988	7/9/1988	U	
889328	tern	1988	Gavins	790	2	unknown	7/8/1988	7/18/1988	U	
889329	tern	1988	Gavins	790	2	unknown	7/8/1988	7/18/1988	U	
889341	tern	1988	Gavins	794	3	unknown	6/29/1988	7/8/1988	U	
889355	tern	1988	Gavins	796	2	unknown	6/28/1988	7/7/1988	U	
889357	tern	1988	Gavins	796	2	unknown	7/19/1988	7/25/1988	U	
889379	tern	1988	Gavins	802	2	unknown	6/22/1988	6/27/1988	U	
889380	tern	1988	Gavins	802	1	unknown	6/22/1988	6/27/1988	U	
889390	tern	1988	Gavins	802	2	unknown	7/7/1988	7/13/1988	U	
889393	tern	1988	Gavins	802	2	unknown	7/13/1988	7/22/1988	U	
889396	tern	1988	Gavins	804	3	unknown	6/10/1988	6/22/1988	U	
889397	tern	1988	Gavins	804	1	unknown	6/10/1988	6/22/1988	U	
889398	tern	1988	Gavins	804	3	unknown	6/10/1988	6/14/1988	U	
889401	tern	1988	Gavins	804	2	unknown	7/18/1988	7/25/1988	U	
889404	tern	1988	Gavins	804	2	unknown	7/13/1988	7/18/1988	U	
889405	tern	1988	Gavins	804	2	unknown	7/13/1988	7/18/1988	U	
889406	tern	1988	Gavins	804	2	unknown	7/18/1988	7/25/1988	U	
889407	tern	1988	Gavins	804	1	unknown	7/13/1988	7/18/1988	U	
889408	tern	1988	Gavins	804	1	unknown	7/18/1988	7/25/1988	U	
889005	plover	1989	Lewis & Clark	829	4	flooded	6/16/1989	6/20/1989	O	
889010	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889011	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889012	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889013	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889016	tern	1989	Lewis & Clark	829	2	flooded	6/16/1989	6/20/1989	O	
889017	tern	1989	Lewis & Clark	829	2	flooded	6/16/1989	6/20/1989	O	
889018	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889020	tern	1989	Lewis & Clark	829	3	flooded	6/9/1989	6/19/1989	NO	rainfall
889021	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889023	tern	1989	Lewis & Clark	829	3	flooded	6/16/1989	6/20/1989	O	
889033	tern	1989	Lewis & Clark	829	1	flooded	7/13/1989	7/19/1989	O	
889038	tern	1989	Lewis & Clark	833	3	flooded	7/13/1989	7/19/1989	O	
889001	plover	1989	Gavins	753	4	unknown	5/22/1989	6/2/1989	U	
889007	plover	1989	Gavins	753	3	unknown	6/29/1989	7/11/1989	U	
889008	plover	1989	Gavins	753	4	unknown	7/11/1989	7/19/1989	U	
889009	plover	1989	Gavins	758	4	unknown	5/22/1989	6/2/1989	U	
889011	plover	1989	Gavins	759	4	unknown	5/22/1989	6/2/1989	U	
889021	plover	1989	Gavins	759	4	unknown	5/22/1989	6/2/1989	U	
889022	plover	1989	Gavins	759	4	unknown	5/22/1989	6/2/1989	U	
889024	plover	1989	Gavins	759	4	unknown	6/2/1989	6/8/1989	U	
889025	plover	1989	Gavins	759	4	unknown	5/22/1989	6/2/1989	U	
889027	plover	1989	Gavins	759	4	unknown	5/22/1989	6/2/1989	U	
889038	plover	1989	Gavins	759	4	unknown	6/8/1989	6/15/1989	U	
889043	plover	1989	Gavins	759	1	unknown	6/8/1989	6/23/1989	U	
889047	plover	1989	Gavins	760	4	unknown	6/29/1989	7/11/1989	U	
889048	plover	1989	Gavins	770	2	unknown	5/19/1989	6/1/1989	U	
889049	plover	1989	Gavins	770	3	unknown	5/19/1989	6/1/1989	U	
889052	plover	1989	Gavins	770	1	unknown	6/7/1989	6/15/1989	U	
889055	plover	1989	Gavins	770	4	unknown	6/7/1989	6/15/1989	U	
889056	plover	1989	Gavins	770	4	unknown	6/22/1989	6/29/1989	U	
889064	plover	1989	Gavins	770	4	unknown	6/29/1989	7/11/1989	U	
889068	plover	1989	Gavins	775	4	unknown	6/27/1989	7/7/1989	U	
889069	plover	1989	Gavins	778	2	unknown	5/19/1989	6/1/1989	U	
889070	plover	1989	Gavins	778	1	unknown	5/19/1989	6/1/1989	U	
889077	plover	1989	Gavins	781	4	unknown	6/7/1989	6/15/1989	U	
889079	plover	1989	Gavins	781	1	unknown	6/7/1989	6/15/1989	U	
889087	plover	1989	Gavins	790	4	unknown	6/1/1989	6/15/1989	U	
889090	plover	1989	Gavins	794	4	unknown	5/31/1989	6/6/1989	U	
889091	plover	1989	Gavins	794	5	unknown	5/31/1989	6/6/1989	U	

H-7

Historical_Record

899099	plover	1989 Gavins	796	4 unknown	6/6/1989	6/13/1989	U	
899100	plover	1989 Gavins	796	4 unknown	6/6/1989	6/13/1989	U	
899101	plover	1989 Gavins	796	4 unknown	6/21/1989	6/30/1989	U	
899102	plover	1989 Gavins	796	3 unknown	6/30/1989	7/6/1989	U	
899104	plover	1989 Gavins	799	2 unknown	6/27/1989	7/7/1989	U	
899121	tern	1989 Gavins	753	3 unknown	7/11/1989	7/19/1989	U	
899122	tern	1989 Gavins	759	2 flooded	7/11/1989	7/19/1989	O	
899140	tern	1989 Gavins	759	3 unknown	6/8/1989	6/15/1989	U	
899141	tern	1989 Gavins	759	2 unknown	6/2/1989	6/8/1989	U	
899142	tern	1989 Gavins	759	2 unknown	6/8/1989	6/15/1989	U	
899144	tern	1989 Gavins	759	3 unknown	6/2/1989	6/8/1989	U	
899148	tern	1989 Gavins	759	2 unknown	6/2/1989	6/8/1989	U	
899156	tern	1989 Gavins	760	3 flooded	7/11/1989	7/19/1989	O	
899163	tern	1989 Gavins	770	3 unknown	6/7/1989	6/15/1989	U	
899180	tern	1989 Gavins	770	2 unknown	6/29/1989	7/11/1989	U	
899185	tern	1989 Gavins	770	1 unknown	6/29/1989	7/11/1989	U	
899207	tern	1989 Gavins	780	2 unknown	7/12/1989	7/18/1989	U	
899241	tern	1989 Gavins	794	3 unknown	6/6/1989	6/15/1989	U	
899253	tern	1989 Gavins	796	3 unknown	6/8/1989	6/13/1989	U	
899262	tern	1989 Gavins	796	3 unknown	6/21/1989	6/30/1989	U	
899263	tern	1989 Gavins	796	2 unknown	6/30/1989	7/6/1989	U	
899265	tern	1989 Gavins	796	1 unknown	6/21/1989	6/30/1989	U	
899269	tern	1989 Gavins	796	1 unknown	6/30/1989	7/6/1989	U	
899271	tern	1989 Gavins	796	3 unknown	6/30/1989	7/6/1989	U	
899272	tern	1989 Gavins	796	1 unknown	7/12/1989	7/17/1989	U	
899288	tern	1989 Gavins	800	3 unknown	5/31/1989	6/6/1989	U	
907012	plover	1990 Randall	866.7	1 flooded	6/25/1990	7/7/1990	O	FTRA 1 day up, 2 down, gradual increases
907015	tern	1990 Randall	866.7	3 flooded	6/25/1990	7/7/1990	O	FTRA 1 day up, 2 down, gradual increases
907016	tern	1990 Randall	866.7	2 flooded	6/25/1990	7/7/1990	O	FTRA 1 day up, 2 down, gradual increases
907017	tern	1990 Randall	866.7	3 flooded	6/25/1990	7/7/1990	O	FTRA 1 day up, 2 down, gradual increases
907018	tern	1990 Randall	866.7	1 flooded	6/25/1990	7/7/1990	O	FTRA 1 day up, 2 down, gradual increases
908001	plover	1990 Lewis & Clark	832	4 flooded	5/31/1990	6/12/1990	O	
908004	plover	1990 Lewis & Clark	832.8	3 unknown	6/27/1990	7/7/1990	U	
908006	plover	1990 Lewis & Clark	832.8	3 flooded	7/7/1990	7/16/1990	NO	Niobrara flows
908011	plover	1990 Lewis & Clark	829	4 unknown	6/20/1990	6/27/1990	U	
908014	plover	1990 Lewis & Clark	833.9	2 unknown	6/20/1990	6/27/1990	U	
908016	plover	1990 Lewis & Clark	838	4 unknown	5/31/1990	6/14/1990	U	
908017	plover	1990 Lewis & Clark	838	4 unknown	5/31/1990	6/14/1990	U	
908026	plover	1990 Lewis & Clark	842	1 flooded	6/1/1990	6/14/1990	NO	
908030	plover	1990 Lewis & Clark	843	2 flooded	6/1/1990	6/14/1990	NO	
908042	tern	1990 Lewis & Clark	832.8	3 flooded	6/12/1990	6/20/1990	O	
908046	tern	1990 Lewis & Clark	832.8	2 flooded	6/12/1990	6/20/1990	O	
908051	tern	1990 Lewis & Clark	833.9	1 unknown	6/12/1990	6/14/1990	U	
908052	tern	1990 Lewis & Clark	833.9	1 unknown	6/12/1990	6/14/1990	U	
908063	tern	1990 Lewis & Clark	840	2 flooded	7/16/1990	7/26/1990	NO	
908066	tern	1990 Lewis & Clark	840	2 flooded	6/27/1990	7/7/1990	O	
908068	tern	1990 Lewis & Clark	840	3 flooded	7/7/1990	7/16/1990	NO	Niobrara flows
908069	tern	1990 Lewis & Clark	840	3 flooded	7/7/1990	7/16/1990	NO	Niobrara flows
909010	plover	1990 Gavins	801	3 unknown	5/28/1990	6/6/1990	U	
909015	plover	1990 Gavins	797	4 unknown	6/6/1990	6/15/1990	U	
909016	plover	1990 Gavins	797	4 unknown	6/6/1990	6/15/1990	U	
909021	plover	1990 Gavins	794	4 flooded	6/7/1990	6/18/1990	NO	
909023	plover	1990 Gavins	790.5	2 unknown	5/18/1990	5/28/1990	U	
909027	plover	1990 Gavins	790.5	4 unknown	5/28/1990	6/7/1990	U	
909028	plover	1990 Gavins	790.5	4 unknown	6/29/1990	7/6/1990	U	GASD gage not working well
909029	plover	1990 Gavins	781.3	1 unknown	5/16/1990	5/18/1990	U	
909033	plover	1990 Gavins	781.4	1 unknown	6/16/1990	6/29/1990	U	
909043	plover	1990 Gavins	770.5	4 unknown	6/12/1990	6/19/1990	U	
909047	plover	1990 Gavins	770.2	1 unknown	6/19/1990	7/2/1990	U	
909048	plover	1990 Gavins	770.2	1 unknown	6/19/1990	7/2/1990	U	
909051	plover	1990 Gavins	770	4 unknown	5/29/1990	6/12/1990	U	
909054	plover	1990 Gavins	770	1 unknown	6/19/1990	7/2/1990	U	
909056	plover	1990 Gavins	770	4 unknown	7/2/1990	7/11/1990	U	
909064	plover	1990 Gavins	766.2	4 unknown	7/11/1990	7/21/1990	U	
909082	plover	1990 Gavins	757.4	2 unknown	7/11/1990	7/21/1990	U	
909084	plover	1990 Gavins	753.3	4 unknown	6/9/1990	6/19/1990	U	
909104	tern	1990 Gavins	803.8	2 unknown	7/6/1990	7/13/1990	U	
909117	tern	1990 Gavins	798.5	3 flooded	6/6/1990	6/15/1990	U	
909132	tern	1990 Gavins	790.5	3 unknown	6/18/1990	6/29/1990	U	GASD gage not working well
909176	tern	1990 Gavins	770.2	2 unknown	6/19/1990	7/2/1990	U	MANE gage not working well
909177	tern	1990 Gavins	770.2	1 unknown	6/19/1990	7/2/1990	U	MANE gage not working well
909178	tern	1990 Gavins	770.2	1 unknown	6/19/1990	7/2/1990	U	MANE gage not working well
909179	tern	1990 Gavins	766.2	3 unknown	6/19/1990	6/30/1990	U	
909181	tern	1990 Gavins	766.2	3 unknown	6/19/1990	6/30/1990	U	

Historical_Record

909182	tern	1990	Gavins	766.2	3	unknown	6/19/1990	6/30/1990	U	
909187	tern	1990	Gavins	766.2	1	unknown	6/19/1990	6/30/1990	U	
909190	tern	1990	Gavins	766.2	1	unknown	6/30/1990	7/11/1990	U	
909192	tern	1990	Gavins	766.2	2	unknown	7/11/1990	7/21/1990	U	
909199	tern	1990	Gavins	757.4	1	unknown	6/9/1990	6/19/1990	U	
909219	tern	1990	Gavins	757.4	1	flooded	7/11/1990	7/21/1990	NO	
917001	plover	1991	Randall	866.7	4	flooded	6/14/1991	6/21/1991	O	
917002	plover	1991	Randall	866.7	3	flooded	6/24/1991	7/2/1991	O	
917003	plover	1991	Randall	869.5	2	unknown	5/24/1991	6/4/1991	U	GWSD gage not working
917005	plover	1991	Randall	869.5	4	unknown	6/24/1991	7/2/1991	U	GWSD gage not working
917007	plover	1991	Randall	869.5	4	unknown	7/2/1991	7/12/1991	U	GWSD gage not working
917010	plover	1991	Randall	871.5	1	unknown	5/24/1991	6/4/1991	U	GWSD gage not working
917011	plover	1991	Randall	871.5	1	unknown	5/24/1991	6/4/1991	U	GWSD gage not working
917012	plover	1991	Randall	871.5	1	unknown	6/13/1991	6/24/1991	U	GWSD gage not working
917013	plover	1991	Randall	875	2	unknown	6/24/1991	7/2/1991	U	GWSD gage not working
917015	plover	1991	Randall	867.4	1	unknown	5/24/1991	6/4/1991	U	GWSD gage not working
917016	plover	1991	Randall	867.4	4	unknown	6/14/1991	6/24/1991	U	GWSD gage not working
917017	plover	1991	Randall	853.8	3	unknown	6/14/1991	6/24/1991	O	Likely operational, change in FR release
917018	tern	1991	Randall	866.7	3	flooded	6/24/1991	7/2/1991	O	Likely operational
917019	tern	1991	Randall	866.7	1	unknown	6/24/1991	7/2/1991	U	GWSD gage not working
917020	tern	1991	Randall	866.7	2	unknown	6/24/1991	7/2/1991	U	GWSD gage not working
917021	tern	1991	Randall	866.7	2	unknown	6/24/1991	7/2/1991	U	GWSD gage not working
917022	tern	1991	Randall	869.5	2	flooded	6/24/1991	7/2/1991	O	Likely operational
917023	tern	1991	Randall	869.5	2	flooded	6/24/1991	7/2/1991	O	Likely operational
917027	tern	1991	Randall	869.5	3	flooded	7/2/1991	7/12/1991	O	Likely operational
917031	tern	1991	Randall	869.5	2	unknown	7/2/1991	7/12/1991	U	Likely operational
917037	tern	1991	Randall	869.5	2	flooded	7/2/1991	7/12/1991	O	GWSD gage not working
918001	plover	1991	Lewis & Clark	832	1	flooded	6/3/1991	6/17/1991	O	Likely operational
918002	plover	1991	Lewis & Clark	832	4	unknown	6/17/1991	6/25/1991	U	
918004	plover	1991	Lewis & Clark	832.8	1	flooded	6/3/1991	6/17/1991	O	
918005	plover	1991	Lewis & Clark	832.8	4	unknown	7/3/1991	7/25/1991	U	
918006	plover	1991	Lewis & Clark	833.1	4	unknown	6/17/1991	6/25/1991	U	
918010	plover	1991	Lewis & Clark	840	1	flooded	6/3/1991	6/5/1991	O	
918011	plover	1991	Lewis & Clark	840	2	flooded	6/3/1991	6/14/1991	O	
918012	plover	1991	Lewis & Clark	840	1	flooded	6/14/1991	6/25/1991	O	
918013	plover	1991	Lewis & Clark	840	4	flooded	7/3/1991	7/12/1991	O	
918016	plover	1991	Lewis & Clark	840	4	unknown	6/3/1991	6/14/1991	O	Likely operational, FR/GP cycling
918017	plover	1991	Lewis & Clark	840	4	flooded	6/25/1991	7/3/1991	O	Likely operational, FR/GP cycling
918018	plover	1991	Lewis & Clark	843	4	unknown	6/3/1991	6/14/1991	O	Likely operational, FR/GP cycling
918019	plover	1991	Lewis & Clark	843	4	unknown	5/25/1991	6/5/1991	U	
918020	plover	1991	Lewis & Clark	843	4	unknown	6/3/1991	6/14/1991	O	Likely operational, FR/GP cycling
918021	plover	1991	Lewis & Clark	843	2	flooded	6/24/1991	7/3/1991	O	Likely operational, FR/GP cycling
918022	plover	1991	Lewis & Clark	843	1	flooded	6/14/1991	6/24/1991	O	
918023	plover	1991	Lewis & Clark	843	1	unknown	6/14/1991	6/24/1991	U	
918024	plover	1991	Lewis & Clark	843	4	flooded	7/3/1991	7/12/1991	O	
918025	plover	1991	Lewis & Clark	843	3	flooded	7/3/1991	7/12/1991	O	
918028	plover	1991	Lewis & Clark	843	4	flooded	6/5/1991	6/14/1991	O	
918029	tern	1991	Lewis & Clark	832	1	unknown	6/17/1991	6/25/1991	U	
918030	tern	1991	Lewis & Clark	832.8	1	flooded	7/3/1991	7/25/1991	O	
918031	tern	1991	Lewis & Clark	833	2	flooded	6/3/1991	6/17/1991	O	
918032	tern	1991	Lewis & Clark	833	1	flooded	6/3/1991	6/17/1991	O	
918033	tern	1991	Lewis & Clark	838	3	unknown	6/17/1991	6/25/1991	U	
918034	tern	1991	Lewis & Clark	838	3	unknown	6/17/1991	6/25/1991	U	
918036	tern	1991	Lewis & Clark	838.2	2	unknown	6/25/1991	7/3/1991	U	
918038	tern	1991	Lewis & Clark	840	2	flooded	6/25/1991	7/3/1991	O	Likely operational, change in FTRA release
918040	tern	1991	Lewis & Clark	840	2	flooded	7/3/1991	7/12/1991	O	
918041	tern	1991	Lewis & Clark	840	3	flooded	6/25/1991	7/3/1991	O	Likely operational, change in FTRA release
918042	tern	1991	Lewis & Clark	840	2	flooded	6/25/1991	7/3/1991	O	Likely operational, change in FTRA release
918043	tern	1991	Lewis & Clark	840	2	flooded	7/3/1991	7/12/1991	O	
918045	tern	1991	Lewis & Clark	843	2	unknown	6/3/1991	6/14/1991	O	
918046	tern	1991	Lewis & Clark	843	1	flooded	6/14/1991	7/3/1991	O	
918047	tern	1991	Lewis & Clark	843	1	unknown	6/14/1991	6/24/1991	O	
918048	tern	1991	Lewis & Clark	843	2	flooded	6/24/1991	7/3/1991	O	Likely operational, change in FTRA release
918050	tern	1991	Lewis & Clark	843	1	flooded	6/24/1991	7/3/1991	O	Likely operational, change in FTRA release
918051	tern	1991	Lewis & Clark	843	2	flooded	6/24/1991	7/3/1991	O	Likely operational, change in FTRA release
918053	tern	1991	Lewis & Clark	843	3	flooded	7/3/1991	7/3/1991	O	
918054	tern	1991	Lewis & Clark	843	2	flooded	7/3/1991	7/12/1991	O	
918055	tern	1991	Lewis & Clark	843	2	unknown	7/3/1991	7/12/1991	U	
919003	plover	1991	Gavins	753.7	2	unknown	5/22/1991	5/30/1991	U	
919006	plover	1991	Gavins	753.7	3	unknown	5/30/1991	6/11/1991	U	
919007	plover	1991	Gavins	753.7	2	unknown	6/20/1991	7/1/1991	U	
919009	plover	1991	Gavins	753.7	2	unknown	6/11/1991	6/20/1991	U	
919010	plover	1991	Gavins	753.7	4	unknown	7/11/1991	7/11/1991	U	
919011	plover	1991	Gavins	753.7	3	unknown	6/11/1991	6/20/1991	U	

6-H

Historical_Record

919012	plover	1991 Gavins	757.3	4 unknown	6/20/1991	7/1/1991	NO
919013	plover	1991 Gavins	757.3	4 flooded	6/20/1991	7/1/1991	U
919016	plover	1991 Gavins	757.3	2 unknown	7/1/1991	7/1/1991	U
919017	plover	1991 Gavins	759	4 unknown	5/30/1991	6/11/1991	U
919018	plover	1991 Gavins	759	4 unknown	5/22/1991	5/30/1991	U
919029	plover	1991 Gavins	759	4 unknown	5/30/1991	6/11/1991	U
919030	plover	1991 Gavins	759	4 unknown	6/11/1991	6/20/1991	U
919043	plover	1991 Gavins	768.4	4 unknown	6/10/1991	6/19/1991	U
919044	plover	1991 Gavins	768.4	3 unknown	6/28/1991	7/10/1991	U
919055	plover	1991 Gavins	770.5	4 unknown	5/23/1991	5/30/1991	U
919056	plover	1991 Gavins	770.5	4 flooded	6/28/1991	7/10/1991	NO
919057	plover	1991 Gavins	770.5	3 flooded	6/19/1991	6/28/1991	NO
919061	plover	1991 Gavins	771.2	1 unknown	5/29/1991	6/10/1991	U
919069	plover	1991 Gavins	775	1 unknown	5/16/1991	5/29/1991	U
919072	plover	1991 Gavins	775.2	2 unknown	5/16/1991	5/29/1991	U
919074	plover	1991 Gavins	778.5	2 unknown	5/16/1991	5/29/1991	U
919076	plover	1991 Gavins	781.4	1 unknown	5/15/1991	5/29/1991	U
919081	plover	1991 Gavins	796.7	3 unknown	5/28/1991	6/6/1991	U
919084	plover	1991 Gavins	797.1	4 unknown	6/8/1991	6/17/1991	U
919105	plover	1991 Gavins	804.6	1 unknown	6/26/1991	7/8/1991	U
919106	plover	1991 Gavins	807.7	3 unknown	5/27/1991	6/7/1991	U
919107	plover	1991 Gavins	807.7	4 unknown	6/7/1991	6/17/1991	U
919115	tern	1991 Gavins	804.6	2 unknown	7/8/1991	7/16/1991	U
919116	tern	1991 Gavins	804.6	1 unknown	7/16/1991	7/23/1991	U
919119	tern	1991 Gavins	804.6	2 unknown	6/17/1991	6/26/1991	U
919121	tern	1991 Gavins	804.6	1 unknown	6/17/1991	6/26/1991	U
919123	tern	1991 Gavins	803.7	2 unknown	6/17/1991	6/26/1991	U
919124	tern	1991 Gavins	803.7	2 unknown	6/17/1991	6/26/1991	U
919126	tern	1991 Gavins	803.7	3 unknown	6/6/1991	6/17/1991	U
919129	tern	1991 Gavins	803.7	2 unknown	6/17/1991	6/26/1991	U
919140	tern	1991 Gavins	799.2	2 flooded	6/17/1991	6/26/1991	NO
919141	tern	1991 Gavins	799.2	2 unknown	6/17/1991	6/26/1991	U
919145	tern	1991 Gavins	799.2	2 flooded	6/8/1991	6/17/1991	NO
919147	tern	1991 Gavins	799.2	1 unknown	6/8/1991	6/17/1991	U
919149	tern	1991 Gavins	799.2	1 unknown	5/14/1991	5/28/1991	U
919160	tern	1991 Gavins	797	1 unknown	7/8/1991	7/16/1991	U
919161	tern	1991 Gavins	797	2 unknown	6/26/1991	7/8/1991	U
919162	tern	1991 Gavins	797	2 unknown	6/26/1991	7/8/1991	U
919163	tern	1991 Gavins	797	2 unknown	6/26/1991	7/8/1991	U
919164	tern	1991 Gavins	797	1 unknown	6/26/1991	7/8/1991	U
919166	tern	1991 Gavins	797	2 unknown	6/17/1991	6/26/1991	U
919167	tern	1991 Gavins	797	1 unknown	6/17/1991	6/26/1991	U
919168	tern	1991 Gavins	797	1 unknown	6/6/1991	6/17/1991	U
919175	tern	1991 Gavins	797	3 unknown	6/6/1991	6/17/1991	U
919186	tern	1991 Gavins	771.2	3 unknown	6/10/1991	6/19/1991	U
919190	tern	1991 Gavins	770.1	1 unknown	6/28/1991	7/10/1991	U
919198	tern	1991 Gavins	768.4	3 unknown	6/28/1991	7/10/1991	U
919200	tern	1991 Gavins	768.4	1 unknown	6/19/1991	6/28/1991	U
919201	tern	1991 Gavins	768.4	2 unknown	6/19/1991	6/28/1991	U
919204	tern	1991 Gavins	768.4	1 unknown	5/30/1991	6/10/1991	U
919229	tern	1991 Gavins	757.3	2 unknown	7/1/1991	7/11/1991	U
919230	tern	1991 Gavins	757.3	1 unknown	7/1/1991	7/11/1991	U
919238	tern	1991 Gavins	757.3	2 unknown	6/20/1991	7/1/1991	U
919240	tern	1991 Gavins	757.3	2 unknown	6/11/1991	6/20/1991	NO
919242	tern	1991 Gavins	757.3	2 flooded	6/11/1991	6/20/1991	NO
919246	tern	1991 Gavins	757.3	3 unknown	6/11/1991	6/20/1991	NO
919247	tern	1991 Gavins	757.3	2 unknown	6/11/1991	6/20/1991	NO
919250	tern	1991 Gavins	757.3	2 unknown	6/11/1991	6/20/1991	NO
919253	tern	1991 Gavins	781.6	3 unknown	6/18/1991	6/27/1991	U
919256	tern	1991 Gavins	790.6	2 flooded	6/18/1991	6/27/1991	NO
919257	tern	1991 Gavins	790.6	2 unknown	6/27/1991	7/9/1991	U
919264	tern	1991 Gavins	790.5	3 unknown	6/7/1991	6/18/1991	U
919265	tern	1991 Gavins	790.5	2 unknown	6/7/1991	6/18/1991	U
919278	tern	1991 Gavins	781.4	2 unknown	6/27/1991	7/9/1991	U
919279	tern	1991 Gavins	781.4	3 unknown	6/18/1991	6/27/1991	U
919281	tern	1991 Gavins	781.4	2 unknown	6/18/1991	6/27/1991	U
919286	tern	1991 Gavins	778.5	1 unknown	7/24/1991	8/6/1991	U
919288	tern	1991 Gavins	778.5	3 unknown	6/17/1991	6/27/1991	U
919292	tern	1991 Gavins	772.5	1 unknown	7/24/1991	8/6/1991	U
919295	tern	1991 Gavins	772.5	1 unknown	6/27/1991	7/7/1991	U
919299	tern	1991 Gavins	772.5	2 flooded	6/19/1991	6/27/1991	NO
928002	plover	1992 Lewis & Clark	832	4 unknown	6/3/1992	6/10/1992	U
928004	plover	1992 Lewis & Clark	843	3 unknown	6/3/1992	6/10/1992	U
928006	plover	1992 Lewis & Clark	843	4 unknown	6/17/1992	7/3/1992	U

GASD gage not working well

GASD not working, some increase at VRSD, GP cycling - no change in max

Historical_Record

928007	tern	1992	Lewis & Clark	832	1	unknown	6/3/1992	6/10/1992	U	
928008	tern	1992	Lewis & Clark	832	3	unknown	6/10/1992	6/17/1992	U	
928009	tern	1992	Lewis & Clark	832	1	unknown	6/10/1992	6/17/1992	U	
928012	tern	1992	Lewis & Clark	832.8	1	unknown	6/10/1992	6/17/1992	U	
928020	tern	1992	Lewis & Clark	833	3	unknown	7/3/1992	7/10/1992	U	
928022	tern	1992	Lewis & Clark	833	1	unknown	7/3/1992	7/10/1992	U	
928023	tern	1992	Lewis & Clark	833	1	unknown	7/3/1992	7/10/1992	U	
929012	plover	1992	Gavins	757.3	4	unknown	5/30/1992	6/6/1992	U	
929026	plover	1992	Gavins	770.3	4	unknown	5/20/1992	5/29/1992	U	
929029	plover	1992	Gavins	770.3	4	unknown	N 5/29/1992	6/6/1992	U	
929033	plover	1992	Gavins	771.2	4	unknown	N 6/23/1992	7/1/1992	U	
929050	plover	1992	Gavins	797	4	unknown	6/19/1992	6/25/1992	U	
929067	plover	1992	Gavins	803.7	3	unknown	6/11/1992	6/19/1992	U	
929071	plover	1992	Gavins	804.5	3	unknown	N 5/26/1992	6/4/1992	U	
929075	plover	1992	Gavins	804.6	3	flooded	N 5/15/1992	5/28/1992	NO	
929081	plover	1992	Gavins	807.7	4	unknown	N 6/25/1992	7/8/1992	U	
929087	plover	1992	Gavins	772.5	4	unknown	N 6/22/1992	6/30/1992	U	
929130	tern	1992	Gavins	770.1	1	unknown	N 6/6/1992	6/23/1992	U	
929141	tern	1992	Gavins	772.5	1	unknown	6/12/1992	6/22/1992	U	
929179	tern	1992	Gavins	772.5	2	unknown	7/30/1992	8/18/1992	NO	
929194	tern	1992	Gavins	790.6	1	unknown	6/5/1992	6/12/1992	U	
929199	tern	1992	Gavins	790.6	2	unknown	6/22/1992	6/30/1992	U	
929202	tern	1992	Gavins	797	1	unknown	6/4/1992	6/11/1992	U	
929217	tern	1992	Gavins	804.5	1	unknown	6/25/1992	7/6/1992	U	
931001	plover	1993	Peck Lake	119	4	flooded-nest filled	6/4/1993	6/11/1993	O	Rising pool
931003	plover	1993	Peck Lake	111	4	flooded-nest filled	6/10/1993	6/26/1993	O	Rising pool
931005	plover	1993	Peck Lake	134	2	flooded-nest filled	6/19/1993	6/26/1993	O	Rising pool
931007	plover	1993	Peck Lake	101	4	flooded-nest filled	6/19/1993	7/5/1993	O	Rising pool
931008	plover	1993	Peck Lake	101	2	unknown	6/3/1993	6/10/1993	U	
931009	plover	1993	Peck Lake	115	4	flooded-nest filled	6/11/1993	6/28/1993	O	Rising pool
931011	plover	1993	Peck Lake	101	4	flooded-nest filled	6/19/1993	7/5/1993	O	Rising pool
931013	plover	1993	Peck Lake	101	4	flooded-nest filled	6/19/1993	7/5/1993	O	Rising pool
931014	plover	1993	Peck Lake	119	4	flooded-nest filled	6/30/1993	7/7/1993	O	Rising pool
931015	tern	1993	Peck Lake	105	3	flooded-nest filled	7/1/1993	7/7/1993	U	
931016	tern	1993	Peck Lake	134	2	flooded-nest filled	6/19/1993	6/28/1993	U	
931017	tern	1993	Peck Lake	134	2	flooded-nest filled	6/19/1993	6/28/1993	U	
932004	tern	1993	Peck	1709.4	3	unknown	6/19/1993	6/28/1993	U	
932005	tern	1993	Peck	1709.4	3	unknown	6/19/1993	6/28/1993	U	
932006	tern	1993	Peck	1709.4	3	unknown	6/19/1993	6/28/1993	U	
932007	tern	1993	Peck	1709.4	2	unknown	6/19/1993	6/28/1993	U	
932014	tern	1993	Peck	1709.4	1	unknown	6/28/1993	7/6/1993	U	
932015	plover	1993	Peck	1681.3	4	flooded-nest filled	7/20/1993	7/28/1993	NO	
933001	plover	1993	Sakakawea	Mallard Island	4	unknown	6/15/1993	6/22/1993	U	
933002	plover	1993	Sakakawea	Mallard Island	4	unknown	6/7/1993	6/15/1993	U	
933003	plover	1993	Sakakawea	1444 Deepwater Bay	4	flooded-nest filled	6/23/1993	6/30/1993	O	
933004	plover	1993	Sakakawea	1452 Van Hook Arm	2	flooded-nest filled	6/9/1993	6/16/1993	O	
933005	plover	1993	Sakakawea	1452 Van Hook Arm	2	flooded-nest filled	6/16/1993	6/28/1993	O	
933010	plover	1993	Sakakawea	1444 Deepwater Bay	1	unknown	6/30/1993	7/8/1993	U	
933011	tern	1993	Sakakawea	1444 Deepwater Bay	2	flooded-nest filled	7/20/1993	7/28/1993	O	
933012	tern	1993	Sakakawea	1444 Deepwater Bay	2	flooded-nest filled	7/20/1993	7/28/1993	O	
933013	tern	1993	Sakakawea	1444 Deepwater Bay	1	flooded-nest filled	7/28/1993	8/7/1993	O	
933015	tern	1993	Sakakawea	1444 Deepwater Bay	2	flooded-nest filled	7/28/1993	8/7/1993	O	
933201	plover	1993	Sakakawea	1506.2 Hofflund Bay	4	flood debris	6/1/1993	6/9/1993	O	
933205	plover	1993	Sakakawea	1506 Hofflund Bay	3	flood debris	6/18/1993	6/21/1993	O	
933206	plover	1993	Sakakawea	1505.6 Hofflund Bay	4	flood debris	6/21/1993	6/30/1993	O	
934002	tern	1993	Garrison	1369.4	1	flooded-eggs washed out	6/10/1993	6/17/1993	NO	
934003	tern	1993	Garrison	1369.4	2	flooded-eggs washed out	6/10/1993	6/17/1993	NO	
934004	tern	1993	Garrison	1369.4	1	unknown	6/10/1993	6/17/1993	probably lost	U
934005	tern	1993	Garrison	1369.4	2	flooded-eggs washed out	6/10/1993	6/17/1993	NO	
934007	tern	1993	Garrison	1369.4	1	unknown	6/10/1993	6/17/1993	U	
934008	tern	1993	Garrison	1369.4	2	flooded-eggs washed out	7/1/1993	7/9/1993	NO	
934012	tern	1993	Garrison	1369.4	1	unknown	6/10/1993	6/17/1993	U	
934014	tern	1993	Garrison	1351.1	2	flooded-nest filled	6/27/1993	7/7/1993	NO	
934026	tern	1993	Garrison	1374.6	2	flooded-nest filled	7/16/1993	7/24/1993	O	Increase in GARR release
934036	plover	1993	Garrison	1358.2	4	flooded-nest filled	6/27/1993	7/7/1993	NO	
934042	plover	1993	Garrison	1351.1	3	unknown	7/7/1993	7/14/1993	U	
934202	plover	1993	Garrison	1311.2	1	unknown	5/18/1993		O	Likely operational - rising pool May & June
934203	plover	1993	Garrison	1328.5	1	unknown	5/24/1993		O	Likely operational - rising pool May & June
934204	plover	1993	Garrison	1307.3	2	unknown	5/25/1993	6/2/1993	U	
934205	plover	1993	Garrison	1308.5	4	unknown	5/25/1993	6/2/1993	predation like	U
934207	plover	1993	Garrison	1328.5	1	unknown	5/28/1993		O	Likely operational - rising pool May & June
934217	plover	1993	Garrison	1308.5	1	unknown	7/1/1993	7/8/1993	U	
934225	plover	1993	Garrison	1352.7	2	unknown	6/18/1993	6/27/1993	U	
934228	plover	1993	Garrison	1307.3	4	unknown	6/17/1993	6/24/1993	O	Likely operational - rising pool May & June

H-11

Historical_Record

934229	plover	1993	Garrison	1308.7	2	flooded-eggs washed out	6/17/1993	6/24/1993	NO	Cannonball(BRND) and Heart(MAND)
934240	plover	1993	Garrison	1309.4	2	unknown	7/1/1993		O	Likely operational - rising pool May & June
934241	plover	1993	Garrison	1308.5	4	unknown	7/1/1993	7/8/1993	U	
934243	plover	1993	Garrison	1308.5	3	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934244	plover	1993	Garrison	1308.5	3	unknown	7/1/1993	7/8/1993	U	
934245	plover	1993	Garrison	1307.3	3	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934246	plover	1993	Garrison	1307.3	4	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934250	plover	1993	Garrison	1308.5	1	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934251	plover	1993	Garrison	1325.9	4	flood debris	7/19/1993	7/28/1993	NO	Cannonball(BRND) and Heart(MAND)
934254	plover	1993	Garrison	1327	2	unknown	7/19/1993	7/28/1993	U	
934255	plover	1993	Garrison	1319.8	3	flood debris	7/21/1993	7/28/1993	NO	Cannonball(BRND) and Heart(MAND)
934256	tern	1993	Garrison	1308.5	1	flooded-nest filled	6/10/1993	6/17/1993	NO	
934260	tern	1993	Garrison	1308.5	2	unknown	6/17/1993	6/24/1993	U	
934261	tern	1993	Garrison	1308.5	2	unknown	6/24/1993	7/1/1993	U	
934263	tern	1993	Garrison	1307.3	1	unknown	6/17/1993	6/24/1993	U	
934265	tern	1993	Garrison	1308.5	2	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934269	tern	1993	Garrison	1308.5	2	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934270	tern	1993	Garrison	1308.5	2	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934272	tern	1993	Garrison	1307.3	1	unknown	7/1/1993	7/8/1993	U	
934273	tern	1993	Garrison	1307.3	2	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934276	tern	1993	Garrison	1308.5	1	flood debris	7/8/1993	7/16/1993	NO	Cannonball(BRND) and Heart(MAND)
934277	tern	1993	Garrison	1307.3	2	flood debris	7/16/1993	7/20/1993	NO	
934278	tern	1993	Garrison	1319.8	1	flood debris	7/21/1993	7/28/1993	NO	Cannonball(BRND) and Heart(MAND)
934279	plover	1993	Garrison	1328.5	3	unknown	7/7/1993	7/10/1993	U	
934282	tern	1993	Garrison	1324.2	1	unknown	6/14/1993	6/21/1993	U	
934285	tern	1993	Garrison	1326.8	2	unknown	6/28/1993	7/7/1993	U	
934286	tern	1993	Garrison	1326.8	2	unknown	6/28/1993	7/7/1993	U	
935258	tern	1993	Oahe	1279.5	1	flooded-eggs washed out	6/23/1993	6/30/1993	O	Rising pool
936001	tern	1993	Oahe	1093	2	flood debris	7/2/1993	7/6/1993	O	Rising pool
936003	tern	1993	Oahe	1104	2	flooded-nest filled	7/6/1993	7/14/1993	O	Rising pool
936100	tern	1993	Oahe	1191.5	1	flooded-nest filled	6/18/1993	7/7/1993	O	Rising pool
936103	tern	1993	Oahe	1191.5	2	flood debris	7/21/1993	7/29/1993	O	Rising pool
936112	tern	1993	Oahe	1231.1 Kenel	2	flood debris	6/19/1993	6/29/1993	O	Rising pool
936113	tern	1993	Oahe	1231.1 Kenel	2	unknown	6/19/1993	6/29/1993	U	
936200	plover	1993	Oahe	1272	1	flood debris	6/30/1993	7/7/1993	U	
936201	plover	1993	Oahe	1272	2	flood debris	6/30/1993	7/7/1993	U	
936202	plover	1993	Oahe	1272	1	flooded-nest filled	6/23/1993	6/30/1993	U	
936203	plover	1993	Oahe	1272	1	flood debris	6/15/1993	6/23/1993	O	Rising pool
936206	plover	1993	Oahe	1272.5	1	flood debris	6/5/1993	6/15/1993	O	Rising pool
936207	plover	1993	Oahe	1272.5	1	flood debris	6/15/1993	6/23/1993	O	Rising pool
936208	plover	1993	Oahe	1272.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool
936209	plover	1993	Oahe	1272.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool
936210	plover	1993	Oahe	1273.1	1	unknown	5/26/1993	6/5/1993	O	Rising pool
936211	plover	1993	Oahe	1273.1	1	flood debris	6/15/1993	6/23/1993	O	Rising pool
936212	plover	1993	Oahe	1273.1	1	flooded-nest filled	7/7/1993	7/14/1993	O	Rising pool
936213	plover	1993	Oahe	1274	4	flood debris	6/30/1993	7/7/1993	O	Rising pool
936214	plover	1993	Oahe	1279.5	4	flood debris	6/30/1993	7/7/1993	O	Rising pool
936216	plover	1993	Oahe	1279.5	4	flood debris	6/30/1993	7/7/1993	O	Rising pool
936217	plover	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool
936218	plover	1993	Oahe	1279.5	4	flood debris	6/30/1993	7/7/1993	O	Rising pool
936219	plover	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool
936221	plover	1993	Oahe	1289.8	4	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool
936223	plover	1993	Oahe	1289.8	4	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool
936224	plover	1993	Oahe	1289.8	4	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool
936225	plover	1993	Oahe	1289.8	4	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool
936226	plover	1993	Oahe	1289.8	3	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool
936228	plover	1993	Oahe	1291.2	1	unknown	6/1/1993	6/10/1993	U	
936229	plover	1993	Oahe	1291.2	1	unknown	6/1/1993	6/10/1993	U	
936231	plover	1993	Oahe	1291.2	2	flood debris	6/23/1993	7/2/1993	O	Rising pool
936232	plover	1993	Oahe	1291.2	1	flood debris	6/23/1993	7/2/1993	O	Rising pool
936233	plover	1993	Oahe	1291.2	3	unknown	7/2/1993	7/9/1993	U	
936234	plover	1993	Oahe	1291.2	3	flood debris	6/24/1993	7/2/1993	O	Rising pool
936236	plover	1993	Oahe	1293.5	1	unknown	6/2/1993	6/10/1993	U	
936237	plover	1993	Oahe	1293.5	2	unknown	6/2/1993	6/10/1993	U	
936238	plover	1993	Oahe	1293.5	3	flooded-nest filled	7/12/1993	7/23/1993	O	Rising pool
936239	plover	1993	Oahe	1293.5	4	flooded-eggs washed out	7/12/1993	7/23/1993	O	Rising pool
936241	tern	1993	Oahe	1272	3	flood debris	6/30/1993	7/7/1993	O	Rising pool
936242	tern	1993	Oahe	1272	2	flood debris	6/30/1993	7/7/1993	O	Rising pool
936243	tern	1993	Oahe	1272	2	flood debris	6/30/1993	7/7/1993	O	Rising pool
936244	tern	1993	Oahe	1272.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool
936245	tern	1993	Oahe	1272.5	2	flood debris	6/23/1993	6/30/1993	O	Rising pool
936246	tern	1993	Oahe	1272.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool
936248	tern	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool
936249	tern	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool

H-12

Historical_Record

936250	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool	L	Rising pool	L	Rising pool
936251	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936252	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936253	tern	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936254	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936255	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936256	tern	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936257	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936259	tern	1993	Oahe	1279.5	3	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936260	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936261	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936262	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936263	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936264	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936265	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936266	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936267	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936268	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936269	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936270	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936271	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936272	tern	1993	Oahe	1279.5	2	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936273	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936274	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936275	tern	1993	Oahe	1279.5	1	flood debris	6/30/1993	7/7/1993	O	Rising pool				
936276	tern	1993	Oahe	1279.5	1	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936277	tern	1993	Oahe	1279.5	1	flood debris	7/14/1993	7/23/1993	O	Rising pool				
936280	tern	1993	Oahe	1289.8	1	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936281	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936282	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936283	tern	1993	Oahe	1289.8	3	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936284	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936285	tern	1993	Oahe	1289.8	3	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936286	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936287	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936288	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936289	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936290	tern	1993	Oahe	1289.8	1	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936291	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936292	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936293	tern	1993	Oahe	1289.8	2	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936294	tern	1993	Oahe	1289.8	1	flooded-nest filled	7/14/1993	7/23/1993	O	Rising pool				
936298	tern	1993	Oahe	1284.8	2	unknown	7/1/1993	7/8/1993	U					
936299	tern	1993	Oahe	1289.8	1	unknown	7/1/1993	7/8/1993	U					
936300	tern	1993	Oahe	1289.8	1	unknown	6/21/1993	6/30/1993	U					
936301	tern	1993	Oahe	1289.8	1	unknown	6/21/1993	6/30/1993	U					
936302	tern	1993	Oahe	1291.2	1	flood debris	6/24/1993	7/2/1993	O	Rising pool				
936304	tern	1993	Oahe	1292.2	1	flood debris	6/16/1993	6/24/1993	O	Rising pool				
936305	tern	1993	Oahe	1292.2	1	flood debris	6/16/1993	6/23/1993	O	Rising pool				
937001	plover	1993	Randall	869	1	unknown	6/4/1993	6/16/1993	U					
937002	plover	1993	Randall	866.7	3	flood debris	6/16/1993	6/23/1993	O					
938005	plover	1993	Lewis & Clark	833	2	unknown	6/15/1993	6/23/1993	U					
938006	plover	1993	Lewis & Clark	833	1	unknown	6/23/1993	7/9/1993	U					
938007	plover	1993	Lewis & Clark	833.7	2	unknown	5/25/1993	6/8/1993	U					
938009	plover	1993	Lewis & Clark	833.7	4	unknown	6/15/1993	6/23/1993	U					
938012	plover	1993	Lewis & Clark	843	2	unknown	5/11/1993	5/27/1993	U					
938017	tern	1993	Lewis & Clark	833	1	unknown	6/8/1993	6/15/1993	U					
938018	tern	1993	Lewis & Clark	833	1	flood debris	6/15/1993	6/23/1993	NO					
938021	tern	1993	Lewis & Clark	833.7	1	unknown	6/15/1993	6/23/1993	U					
938022	tern	1993	Lewis & Clark	833.7	3	unknown	6/15/1993	6/23/1993	U					
938023	tern	1993	Lewis & Clark	833.7	1	unknown	6/15/1993	6/23/1993	U					
938024	tern	1993	Lewis & Clark	833.7	2	unknown	6/15/1993	6/23/1993	U					
938025	tern	1993	Lewis & Clark	833.7	1	flood debris	6/15/1993	6/23/1993	NO					
938026	tern	1993	Lewis & Clark	833.7	3	unknown	6/15/1993	6/23/1993	NO					
938028	tern	1993	Lewis & Clark	833.7	2	flood debris	6/15/1993	6/23/1993	NO					
938029	tern	1993	Lewis & Clark	833.7	2	flood debris	6/15/1993	6/23/1993	NO					
938030	tern	1993	Lewis & Clark	833.7	3	flood debris	6/15/1993	6/23/1993	NO					
938031	tern	1993	Lewis & Clark	833.7	3	flood debris	6/15/1993	6/23/1993	NO					
938032	tern	1993	Lewis & Clark	833.7	2	flood debris	6/15/1993	6/23/1993	NO					
938052	tern	1993	Lewis & Clark	843	1	unknown	6/8/1993	6/23/1993	U					
938053	tern	1993	Lewis & Clark	843	1	unknown	6/23/1993	7/9/1993	U					
938054	tern	1993	Lewis & Clark	843	1	unknown	6/23/1993	7/9/1993	U					
938055	tern	1993	Lewis & Clark	843	1	unknown	6/23/1993	7/9/1993	U					
938067	tern	1993	Lewis & Clark	843.8	2	flood debris	7/9/1993	7/16/1993	NO					

H-13

Historical_Record

938068	tern	1993 Lewis & Clark	843.8	2	flooded-eggs washed out	7/9/1993	7/16/1993	NO	
939004	plover	1993 Gavins	764.3	3	flooded-eggs washed out	6/22/1993	7/7/1993	O	1 day up, 3-4 days down
939005	plover	1993 Gavins	764.3	4	flooded-nest filled	7/7/1993	7/12/1993	NO	Rain - Vermillion River
939007	plover	1993 Gavins	767.8	1	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939009	plover	1993 Gavins	772.5	4	flood debris	7/6/1993	7/19/1993	NO	Rain - Vermillion River
939010	plover	1993 Gavins	772.5	4	unknown	6/11/1993	6/21/1993	U	
939017	plover	1993 Gavins	772.5	4	unknown	6/11/1993	6/21/1993	U	
939020	plover	1993 Gavins	777.6	4	unknown	7/6/1993	8/4/1993	U	
939034	plover	1993 Gavins	797.8	4	unknown	6/16/1993	6/30/1993	U	
939054	plover	1993 Gavins	804.6	1	unknown	5/26/1993	6/10/1993	U	
939058	tern	1993 Gavins	757.3	3	unknown	6/14/1993	6/22/1993	U	
939073	tern	1993 Gavins	764.3	2	unknown	6/14/1993	6/22/1993	U	
939074	tern	1993 Gavins	766.3	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939075	tern	1993 Gavins	766.3	3	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939076	tern	1993 Gavins	766.3	3	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939077	tern	1993 Gavins	766.3	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River_L Rain - Vermillion River
939078	tern	1993 Gavins	766.3	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939079	tern	1993 Gavins	766.3	1	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939080	tern	1993 Gavins	766.3	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939087	tern	1993 Gavins	767.8	1	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939089	tern	1993 Gavins	767.8	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939090	tern	1993 Gavins	767.8	3	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939092	tern	1993 Gavins	772.5	2	unknown	6/11/1993	6/22/1993	U	
939097	tern	1993 Gavins	772.5	2	unknown	6/11/1993	6/21/1993	U	
939098	tern	1993 Gavins	772.5	1	unknown	6/2/1993	6/11/1993	U	
939099	tern	1993 Gavins	772.5	1	unknown	6/2/1993	6/11/1993	U	
939100	tern	1993 Gavins	772.5	1	unknown	6/2/1993	6/11/1993	U	
939102	tern	1993 Gavins	772.5	1	unknown	6/11/1993	6/21/1993	U	
939104	tern	1993 Gavins	772.5	3	unknown	6/11/1993	6/21/1993	U	
939106	tern	1993 Gavins	772.5	1	unknown	6/11/1993	6/21/1993	U	
939109	tern	1993 Gavins	772.5	2	unknown	6/11/1993	6/21/1993	U	
939112	tern	1993 Gavins	777.6	1	flood debris	6/11/1993	6/21/1993	NO	
939113	tern	1993 Gavins	777.6	1	flood debris	6/11/1993	6/21/1993	NO	
939114	tern	1993 Gavins	777.6	1	flooded-eggs washed out	6/11/1993	6/21/1993	NO	
939115	tern	1993 Gavins	777.6	1	flood debris	6/11/1993	6/21/1993	NO	
939116	tern	1993 Gavins	777.6	3	flood debris	6/11/1993	6/21/1993	NO	
939117	tern	1993 Gavins	777.6	3	unknown	6/21/1993	7/6/1993	U	
939119	tern	1993 Gavins	777.6	3	unknown	6/21/1993	7/6/1993	U	
939120	tern	1993 Gavins	777.6	2	unknown	6/21/1993	7/6/1993	U	
939121	tern	1993 Gavins	777.6	3	flood debris	7/8/1993	7/19/1993	NO	
939128	tern	1993 Gavins	770.6	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939129	tern	1993 Gavins	770.6	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939130	tern	1993 Gavins	770.6	2	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939131	tern	1993 Gavins	770.6	1	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939132	tern	1993 Gavins	770.6	3	flooded-nest filled	7/7/1993	7/20/1993	NO	Rain - Vermillion River
939134	tern	1993 Gavins	777.6	3	unknown	7/19/1993	7/29/1993	U	
939146	tern	1993 Gavins	789.8	3	flood debris	6/17/1993	7/2/1993	NO	
939158	tern	1993 Gavins	789.8	3	flood debris	6/17/1993	7/2/1993	NO	
939169	tern	1993 Gavins	789.8	3	flood debris	6/17/1993	7/2/1993	NO	
939176	tern	1993 Gavins	789.8	2	unknown	7/2/1993	7/15/1993	U	
939182	tern	1993 Gavins	796.9	2	flooded-nest filled	7/1/1993	7/15/1993	NO	
939183	tern	1993 Gavins	796.9	3	flooded-nest filled	7/1/1993	7/15/1993	NO	
939192	tern	1993 Gavins	797.8	2	flooded-nest filled	6/30/1993	7/15/1993	NO	
939193	tern	1993 Gavins	797.8	3	flooded-nest filled	6/30/1993	7/15/1993	NO	
939195	tern	1993 Gavins	796.9	1	unknown	7/15/1993	8/4/1993	U	
939209	tern	1993 Gavins	801.5	2	flooded-eggs washed out	6/30/1993	7/14/1993	NO	
939218	tern	1993 Gavins	801.5	1	unknown	6/16/1993	6/30/1993	U	
939220	tern	1993 Gavins	801.5	2	flooded-eggs washed out	6/30/1993	7/14/1993	NO	
941012	tern	1994 Peck Lake		2	flooded-eggs washed out	6/18/1994	6/26/1994	O	Steady pool - likely wind-wave
941018	tern	1994 Peck Lake		1	unknown	7/27/1994	8/3/1994	about 400 gul U	
942013	tern	1994 Peck	1709.2	3	unknown	6/15/1994	7/11/1994	U	
942016	tern	1994 Peck	1681.4	1	unknown	6/21/1994	6/29/1994	U	
943001	plover	1994 Sakakawea		4	flooded-nest filled	6/9/1994	6/16/1994	O	Rising pool
943006	plover	1994 Sakakawea		4	flooded-nest filled	6/3/1994	6/12/1994	O	Rising pool
943011	plover	1994 Sakakawea		4	flooded-nest filled	6/23/1994	7/1/1994	O	Rising pool
944003	plover	1994 Garrison	1354	4	unknown	6/6/1994	6/20/1994	U	
944020	tern	1994 Garrison	1389.8	3	unknown	6/9/1994	6/16/1994	U	
944040	tern	1994 Garrison	1351.8	1	unknown	6/17/1994	6/21/1994	U	
944053	plover	1994 Garrison	1351.8	4	unknown	6/21/1994	6/28/1994	U	
944060	plover	1994 Garrison	1354	2	unknown	6/20/1994	6/29/1994	U	
944084	tern	1994 Garrison	1374.5	2	flooded-eggs washed out	7/7/1994	7/11/1994	O	
944114	plover	1994 Garrison	1341.2	3	unknown	6/1/1994	6/9/1994	U	
944174	tern	1994 Garrison	1329	1	unknown	6/13/1994	6/20/1994	U	
944183	tern	1994 Garrison	1329	1	unknown	6/20/1994	6/29/1994	U	

H-14

Historical_Record

944185	tern	1994	Garrison	1328	2	unknown	6/20/1994	6/29/1994	U	
944190	tern	1994	Garrison	1327.3	2	unknown	6/20/1994	6/29/1994	U	
944192	tern	1994	Garrison	1309.5	2	unknown	6/22/1994	7/1/1994	U	
944193	tern	1994	Garrison	1309.5	2	unknown	6/22/1994	7/1/1994	U	
944195	tern	1994	Garrison	1309.5	2	unknown	6/22/1994	7/1/1994	U	
944197	tern	1994	Garrison	1308.3	1	unknown	6/22/1994	7/1/1994	U	
944234	tern	1994	Garrison	1328	3	unknown	7/14/1994	7/22/1994	U	
944311	tern	1994	Garrison	1335	2	unknown	6/20/1994	6/28/1994	U	
944313	tern	1994	Garrison	1335	2	unknown	6/20/1994	6/28/1994	U	
944317	tern	1994	Garrison	1335	2	unknown	6/20/1994	6/28/1994	U	
944318	tern	1994	Garrison	1335	2	unknown	6/20/1994	6/28/1994	U	
946101	plover	1994	Oahe	1091	3	unknown	6/21/1994	6/29/1994	U	
946102	tern	1994	Oahe	1091	3	unknown	6/21/1994	6/29/1994	U	
946235	tern	1994	Oahe	1270	2	unknown	6/10/1994	6/21/1994	U	
947020	tern	1994	Randall	869	1	flooded-nest filled	7/12/1994	7/19/1994	NO	
947022	tern	1994	Randall	869	2	flooded-eggs washed out	7/5/1994	7/19/1994	NO	
947029	tern	1994	Randall	869	1	flooded-nest filled	7/5/1994	7/12/1994	NO	
947030	tern	1994	Randall	869	3	flooded-nest filled	7/5/1994	7/12/1994	NO	
948219	tern	1994	Lewis & Clark	842.2	1	flooded-eggs washed out	6/28/1994	7/6/1994	O	
948220	tern	1994	Lewis & Clark	842.2	1	flooded-eggs washed out	6/28/1994	7/6/1994	O	
948221	tern	1994	Lewis & Clark	842.2	1	flooded-eggs washed out	6/28/1994	7/6/1994	O	
948222	tern	1994	Lewis & Clark	842.2	2	flooded-eggs washed out	6/28/1994	7/6/1994	O	
948223	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/8/1994	7/14/1994	NO	Rain - Niobrara
948224	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948254	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948255	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948256	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948257	tern	1994	Lewis & Clark	843.4	2	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948258	tern	1994	Lewis & Clark	843.4	1	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
948259	plover	1994	Lewis & Clark	843.4	5	flooded-eggs washed out	7/6/1994	7/14/1994	NO	Rain - Niobrara
949061	plover	1994	Gavins	801	1	unknown	6/2/1994	6/9/1994	U	
949082	plover	1994	Gavins	801.5	4	unknown	6/16/1994	6/23/1994	U	
949088	plover	1994	Gavins	760.6	4	unknown	6/17/1994	6/30/1994	U	
949098	tern	1994	Gavins	770	1	unknown	6/3/1994	6/10/1994	U	
949105	tern	1994	Gavins	768.4	2	unknown	6/10/1994	6/20/1994	U	
949107	tern	1994	Gavins	768.4	3	unknown	6/10/1994	6/20/1994	U	
949111	tern	1994	Gavins	804.6	3	unknown	6/16/1994	6/23/1994	U	
949157	tern	1994	Gavins	761.7	3	unknown	6/10/1994	6/21/1994	U	
949158	tern	1994	Gavins	761.7	1	unknown	6/10/1994	6/21/1994	U	
949180	tern	1994	Gavins	775	3	flooded-nest filled	6/24/1994	7/1/1994	NO	Rainfall
949181	tern	1994	Gavins	775	3	flooded-nest filled	6/24/1994	7/1/1994	NO	Rainfall
949185	tern	1994	Gavins	775	1	flooded-other	6/24/1994	7/1/1994	NO	Rainfall
949187	tern	1994	Gavins	772.5	3	unknown	6/20/1994	6/24/1994	U	
949204	tern	1994	Gavins	804.6	3	unknown	6/23/1994	6/29/1994	U	
949205	tern	1994	Gavins	804.6	3	unknown	6/23/1994	6/29/1994	U	
949206	tern	1994	Gavins	804.6	3	unknown	6/23/1994	6/29/1994	U	
949216	tern	1994	Gavins	789.5	1	flooded-eggs washed out	6/27/1994	7/5/1994	NO	Rainfall - Vermillion River
949217	tern	1994	Gavins	789.5	1	flooded-eggs washed out	6/27/1994	7/5/1994	NO	Rainfall - Vermillion River
949218	tern	1994	Gavins	789.5	1	flooded-eggs washed out	6/27/1994	7/5/1994	NO	Rainfall - Vermillion River
949238	plover	1994	Gavins	790.6	4	unknown	6/30/1994	7/15/1994	U	
949249	tern	1994	Gavins	789.5	3	flooded-eggs washed out	7/5/1994	7/12/1994	NO	Rainfall - Vermillion River
949250	tern	1994	Gavins	789.5	2	unknown	7/12/1994	7/19/1994	U	
949251	tern	1994	Gavins	789.5	1	flooded-eggs washed out	7/5/1994	7/12/1994	U	
949252	tern	1994	Gavins	789.5	3	flooded-eggs washed out	7/5/1994	7/12/1994	NO	Rainfall - Vermillion River
949253	plover	1994	Gavins	769.5	4	unknown	7/12/1994	7/19/1994	U	
949272	tern	1994	Gavins	797.8	2	flooded-eggs washed out	7/11/1994	7/18/1994	NO	
949275	tern	1994	Gavins	797.8	2	flooded-eggs washed out	7/8/1994	7/18/1994	NO	
949277	plover	1994	Gavins	797.8	3	unknown	7/11/1994	7/18/1994	U	
949279	tern	1994	Gavins	804.5	2	unknown	7/11/1994	7/25/1994	U	
949287	tern	1994	Gavins	797.8	1	flooded-eggs washed out	7/11/1994	7/18/1994	NO	
949288	tern	1994	Gavins	797.8	2	flooded-eggs washed out	7/11/1994	7/18/1994	NO	
949295	tern	1994	Gavins	804.6	1	unknown	7/25/1994	8/1/1994	U	
949298	tern	1994	Gavins	774.8	1	unknown	7/12/1994	7/19/1994	U	
951001	plover	1995	Peck Lake	Beach 1A	1	flooded-nest missing	5/23/1995	5/25/1995	area under w: O	Rising pool
951002	plover	1995	Peck Lake	Beach 40E	3	flooded-nest missing	5/17/1995	5/23/1995	O	Rising pool
951006	plover	1995	Peck Lake	Beach 40N	2	flooded-eggs washed out	6/1/1995	6/9/1995	O	Rising pool
951008	plover	1995	Peck Lake	Beach 18	2	flooded-nest missing	6/5/1995	6/13/1995	O	Rising pool
951009	plover	1995	Peck Lake	Beach 37	3	flooded-nest missing	6/9/1995	6/12/1995	O	Rising pool
951010	plover	1995	Peck Lake	Beach 20	1	flooded-nest missing	6/13/1995	6/20/1995	O	Rising pool
951101	tern	1995	Peck Lake	Beach 37	1	flooded-nest missing	6/12/1995	6/16/1995	O	Rising pool
951102	tern	1995	Peck Lake	Beach 41	1	flooded-nest missing	6/16/1995	6/20/1995	O	Rising pool
951103	tern	1995	Peck Lake	Beach 37	1	flooded-nest missing	6/16/1995	6/20/1995	O	Rising pool
951104	tern	1995	Peck Lake	Beach 37	2	flooded-nest missing	6/16/1995	6/20/1995	O	Rising pool
951105	tern	1995	Peck Lake	Beach 37	1	flooded-nest missing	6/16/1995	6/20/1995	O	Rising pool

Historical_Record

952104	tern	1995 Peck	1580.2	2 flooded-eggs washed out	7/20/1995	7/27/1995	NO	Declining stages at WPMT & CLMT
953004	plover	1995 Sakakawea		4 flooded-eggs washed out	6/4/1995	6/11/1995	O	Rising pool
953005	plover	1995 Sakakawea		4 flooded-eggs washed out	6/4/1995	6/11/1995	O	Rising pool
953006	plover	1995 Sakakawea		4 flooded-nest missing	6/12/1995	6/18/1995	O	Rising pool
953007	plover	1995 Sakakawea		4 flooded-eggs washed out	6/3/1995	6/7/1995	O	Rising pool
953008	tern	1995 Sakakawea		3 flooded-nest missing	6/10/1995	6/17/1995	O	Rising pool
953009	plover	1995 Sakakawea		4 flooded-nest missing	6/10/1995	6/17/1995	O	Rising pool
953011	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953012	plover	1995 Sakakawea		3 flooded-nest missing	6/4/1995	6/11/1995	O	Rising pool
953014	plover	1995 Sakakawea		4 flooded-nest missing	6/4/1995	6/11/1995	O	Rising pool
953015	plover	1995 Sakakawea		4 flooded-nest missing	6/12/1995	6/18/1995	O	Rising pool
953016	plover	1995 Sakakawea		4 flooded-nest missing	6/16/1995	7/2/1996	O	Rising pool
953017	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953018	plover	1995 Sakakawea		1 flooded-nest missing	6/9/1995	6/16/1995	O	Rising pool
953019	plover	1995 Sakakawea		4 collected	6/19/1995		C	
953020	plover	1995 Sakakawea		1 collected	6/18/1995		C	
953021	plover	1995 Sakakawea		2 flooded-nest missing	7/10/1995	7/17/1995	U	
953022	plover	1995 Sakakawea		3 flooded-eggs washed out	6/26/1995	7/3/1995	U	
953023	plover	1995 Sakakawea		4 flooded-eggs washed out	7/3/1995	7/10/1995	U	
953024	plover	1995 Sakakawea		4 flooded-nest missing	6/26/1995	7/3/1995	U	
953026	tern	1995 Sakakawea		2 flooded-nest missing	7/10/1995	7/17/1995	U	
953201	plover	1995 Sakakawea		4 collected	6/2/1995		C	
953203	plover	1995 Sakakawea		4 collected	6/2/1995		C	
953204	plover	1995 Sakakawea		4 collected	6/2/1995		C	
953205	plover	1995 Sakakawea		4 collected	6/2/1995		C	
953206	plover	1995 Sakakawea		4 collected	6/2/1995		C	
953211	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953212	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953213	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953214	plover	1995 Sakakawea		4 collected	6/18/1995		C	
953216	plover	1995 Sakakawea		2 collected	6/18/1995		C	
953363	tern	1995 Garrison	1320	1 unknown	7/12/1995	7/21/1995	U	
954004	plover	1995 Garrison	1377.3	4 unknown	6/13/1995	6/20/1995	U	
954021	tern	1995 Garrison	1367.2	2 unknown	6/13/1995	6/20/1995	U	
954026	tern	1995 Garrison	1364.4	3 unknown	6/13/1995	6/23/1995	U	
954031	tern	1995 Garrison	1361	3 flooded-eggs washed out	6/23/1995	6/30/1995	O	Change in GARR release
954047	tern	1995 Garrison	1361	2 flooded-eggs washed out	6/24/1995	6/30/1995	O	Change in GARR release
954049	plover	1995 Garrison	1370	4 collected	7/26/1995		C	
954055	plover	1995 Garrison	1374.5	3 collected	7/18/1995		C	
954057	plover	1995 Garrison	1359	4 collected	7/27/1995		C	
954069	plover	1995 Garrison	1356	4 flooded-nest filled	7/7/1995	7/13/1995	O	Increase in GARR release
954070	tern	1995 Garrison	1380	2 collected	7/27/1995		C	
954071	tern	1995 Garrison	1380	2 flooded-eggs washed out	7/26/1995	7/27/1995	O	Change in GARR release
954076	tern	1995 Garrison	1364.4	2 flooded-nest filled	7/7/1995	7/12/1995	O	Change in GARR release
954206	plover	1995 Garrison	1335.5	1 unknown	5/25/1995	6/2/1995	U	
954215	plover	1995 Garrison	1354.2	4 unknown	6/12/1995	6/23/1995	U	
954219	plover	1995 Garrison	1354.2	4 unknown	6/12/1995	6/23/1995	U	
954220	plover	1995 Garrison	1345	4 unknown	6/8/1995	6/13/1995	U	
954228	plover	1995 Garrison	1354.2	4 unknown	6/12/1995	6/23/1995	U	
954229	tern	1995 Garrison	1347.5	1 unknown	6/13/1995	6/25/1995	U	
954230	tern	1995 Garrison	1347.5	1 unknown	6/13/1995	6/25/1995	U	
954231	tern	1995 Garrison	1347.5	3 unknown	6/13/1995	6/25/1995	U	
954235	tern	1995 Garrison	1347.5	2 unknown	6/13/1995	6/25/1995	U	
954240	tern	1995 Garrison	1328	1 unknown	6/9/1995	6/19/1995	U	
954244	tern	1995 Garrison	1328	3 unknown	6/19/1995	6/27/1995	U	
954245	tern	1995 Garrison	1328	3 unknown	6/19/1995	6/27/1995	U	
954273	tern	1995 Garrison	1347.5	2 unknown	6/13/1995	6/25/1995	U	
954278	tern	1995 Garrison	1347.5	2 unknown	6/13/1995	6/25/1995	U	
954279	tern	1995 Garrison	1347.5	1 unknown	6/13/1995	6/25/1995	U	
954282	plover	1995 Garrison	1338	2 unknown	6/19/1995	6/26/1995	U	
954283	plover	1995 Garrison	1338	4 unknown	6/19/1995	6/26/1995	U	
954288	tern	1995 Garrison	1338	3 flooded-nest filled	6/26/1995	7/11/1995	O	Increase in GARR release
954304	tern	1995 Garrison	1335.5	3 unknown	6/26/1995	7/11/1995	U	
954306	tern	1995 Garrison	1335.5	3 unknown	6/19/1995	6/26/1995	U	
954308	plover	1995 Garrison	1328	4 flooded-nest filled	6/27/1995	7/11/1995	O	Increase in GARR release
954339	tern	1995 Garrison	1345.5	2 unknown	6/25/1995	7/7/1995	U	
954342	plover	1995 Garrison	1345	4 collected	7/25/1995		C	
954348	tern	1995 Garrison	1335.5	2 unknown	6/26/1995	7/11/1995	U	
954351	tern	1995 Garrison	1335.5	2 unknown	6/26/1995	7/11/1995	U	
954352	plover	1995 Garrison	1335.5	4 unknown	6/26/1995	7/11/1995	U	
954362	plover	1995 Garrison	1325.5	2 unknown	6/27/1995	7/11/1995	U	
954364	tern	1995 Garrison	1327.5	2 unknown	6/27/1995	7/11/1995	U	
954365	plover	1995 Garrison	1327.5	4 flooded-eggs washed out	7/11/1995	7/20/1995	O	Increase in GARR release
954366	plover	1995 Garrison	1328	1 unknown	6/27/1995	7/20/1995	U	

H-16

Historical_Record

954369	plover	1995	Garrison	1354.6	4	collected	7/27/1995		C		
954370	tern	1995	Garrison	1351.5	2	collected	7/25/1995		C		
954372	plover	1995	Garrison	1345.5	4	collected	7/25/1995		C		
954374	tern	1995	Garrison	1345.5	2	collected	7/25/1995		C		
954375	plover	1995	Garrison	1338	3	collected	7/25/1995		C		
954376	tern	1995	Garrison	1338	2	collected	7/25/1995		C		
954377	tern	1995	Garrison	1338	2	collected	7/25/1995		C		
954379	plover	1995	Garrison	1335.5	4	collected	7/27/1995		C		
954380	tern	1995	Garrison	1325.5	2	collected	7/25/1995		C		
954384	plover	1995	Garrison	1322	3	collected	7/27/1995		C		
954386	plover	1995	Garrison	1319.8	4	collected	7/25/1995		C		
954387	plover	1995	Garrison	1319.8	1	collected	7/25/1995		C		
954389	plover	1995	Garrison	1309.5	4	collected	7/25/1995		C		
954390	plover	1995	Garrison	1308.7	1	flooded-nest filled	7/13/1995	7/21/1995	NO	No change in GARR Q, no change in peak stage	
954391	tern	1995	Garrison	1345.5	2	collected	7/25/1995		C		
954394	tern	1995	Garrison	1345.5	2	collected	7/25/1995		C		
954396	tern	1995	Garrison	1338.8	2	collected	7/25/1995		C		
954397	tern	1995	Garrison	1338	2	collected	7/25/1995		C		
954398	tern	1995	Garrison	1338	2	collected	7/25/1995		C		
954399	tern	1995	Garrison	1324.2	2	collected	7/25/1995		C		
954400	tern	1995	Garrison	1308.4	1	collected	7/28/1995		C		
954401	tern	1995	Garrison	1345.5	1	collected	7/26/1995		C		
954416	tern	1995	Garrison	1327	2	collected	7/27/1995		C		
956001	plover	1995	Oahe	1106.6	4	flooded-eggs washed out	5/29/1995	6/5/1995	O	Rising pool	
956002	plover	1995	Oahe	1090	4	flooded-eggs washed out	5/23/1995	5/29/1995	O	Rising pool	
956003	plover	1995	Oahe	1104.5	Mission Island	4	collected	6/1/1995		C	
956005	plover	1995	Oahe	1091.9	Okobojo	4	collected	5/25/1995		C	
956007	plover	1995	Oahe	1091.9	Okobojo	2	collected	6/1/1995		C	
956008	plover	1995	Oahe	1092	Okobojo	3	unknown	6/13/1995	6/18/1995	U	
956009	plover	1995	Oahe	1104.5	Mission Island	1	flooded-eggs washed out	6/12/1995	6/16/1995	O	Rising pool
956207	plover	1995	Oahe	1270	Dredge Island	2	flooded-other	6/6/1995	6/14/1995	U	Rising pool
956229	tern	1995	Oahe	1270	Dredge Island	2	unknown	7/17/1995	7/24/1995	U	
957001	plover	1995	Randall	866.7		2	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957002	tern	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957003	tern	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957004	tern	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957005	tern	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957006	plover	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957007	plover	1995	Randall	866.7		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957008	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957009	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957010	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957011	plover	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957012	plover	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957013	plover	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957014	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957015	plover	1995	Randall	869		2	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957016	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957017	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957018	tern	1995	Randall	869		1	flooded-nest filled	6/6/1995	6/9/1995	O	Increase in FTRA releases
957019	tern	1995	Randall	869		1	collected	6/9/1995		C	
957020	tern	1995	Randall	869		1	collected	6/9/1995		C	
957021	tern	1995	Randall	866.7		1	collected	6/13/1995		C	
957022	tern	1995	Randall	869		1	collected	6/13/1995		C	
957023	tern	1995	Randall	869		1	collected	6/13/1995		C	
957024	tern	1995	Randall	869		1	collected	6/13/1995		C	
957025	tern	1995	Randall	866.7		2	collected	6/16/1995		C	
957026	tern	1995	Randall	869		2	collected	6/16/1995		C	
957028	tern	1995	Randall	869		1	collected	6/20/1995		C	
957032	tern	1995	Randall	869		2	collected	6/20/1995		C	
957033	tern	1995	Randall	869		2	collected	6/20/1995		C	
958002	tern	1995	Lewis & Clark	840		1	flooded-eggs washed out	6/12/1995	6/16/1995	O	
958003	tern	1995	Lewis & Clark	840		1	flooded-eggs washed out	6/12/1995	6/16/1995	O	
958004	tern	1995	Lewis & Clark	840		3	collected	6/12/1995		C	
958005	tern	1995	Lewis & Clark	840		1	collected	6/12/1995		C	
958006	tern	1995	Lewis & Clark	840		1	collected	6/12/1995		C	
958007	tern	1995	Lewis & Clark	840		1	collected	6/12/1995		C	
958008	tern	1995	Lewis & Clark	840		2	collected	6/12/1995		C	
958009	tern	1995	Lewis & Clark	840		2	collected	6/12/1995		C	
958010	tern	1995	Lewis & Clark	840		3	collected	6/12/1995		C	
958011	plover	1995	Lewis & Clark	840		3	collected	6/12/1995		C	
958012	tern	1995	Lewis & Clark	840		3	collected	6/12/1995		C	
958014	tern	1995	Lewis & Clark	840		2	flooded-eggs washed out	6/12/1995	6/16/1995	O	
958015	tern	1995	Lewis & Clark	828.5		1	collected	6/26/1995		C	

Historical_Record

958017	tern	1995 Lewis & Clark	828.5	2 collected	6/26/1995		C	
958018	tern	1995 Lewis & Clark	828.5	3 collected	6/26/1995		C	
958019	plover	1995 Lewis & Clark	828.5	2 collected	6/26/1995		C	
958020	tern	1995 Lewis & Clark	828.5	1 collected	6/26/1995		C	
959001	plover	1995 Gavins	797	4 flooded-other	5/22/1995	6/2/1995 water was ab	NO	Rainfall - 5 kcfs on James
959003	plover	1995 Gavins	803.8	2 flooded-eggs washed out	5/22/1995	6/2/1995	NO	Rainfall - 5 kcfs on James
959004	plover	1995 Gavins	807.7	2 collected	6/2/1995		C	
959006	plover	1995 Gavins	804.5	4 collected	6/15/1995		C	
959010	plover	1995 Gavins	802	4 collected	6/15/1995		C	
959011	plover	1995 Gavins	802	4 collected	6/15/1995		C	
959012	tern	1995 Gavins	801	3 collected	6/15/1995		C	
959013	plover	1995 Gavins	801	4 collected	6/15/1995		C	
959015	tern	1995 Gavins	801	3 collected	6/15/1995		C	
959017	plover	1995 Gavins	801	4 collected	6/15/1995		C	
959018	tern	1995 Gavins	802	3 collected	6/15/1995		C	
959019	plover	1995 Gavins	802	4 collected	6/15/1995		C	
959020	tern	1995 Gavins	802	3 collected	6/15/1995		C	
959021	plover	1995 Gavins	802	4 collected	6/15/1995		C	
959024	tern	1995 Gavins	802	3 collected	6/15/1995		C	
959025	tern	1995 Gavins	802	3 collected	6/15/1995		C	
959026	tern	1995 Gavins	807.7	3 flooded-eggs washed out	6/7/1995	6/12/1995	O	Increase in GAPT releases
959027	plover	1995 Gavins	807.7	4 collected	6/12/1995		O	
959028	tern	1995 Gavins	807.7	3 flooded-eggs washed out	6/12/1995	6/15/1995	O	Increase in GAPT releases
959029	plover	1995 Gavins	807.7	4 flooded-eggs washed out	6/12/1995	6/15/1995	O	Increase in GAPT releases
959030	tern	1995 Gavins	807.7	3 collected	6/12/1995		C	
959031	tern	1995 Gavins	807.7	1 collected	6/12/1995		C	
959032	tern	1995 Gavins	807.7	3 collected	6/12/1995		C	
959033	plover	1995 Gavins	804.5	4 collected	6/15/1995		C	
959034	tern	1995 Gavins	804.5	3 collected	6/15/1995		C	
959035	tern	1995 Gavins	804.5	1 collected	6/15/1995		C	
959036	plover	1995 Gavins	804.5	4 collected	6/15/1995		C	
959037	plover	1995 Gavins	804.5	4 collected	6/15/1995		C	
959038	tern	1995 Gavins	804.5	3 collected	6/19/1995		C	
959040	plover	1995 Gavins	804.5	3 collected	6/19/1995		C	
959041	tern	1995 Gavins	804.5	2 collected	6/19/1995		C	
959042	tern	1995 Gavins	804.5	2 flooded-eggs washed out	6/12/1995	6/14/1995	O	Increase in GAPT releases
959044	plover	1995 Gavins	804.5	3 collected	6/19/1995		C	
959045	plover	1995 Gavins	804.5	4 collected	6/15/1995		C	
959046	tern	1995 Gavins	804.5	1 collected	6/19/1995		C	
959047	tern	1995 Gavins	804.5	1 collected	6/15/1995		C	
959048	tern	1995 Gavins	804.5	1 flooded-eggs washed out	6/12/1995	6/20/1995	O	Increase in GAPT releases
959049	tern	1995 Gavins	791.2	1 collected	6/15/1995		C	
959051	tern	1995 Gavins	760	3 collected	6/16/1995		C	
959052	tern	1995 Gavins	760	2 collected	6/16/1995		C	
959053	tern	1995 Gavins	760	2 collected	6/16/1995		C	
959058	plover	1995 Gavins	760	4 collected	6/16/1995		C	
959059	tern	1995 Gavins	791.2	3 collected	6/15/1995		C	
959060	plover	1995 Gavins	791.2	2 collected	6/15/1995		C	
959061	tern	1995 Gavins	791.2	2 collected	6/15/1995		C	
959062	tern	1995 Gavins	791.2	2 collected	6/15/1995		C	
959063	tern	1995 Gavins	791.2	2 collected	6/15/1995		C	
959064	tern	1995 Gavins	791.2	1 collected	6/15/1995		C	
959065	tern	1995 Gavins	791.2	3 collected	6/15/1995		C	
959067	tern	1995 Gavins	801	3 collected	6/15/1995		C	
959068	tern	1995 Gavins	801	3 collected	6/15/1995		C	
959069	plover	1995 Gavins	801	4 collected	6/15/1995		C	
959070	tern	1995 Gavins	801	1 collected	6/15/1995		C	
959071	tern	1995 Gavins	801	3 collected	6/15/1995		C	
959072	plover	1995 Gavins	801	2 collected	6/15/1995		C	
959073	tern	1995 Gavins	804.5	2 collected	6/15/1995		C	
959074	tern	1995 Gavins	804.5	2 collected	6/15/1995		C	
959075	tern	1995 Gavins	804.5	2 collected	6/15/1995		C	
959076	tern	1995 Gavins	804.5	3 collected	6/19/1995		C	
959077	plover	1995 Gavins	804.5	4 collected	6/19/1995		C	
959078	plover	1995 Gavins	804.5	1 collected	6/19/1995		C	
959079	plover	1995 Gavins	804.5	4 collected	6/19/1995		C	
959080	plover	1995 Gavins	804.5	4 collected	6/19/1995		C	
959081	tern	1995 Gavins	802	2 collected	6/15/1995		C	
959082	tern	1995 Gavins	791.2	1 collected	6/15/1995		C	
959083	tern	1995 Gavins	799.2	1 collected	6/19/1995		C	
959084	tern	1995 Gavins	799.2	2 collected	6/19/1995		C	
959085	tern	1995 Gavins	804.5	3 collected	6/20/1995		C	
959086	plover	1995 Gavins	804.5	4 collected	6/20/1995		C	
959087	plover	1995 Gavins	804.5	1 collected	6/20/1995		C	

Historical_Record

959088	tern	1995	Gavins	804.5	2	collected	6/20/1995		C	
959090	plover	1995	Gavins	804.5	1	collected	6/20/1995		C	
959095	plover	1995	Gavins	801	2	collected	6/20/1995		C	
959097	tern	1995	Gavins	801	2	collected	6/20/1995		C	
959103	tern	1995	Gavins	801	1	collected	6/20/1995		C	
959104	tern	1995	Gavins	801	2	collected	6/20/1995		C	
959149	plover	1995	Gavins	780	4	collected	7/21/1995		C	
959151	tern	1995	Gavins	804.5	2	flooded-eggs washed out	7/18/1995	7/25/1995	O	Increase in GAPT releases
959161	tern	1995	Gavins	804.5	2	flooded-eggs washed out	7/17/1995	7/18/1995	O	Change in GAPT releases
963003	plover	1996	Sakakawea	Deepwater	4	flooded-other	6/9/1996	6/14/1996	O	Rising pool
963007	plover	1996	Sakakawea	Independence Point	4	unknown	6/9/1996	6/22/1996	U	nest & cage t
963009	plover	1996	Sakakawea	1451 Van Hook Arm	4	collected	6/17/1996		C	
963010	plover	1996	Sakakawea	1451 Van Hook Arm	3	collected	6/17/1996		C	
963012	tern	1996	Sakakawea	1444 Deepwater Bay	3	collected	6/17/1996		C	
963014	tern	1996	Sakakawea	Deepwater	3	collected	6/17/1996		C	
963017	plover	1996	Sakakawea	Pouch Point	4	collected	6/17/1996		C	
963019	plover	1996	Sakakawea	Steinke Bay	1	flooded-eggs washed out	6/11/1996	6/14/1996	O	Rising pool
963020	plover	1996	Sakakawea	Steinke Bay	3	collected	6/17/1996		C	
963022	plover	1996	Sakakawea	Beaver Creek Bay	4	flooded-eggs washed out	6/12/1996	6/26/1996	O	Rising pool
963023	plover	1996	Sakakawea	Douglas Creek Bay	4	collected	6/17/1996		C	
963024	plover	1996	Sakakawea	Steinke Bay	4	collected	6/17/1996		C	
963025	plover	1996	Sakakawea	Steinke Bay	3	collected	6/17/1996		C	
963027	plover	1996	Sakakawea	Deepwater	2	collected	6/17/1996		C	
963028	tern	1996	Sakakawea	Deepwater	3	collected	6/17/1996		C	
963029	tern	1996	Sakakawea	Deepwater	2	collected	6/17/1996		C	
963030	tern	1996	Sakakawea	Deepwater	3	collected	6/17/1996		C	
963031	tern	1996	Sakakawea	Deepwater	3	collected	6/17/1996		C	
963032	tern	1996	Sakakawea	Deepwater	1	collected	6/17/1996		C	
963033	tern	1996	Sakakawea	Deepwater	3	collected	6/17/1996		C	
963034	plover	1996	Sakakawea	Deepwater	4	collected	6/17/1996		C	
963035	plover	1996	Sakakawea	Sakakawea State Park	4	collected	6/17/1996		C	
963036	plover	1996	Sakakawea	Steinke Bay	4	collected	6/17/1996		C	
963040	plover	1996	Sakakawea	Steinke Bay	4	flooded-eggs washed out	7/11/1996	7/19/1996	O	Rising pool
963043	tern	1996	Sakakawea	Van Hook Arm	1	flooded-nest filled	6/30/1996	7/9/1996	O	Rising pool
963044	tern	1996	Sakakawea	Van Hook Arm	1	flooded-nest filled	6/30/1996	7/9/1996	O	Rising pool
963045	tern	1996	Sakakawea	Van Hook Arm	1	flooded-nest filled	6/30/1996	7/9/1996	O	Rising pool
963047	tern	1996	Sakakawea	Steinke Bay	2	flooded-eggs washed out	7/8/1996	7/11/1996	O	Rising pool
963048	tern	1996	Sakakawea	Steinke Bay	2	flooded-eggs washed out	7/8/1996	7/11/1996	O	Rising pool
963049	tern	1996	Sakakawea	1451 Van Hook Arm	1	unknown	7/22/1996	7/28/1996	U	
963201	plover	1996	Sakakawea	1508.3 Little Egypt	4	collected	6/17/1996		C	
963202	plover	1996	Sakakawea	1512 Tobacco Gardens	4	collected	6/17/1996		C	
963203	plover	1996	Sakakawea	1513 Tobacco Gardens	4	collected	6/17/1996		C	
963204	plover	1996	Sakakawea	1506.7 Little Egypt	4	collected	6/17/1996		C	
963205	plover	1996	Sakakawea	1507.5 Little Egypt	4	collected	6/17/1996		C	
963206	plover	1996	Sakakawea	1507.9 Little Egypt	3	collected	6/17/1996		C	
963209	plover	1996	Sakakawea	White Earth Bay	2	flooded-eggs washed out	6/25/1996	7/11/1996	O	Rising pool
964037	tern	1996	Garrison	1364.5	3	collected	6/28/1996		C	
964038	tern	1996	Garrison	1364.5	3	collected	6/28/1996		C	
964039	plover	1996	Garrison	1364.5	1	collected	6/28/1996		C	
964040	tern	1996	Garrison	1364.5	3	collected	6/28/1996		C	
964041	plover	1996	Garrison	1364.5	4	collected	6/28/1996		C	
964042	tern	1996	Garrison	1364.5	1	collected	6/28/1996		C	
964043	tern	1996	Garrison	1364.5	2	collected	6/28/1996		C	
964044	tern	1996	Garrison	1364.5	2	collected	6/28/1996		C	
964045	tern	1996	Garrison	1364.5	3	collected	6/28/1996		C	
964046	tern	1996	Garrison	1364.5	1	collected	6/28/1996		C	
964048	plover	1996	Garrison	1356.1	3	collected	6/28/1996		C	
964049	tern	1996	Garrison	1356.5	2	collected	6/28/1996		C	
964050	tern	1996	Garrison	1356.5	2	collected	6/28/1996		C	
964051	tern	1996	Garrison	1364.5	1	collected	6/28/1996		C	
964052	plover	1996	Garrison	1364.5	1	collected	6/28/1996		C	
964053	tern	1996	Garrison	1356.5	1	collected	6/28/1996		C	
964054	tern	1996	Garrison	1356.5	2	collected	6/28/1996		C	
964055	plover	1996	Garrison	1356.5	1	collected	6/28/1996		C	
964056	tern	1996	Garrison	1356.5	1	collected	6/28/1996		C	
964058	tern	1996	Garrison	1364.5	1	flooded-nest filled	7/2/1996	7/11/1996	NO	
964071	tern	1996	Garrison	1362.5	2	flooded-eggs washed out	7/11/1996	7/18/1996	NO	
964073	tern	1996	Garrison	1362.5	2	flooded-eggs washed out	7/11/1996	7/18/1996	NO	
964074	tern	1996	Garrison	1362.5	1	flooded-nest filled	7/11/1996	7/18/1996	NO	
964075	tern	1996	Garrison	1362.5	2	flooded-eggs washed out	7/11/1996	7/18/1996	NO	
964225	tern	1996	Garrison	1354	1	flooded-nest filled	6/17/1996	6/24/1996	NO	
964227	tern	1996	Garrison	1352.6	3	collected	6/24/1996		C	
964228	tern	1996	Garrison	1352.6	1	flooded-eggs washed out	6/17/1996	6/24/1996	O	Reduced releases at GARR several days followed by increase
964229	tern	1996	Garrison	1352.6	1	flooded-eggs washed out	6/17/1996	6/24/1996	NO	

Historical_Record

964230	plover	1996	Garrison	1352.6	3	collected	6/24/1996		C	
964245	plover	1996	Garrison	1353.7	2	collected	6/24/1996		C	
964246	tern	1996	Garrison	1352.6	1	collected	6/24/1996		C	
964247	tern	1996	Garrison	1354	1	collected	6/26/1996		C	
964248	tern	1996	Garrison	1352.1	2	flooded-eggs washed out	6/26/1996	6/28/1996	O	Reduced releases at GARR several days followed by increase
964249	plover	1996	Garrison	1352	2	flooded-eggs washed out	6/26/1996	6/28/1996	O	Reduced releases at GARR several days followed by increase
964250	tern	1996	Garrison	1352	1	collected	6/26/1996		C	
964251	tern	1996	Garrison	1352	1	collected	6/26/1996		C	
964252	tern	1996	Garrison	1352	2	collected	6/26/1996		C	
964253	plover	1996	Garrison	1352	1	collected	6/26/1996		C	
964273	tern	1996	Garrison	1352	1	collected	6/28/1996		C	
964274	tern	1996	Garrison	1352	1	collected	6/28/1996		C	
966001	plover	1996	Oahe	1090	4	flooded	5/30/1996	5/31/1996	O	Rising Pool
966002	plover	1996	Oahe	1104.6	4	flooded	5/31/1996	6/3/1996	O	Rising Pool
966003	plover	1996	Oahe	1104.5	3	flooded	5/31/1996	6/3/1996	O	Rising Pool
966203	plover	1996	Oahe	1270	2	flooded-eggs washed out	5/29/1996	6/5/1996	O	Rising pool
966260	plover	1996	Oahe	1270	1	flooded-eggs washed out	6/27/1996	7/3/1996	O	Wind-wave - steady pool
967001	tern	1996	Randall	866.7	0	flooded			U	
968005	plover	1996	Lewis & Clark	842.2	4	collected	6/6/1996		C	
968006	plover	1996	Lewis & Clark	842.2	3	collected	6/6/1996		C	
968009	plover	1996	Lewis & Clark	842.2	1	collected	6/6/1996		C	
968010	plover	1996	Lewis & Clark	842.2	4	collected	6/6/1996		C	
968011	plover	1996	Lewis & Clark	842.2	2	collected	6/6/1996		C	
968012	plover	1996	Lewis & Clark	842.2	1	collected	6/6/1996		C	
968013	plover	1996	Lewis & Clark	842.2	2	collected	6/6/1996		C	
968014	plover	1996	Lewis & Clark	842.2	1	collected	6/6/1996		C	
968015	plover	1996	Lewis & Clark	842.2	1	collected	6/6/1996		C	
968016	plover	1996	Lewis & Clark	842.2	3	collected	6/6/1996		C	
968036	plover	1996	Lewis & Clark	834	2	collected	6/13/1996		C	
968039	plover	1996	Lewis & Clark	842.2	2	collected	6/13/1996		C	
968040	plover	1996	Lewis & Clark	842.2	1	collected	6/13/1996		C	
968080	plover	1996	Lewis & Clark	838.5	4	collected	6/28/1996		C	
968081	plover	1996	Lewis & Clark	842.2	2	collected	6/28/1996		C	
968082	tern	1996	Lewis & Clark	842.2	2	collected	6/28/1996		C	
968083	tern	1996	Lewis & Clark	842.2	3	collected	6/28/1996		C	
968084	tern	1996	Lewis & Clark	842.2	3	collected	6/28/1996		C	
968085	tern	1996	Lewis & Clark	842.2	2	collected	6/28/1996		C	
968086	plover	1996	Lewis & Clark	842.2	1	unknown	6/24/1996	6/28/1996	U	
968131	tern	1996	Lewis & Clark	838.5	2	collected	6/28/1996		C	
968132	tern	1996	Lewis & Clark	838.5	1	collected	6/28/1996		C	
968133	tern	1996	Lewis & Clark	838.5	3	collected	6/28/1996		C	
968134	plover	1996	Lewis & Clark	838.5	1	collected	6/28/1996		C	
968135	plover	1996	Lewis & Clark	842.2	1	collected	6/28/1996		C	
969002	plover	1996	Gavins	803.4	4	collected	6/10/1996		C	
969004	plover	1996	Gavins	802	1	collected	6/10/1996		C	
969017	tern	1996	Gavins	801	3	collected	6/10/1996		C	
969018	tern	1996	Gavins	801	3	collected	6/10/1996		C	
969019	plover	1996	Gavins	801	3	collected	6/10/1996		C	
969020	tern	1996	Gavins	801	1	collected	6/10/1996		C	
969021	tern	1996	Gavins	801	1	collected	6/10/1996		C	
969023	tern	1996	Gavins	804.5	1	collected	6/10/1996		C	
969024	tern	1996	Gavins	804.5	1	collected	6/10/1996		C	
969025	tern	1996	Gavins	804.5	1	collected	6/10/1996		C	
969026	tern	1996	Gavins	790.4	2	collected	6/10/1996		C	
969027	tern	1996	Gavins	790.4	3	collected	6/10/1996		C	
969028	plover	1996	Gavins	790.4	1	collected	6/10/1996		C	
969029	tern	1996	Gavins	790.4	2	collected	6/10/1996		C	
969030	tern	1996	Gavins	790.4	2	collected	6/10/1996		C	
969031	tern	1996	Gavins	772.5	1	collected	6/10/1996		C	
969032	tern	1996	Gavins	773	3	unknown	6/17/1996	6/25/1996	U	
969033	tern	1996	Gavins	762	1	collected	6/11/1996		C	
969034	plover	1996	Gavins	762	3	collected	6/11/1996		C	
969035	tern	1996	Gavins	759.5	3	collected	6/11/1996		C	
969037	plover	1996	Gavins	804.5	4	collected	6/12/1996		U	
969038	tern	1996	Gavins	804.6	3	unknown	6/21/1996	6/27/1996	U	
969042	tern	1996	Gavins	801	2	collected	6/14/1996		C	
969044	tern	1996	Gavins	801	1	unknown	6/14/1996	6/21/1996	U	
969045	tern	1996	Gavins	801	1	unknown	6/14/1996	6/21/1996	U	
969046	tern	1996	Gavins	801	2	collected	6/14/1996		C	
969048	tern	1996	Gavins	801	2	unknown	6/14/1996	6/21/1996	U	
969050	tern	1996	Gavins	801	2	unknown	6/14/1996	6/21/1996	U	
969051	tern	1996	Gavins	801	2	collected	6/14/1996		C	
969052	tern	1996	Gavins	801	1	unknown	6/14/1996	6/21/1996	U	
969053	tern	1996	Gavins	801	2	unknown	6/14/1996	6/21/1996	U	

H-20

Historical_Record

969054	tern	1996	Gavins	801	1	collected	6/14/1996			C
969055	tern	1996	Gavins	758.5	1	collected	6/17/1996			C
969057	tern	1996	Gavins	762	1	collected	6/17/1996			C
969063	tern	1996	Gavins	761.5	3	collected	6/26/1996			C
969067	plover	1996	Gavins	804.5	4	unknown	6/27/1996	7/8/1996		U
969075	tern	1996	Gavins	804.6	1	unknown	6/21/1996	6/27/1996		U
969076	tern	1996	Gavins	804.6	2	unknown	6/21/1996	6/27/1996		U
969087	plover	1996	Gavins	761.5	2	collected	6/26/1996			C
969089	plover	1996	Gavins	759	1	flooded-other	6/25/1996	6/26/1996	could not relo	U
969090	plover	1996	Gavins	759	2	flooded-other	6/25/1996	6/26/1996	could not relo	U
969091	plover	1996	Gavins	779.5	2	collected	6/26/1996			C
969092	tern	1996	Gavins	779.5	2	collected	6/26/1996			C
969093	tern	1996	Gavins	779.5	2	collected	6/26/1996			C
969094	tern	1996	Gavins	779.5	3	collected	6/26/1996			C
969095	tern	1996	Gavins	779.5	3	collected	6/26/1996			C
969096	tern	1996	Gavins	779.5	2	collected	6/26/1996			C
969097	tern	1996	Gavins	779.5	3	collected	6/26/1996			C
969098	tern	1996	Gavins	779.5	3	collected	6/26/1996			C
969099	tern	1996	Gavins	779.5	2	collected	6/26/1996			C
969100	tern	1996	Gavins	779.5	3	collected	6/26/1996			C
969101	tern	1996	Gavins	789.5	2	collected	6/27/1996			C
969103	tern	1996	Gavins	804.6	3	collected	6/27/1996			C
969104	tern	1996	Gavins	804.6	1	unknown	6/27/1996	7/8/1996		U
969105	tern	1996	Gavins	804.6	3	collected	7/15/1996			C
969106	tern	1996	Gavins	804.5	2	collected	6/27/1996			C
969107	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969108	tern	1996	Gavins	804.5	2	collected	6/27/1996			C
969109	tern	1996	Gavins	804.5	2	collected	6/27/1996			C
969110	tern	1996	Gavins	804.5	3	collected	6/27/1996			C
969111	tern	1996	Gavins	804.5	2	collected	6/27/1996			C
969112	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969113	tern	1996	Gavins	804.5	3	collected	6/27/1996			C
969114	tern	1996	Gavins	804.5	2	collected	6/27/1996			C
969115	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969116	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969117	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969118	tern	1996	Gavins	804.5	1	collected	6/27/1996			C
969119	tern	1996	Gavins	804.5	3	collected	6/27/1996			C
969120	tern	1996	Gavins	804.6	1	collected	6/27/1996			C
969121	tern	1996	Gavins	804.6	2	collected	7/15/1996			C
969122	tern	1996	Gavins	804.6	1	collected	7/15/1996			C
969123	tern	1996	Gavins	804.6	1	collected	7/15/1996			C
969124	tern	1996	Gavins	804.6	1	collected	7/15/1996			C
969125	tern	1996	Gavins	804.6	1	collected	7/15/1996			C
969126	tern	1996	Gavins	804.6	2	collected	7/15/1996			C
969128	tern	1996	Gavins	804.6	2	collected	7/15/1996			C
969129	tern	1996	Gavins	804.6	2	collected	7/15/1996			C
969130	tern	1996	Gavins	804.6	1	collected	7/15/1996			C
969201	tern	1996	Gavins	804.6	1	unknown	7/30/1996	8/6/1996		U
972001	plover	1997	Peck	1674.6	3	unknown	5/29/1997	6/4/1997		U
972002	plover	1997	Peck	1685.6	4	unknown	5/29/1997	6/4/1997		U
972003	plover	1997	Peck	1681.2	4	flooded-eggs washed out	6/4/1997	6/10/1997	within 2 inches	O
972019	tern	1997	Peck	1677	1	unknown	7/2/1997	7/10/1997		U
973001	plover	1997	Sakakawea		4	collected	6/14/1997			C
973002	plover	1997	Sakakawea		4	collected	6/14/1997			C
973003	plover	1997	Sakakawea		3	collected	6/14/1997			C
973004	plover	1997	Sakakawea		4	flooded-nest filled	6/4/1997	6/10/1997		O
973006	plover	1997	Sakakawea		3	flooded-nest filled	6/10/1997	6/14/1997		O
973007	plover	1997	Sakakawea		4	collected	6/14/1997			C
973008	plover	1997	Sakakawea		4	flooded-nest filled	6/12/1997	6/14/1997		O
973009	plover	1997	Sakakawea		4	collected	6/14/1997			C
973010	plover	1997	Sakakawea		4	collected	6/14/1997			C
973011	plover	1997	Sakakawea		4	flooded-nest filled	6/11/1997	6/14/1997		O
973012	tern	1997	Sakakawea		3	collected	6/14/1997			C
973013	tern	1997	Sakakawea		2	collected	6/14/1997			C
973014	tern	1997	Sakakawea		2	collected	6/14/1997			C
973015	tern	1997	Sakakawea		2	collected	6/14/1997			C
973016	plover	1997	Sakakawea		4	collected	6/14/1997			C
973017	tern	1997	Sakakawea		1	collected	6/14/1997			C
973200	plover	1997	Sakakawea	1483.5	4	collected	6/14/1997			C
974001	plover	1997	Garrison	1380	2	collected	6/25/1997			C
974002	tern	1997	Garrison	1367.5	3	collected	6/25/1997			C
974005	tern	1997	Garrison	1367.5	1	collected	6/25/1997			C
974006	tern	1997	Garrison	1367.5	3	collected	6/25/1997			C

Historical_Record

974007	tern	1997	Garrison	1367.5	3	collected	6/25/1997		C	
974008	tern	1997	Garrison	1367.5	3	collected	6/25/1997		C	
974009	tern	1997	Garrison	1367.5	1	collected	6/25/1997		C	
974010	tern	1997	Garrison	1367.5	1	collected	6/25/1997		C	
976002	plover	1997	Oahe	1109.5	2	flooded-flood debris	5/15/1997	5/27/1997	O	Wind-wave - steady/rising pool
976018	tern	1997	Oahe	1158	1	unknown	6/19/1997	6/24/1997	U	
976023	tern	1997	Oahe	1109	3	flooded-eggs washed out	6/23/1997	7/3/1997	O	Wind-wave - steady/rising pool
976025	plover	1997	Oahe	1109	4	unknown	6/23/1997	7/3/1997	U	
976030	plover	1997	Oahe	1109	4	flooded-eggs washed out	6/23/1997	7/3/1997	O	Wind-wave - steady/rising pool
976037	tern	1997	Oahe	1158	2	flooded-flood debris	7/9/1997	7/22/1997	O	Wind-wave - steady/rising pool
976223	tern	1997	Oahe	1249	2	flooded-flood debris	6/16/1997	6/25/1997	O	Wind-wave - steady/rising pool
976244	tern	1997	Oahe	1270	1	unknown	7/14/1997	7/21/1997	U	
976256	tern	1997	Oahe	1249	2	flooded-eggs washed out	7/7/1997	7/14/1997	O	Wind-wave - steady/rising pool
977108	tern	1997	Gavins	775.5	2	unknown	7/10/1997	7/17/1997	U	
979009	tern	1997	Gavins	770	3	unknown	6/16/1997	6/24/1997	U	
979012	tern	1997	Gavins	770	3	unknown	6/11/1997	6/16/1997	U	
979015	tern	1997	Gavins	759.7	3	unknown	6/18/1997	6/26/1997	U	
979016	tern	1997	Gavins	759.7	1	flooded-eggs washed out	6/12/1997	6/18/1997	NO	Rainfall
979023	tern	1997	Gavins	770.8	3	unknown	6/16/1997	6/24/1997	U	
979024	tern	1997	Gavins	771	2	unknown	6/24/1997	7/3/1997	U	
979026	tern	1997	Gavins	770	3	unknown	6/16/1997	6/24/1997	U	
979032	tern	1997	Gavins	770	3	unknown	6/16/1997	6/24/1997	U	
979033	tern	1997	Gavins	770	3	unknown	6/16/1997	6/24/1997	U	
979034	tern	1997	Gavins	801.5	2	unknown	6/17/1997	6/23/1997	U	
979035	tern	1997	Gavins	801.5	1	unknown	6/23/1997	7/1/1997	U	
979038	tern	1997	Gavins	804.5	3	unknown	6/23/1997	7/1/1997	U	
979041	tern	1997	Gavins	804.5	1	flooded-eggs washed out	6/23/1997	7/1/1997	NO	No rain or increase in releases
979042	tern	1997	Gavins	804.5	1	unknown	7/1/1997	7/9/1997	U	
979072	tern	1997	Gavins	759.7	1	unknown	6/26/1997	7/8/1997	U	
979075	tern	1997	Gavins	801	3	unknown	7/1/1997	7/9/1997	U	
979076	tern	1997	Gavins	775.5	3	unknown	7/10/1997	7/17/1997	U	
979085	tern	1997	Gavins	778	2	flooded-eggs washed out	7/3/1997	7/17/1997	O	Increase in GP release
979098	plover	1997	Gavins	770	1	unknown	7/3/1997	7/10/1997	U	
979102	tern	1997	Gavins	759.7	1	flooded-eggs washed out	7/8/1997	7/15/1997	NO	Rainfall
979104	plover	1997	Gavins	759.7	3	flooded-eggs washed out	7/8/1997	7/15/1997	NO	Release steady
979106	tern	1997	Gavins	778	2	flooded-eggs washed out	7/22/1997	8/6/1997	O	Increase in GP release
979110	tern	1997	Gavins	759.7	3	unknown	7/23/1997	7/30/1997	U	
979112	tern	1997	Gavins	767	2	flooded-eggs washed out	7/15/1997	7/23/1997	NO	Rainfall - see VRSD
979115	tern	1997	Gavins	770	2	flooded-eggs washed out	7/17/1997	7/22/1997	NO	Rainfall - see VRSD
979116	tern	1997	Gavins	778	2	flooded-other	8/6/1997	8/12/1997	flooded, eggs O	Increase in GP release
979120	tern	1997	Gavins	759.7	1	flooded-nest filled	7/22/1997	8/1/1997	NO	Rainfall - SCSD, VRSD
983004	plover	1998	Sakakawea		4	unknown	6/3/1998	6/15/1998	U	
983005	plover	1998	Sakakawea		4	unknown	6/3/1998	6/15/1998	U	
983009	plover	1998	Sakakawea		4	unknown	6/15/1998	6/30/1998	U	
983012	plover	1998	Sakakawea		3	flooded-eggs washed out	6/12/1998	7/1/1998	O	Rising pool
983014	plover	1998	Sakakawea		4	flooded-eggs washed out	7/9/1998	7/15/1998	O	Rising pool
983022	plover	1998	Sakakawea		4	flooded-nest filled	6/22/1998	7/10/1998	O	Rising pool
983028	plover	1998	Sakakawea		1	flooded-eggs washed out	6/23/1998	7/9/1998	O	Rising pool
983032	plover	1998	Sakakawea		4	flooded-eggs washed out	6/25/1998	7/7/1998	O	Rising pool
983034	plover	1998	Sakakawea		4	unknown	7/7/1998	7/15/1998	U	
983048	plover	1998	Sakakawea		1	flooded-eggs washed out	6/30/1998	7/13/1998	O	Rising pool
983056	plover	1998	Sakakawea		4	flooded-eggs washed out	7/7/1998	7/15/1998	O	Rising pool
983205	plover	1998	Sakakawea		3	unknown	6/14/1998	6/24/1998	U	
983234	plover	1998	Sakakawea		3	flooded-other	7/30/1998	8/6/1998	stream of wat O	Wind-wave - steady pool
984025	plover	1998	Garrison	1339.1	4	unknown	6/30/1998	7/9/1998	U	
986020	tern	1998	Oahe	1110	2	flooded-other	6/19/1998	6/23/1998	nest 6-7 inch O	Rising pool
986101	plover	1998	Oahe	1228.4	4	unknown	5/19/1998	5/28/1998	U	
986102	plover	1998	Oahe	1228.4	4	unknown	5/19/1998	5/28/1998	U	
987001	plover	1998	Randall	851.6	4	collected	6/5/1998		C	
987003	plover	1998	Randall	851.5	4	collected	6/5/1998		C	
987038	plover	1998	Randall	851.5	4	flooded-eggs washed out	7/15/1998	7/22/1998	O	Increase in FTRA peak
988018	plover	1998	Lewis & Clark	829.5	4	collected	6/17/1998		C	
988019	plover	1998	Lewis & Clark	829.5	4	collected	6/17/1998		C	
988082	plover	1998	Lewis & Clark	841.5	4	collected	7/7/1998		below 18 inch C	
989001	plover	1998	Gavins	804.5	4	unknown	5/28/1998	6/9/1998	U	
989006	plover	1998	Gavins	807	4	unknown	6/9/1998	6/15/1998	U	
989026	plover	1998	Gavins	781	2	unknown	6/11/1998	6/24/1998	U	
989032	plover	1998	Gavins	804.5	4	collected	6/22/1998		C	
993001	plover	1999	Sakakawea	1400.5	5	flooded-flood debris	6/2/1999	6/4/1999	O	Rising pool
993002	plover	1999	Sakakawea	1393	4	flooded-flood debris	6/2/1999	6/7/1999	O	Rising pool
993004	plover	1999	Sakakawea	1415	2	flooded-flood debris	6/3/1999	6/8/1999	O	Rising pool
993007	plover	1999	Sakakawea	1393.7	4	flooded-flood debris	6/1/1999	6/7/1999	O	Rising pool
993008	plover	1999	Sakakawea	1393.8	4	collected	6/7/1999		C	
993009	plover	1999	Sakakawea	1393.9	4	collected	6/7/1999		C	

Historical_Record

993010	plover	1999	Sakakawea	1393.6 West Totten	2	flooded-flood debris	Y	6/1/1999	6/7/1999	O	Rising pool	
993011	plover	1999	Sakakawea	1393.6 West Totten	4	flooded-flood debris	N	6/1/1999	6/7/1999	O	Rising pool	
993012	plover	1999	Sakakawea	1393.1 Mallard Island	4	collected	N	6/7/1999		C		
993013	plover	1999	Sakakawea	1393.5 Mallard Island	4	flooded-flood debris	N	6/2/1999	6/7/1999	O	Rising pool	
993014	plover	1999	Sakakawea	1400.5 Douglas Creek Bay	4	flooded-flood debris	Y	6/17/1999	6/25/1999	2 inches of w.	O	Rising pool
993015	plover	1999	Sakakawea	1401.4 Douglas Creek Bay	3	collected	N	6/7/1999		C		
993016	plover	1999	Sakakawea	1416 Ree Bay West	4	flooded-flood debris	N	6/3/1999	8/8/1999		O	Rising pool
993017	plover	1999	Sakakawea	1394.3 Steinke Bay	3	flooded-flood debris	N	6/4/1999	6/7/1999		O	Rising pool
993018	plover	1999	Sakakawea	1394.3 Steinke Bay	4	collected	N	6/7/1999		C		
993019	plover	1999	Sakakawea	1394.5 Steinke Bay	4	flooded-eggs washed out	N	6/4/1999	6/7/1999	flooded eggs	O	Rising pool
993020	plover	1999	Sakakawea	1394.5 Steinke Bay	4	flooded-flood debris	N	6/4/1999	6/7/1999		O	Rising pool
993021	plover	1999	Sakakawea	1394.5 Steinke Bay	3	flooded-flood debris	N	6/4/1999	6/7/1999		O	Rising pool
993022	plover	1999	Sakakawea	1394.9 DeTroband Bay	4	flooded-flood debris	N	6/4/1999	6/7/1999		O	Rising pool
993023	plover	1999	Sakakawea	1400.5 Douglas Creek Bay	3	collected	N	6/7/1999		C		
993024	plover	1999	Sakakawea	1393.6 West Totten	1	collected	N	6/7/1999		C		
993025	plover	1999	Sakakawea	1416 Ree Bay	2	collected	N	6/8/1999		C		
993031	plover	1999	Sakakawea	1401.5 Douglas Creek Bay	4	flooded-flood debris	Y	7/12/1999	7/20/1999		O	Rising pool
993200	plover	1999	Sakakawea	1511.4 Tobacco Gardens	4	unknown	Y	5/25/1999	6/1/1999	shell fragmen	U	
993206	plover	1999	Sakakawea	1509.8 Little Egypt	4	collected	Y	6/18/1999		barely 18 inct	C	
993209	plover	1999	Sakakawea	1541.2 Lake Jessie	4	collected	N	6/11/1999			C	
993210	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/11/1999			C	
993211	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/11/1999			C	
993212	tern	1999	Sakakawea	1541.2 Lake Jessie	2	collected	N	6/11/1999			C	
993213	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/11/1999			C	
993214	plover	1999	Sakakawea	1511.4 Tobacco Gardens	4	collected	Y	6/18/1999			C	
993216	tern	1999	Sakakawea	1451 Van Hook Arm	3	flooded-nest filled	Y	6/15/1999	6/30/1999		O	Rising pool
993217	tern	1999	Sakakawea	1451 Van Hook Arm	3	flooded-eggs washed out	Y	6/15/1999	6/30/1999	eggs found in	O	Rising pool
993219	plover	1999	Sakakawea	1451 Van Hook Arm	4	flooded-other	N	6/15/1999	6/30/1999	unable to loc:	O	Rising pool
993223	plover	1999	Sakakawea	1451 Van Hook Arm	1	flooded-flood debris	N	6/30/1999	7/12/1999	nest flooded	O	Rising pool
993224	plover	1999	Sakakawea	1451 Van Hook Arm	1	flooded-other	N	6/30/1999	7/12/1999	area flooded	O	Rising pool
993225	plover	1999	Sakakawea	1451 Van Hook Arm	2	flooded-other	N	6/30/1999	7/12/1999	nest area floc	O	Rising pool
993227	plover	1999	Sakakawea	1509.9 Little Egypt	4	flooded-other	N	7/2/1999	7/8/1999	went to move	O	Rising pool
993230	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	Y	6/18/1999			C	
993231	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	Y	6/18/1999			C	
993232	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/18/1999			C	
993233	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/18/1999			C	
993234	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/18/1999			C	
993235	tern	1999	Sakakawea	1541.2 Lake Jessie	3	collected	N	6/18/1999			C	
993236	tern	1999	Sakakawea	1541.2 Lake Jessie	1	collected	N	6/18/1999			C	
993237	tern	1999	Sakakawea	1541.2 Lake Jessie	1	collected	N	6/18/1999			C	
993238	tern	1999	Sakakawea	1541.2 Lake Jessie	1	collected	N	6/18/1999			C	
993239	plover	1999	Sakakawea	1541.2 Lake Jessie	1	collected	N	6/18/1999			C	
993240	tern	1999	Sakakawea	1511.4 Tobacco Gardens	3	flooded-eggs washed out	N	6/18/1999	6/18/1999	nest bowl floc	U	
993241	tern	1999	Sakakawea	1511.4 Tobacco Gardens	1	collected	N	6/18/1999			C	
993242	tern	1999	Sakakawea	1511.4 Tobacco Gardens	2	collected	N	6/18/1999			C	
993243	tern	1999	Sakakawea	1451 Van Hook Arm	3	flooded-other	Y	7/12/1999	7/22/1999	area where n	O	Rising pool
993244	tern	1999	Sakakawea	1451 Van Hook Arm	1	flooded-other	Y	7/12/1999	7/22/1999	nest site com	U	
994001	plover	1999	Garrison	1380	4	unknown	Y	6/5/1999	6/10/1999		U	
994006	plover	1999	Garrison	1389.5	4	unknown	Y	6/5/1999	6/10/1999	no eggs to be	U	
994020	plover	1999	Garrison	1370.2	3	unknown	Y	6/28/1999	7/6/1999		U	
994200	plover	1999	Garrison	1348	4	unknown	Y	5/22/1999	6/4/1999		U	
994201	plover	1999	Garrison	1348	4	unknown	Y	5/22/1999	6/4/1999		U	
994202	plover	1999	Garrison	1339.3	2	unknown	Y	5/22/1999	6/2/1999		U	
994203	plover	1999	Garrison	1333.8	3	unknown	Y	5/22/1999	6/2/1999		U	
994206	plover	1999	Garrison	1326.7	3	unknown	Y	6/2/1999	6/8/1999		U	
994213	plover	1999	Garrison	1311	4	unknown	Y	6/2/1999	6/9/1999		U	
994214	plover	1999	Garrison	1308.5	4	unknown	Y	6/2/1999	6/9/1999		U	
994215	plover	1999	Garrison	1308.5	2	unknown	Y	6/2/1999	6/9/1999		U	
994236	plover	1999	Garrison	1319.5	4	unknown	Y	6/13/1999	6/21/1999		U	
994238	plover	1999	Garrison	1302.5	2	unknown	Y	6/9/1999	6/14/1999	no evidence	U	
994248	plover	1999	Garrison	1319.5	4	unknown	Y	7/7/1999	7/13/1999		U	
994250	plover	1999	Garrison	1308.5	3	unknown	Y	6/14/1999	6/22/1999		U	
994263	plover	1999	Garrison	1308.5	4	unknown	Y	6/28/1999	7/6/1999		U	
994268	plover	1999	Garrison	1347.5	4	unknown	Y	7/7/1999	7/13/1999		U	
994276	plover	1999	Garrison	1319.5	4	unknown	Y	7/7/1999	7/13/1999		U	
996001	plover	1999	Oahe	1108.9 Little Bend	4	flooded-other	N	5/15/1999	5/23/1999	flooded out b	O	Rising pool
996002	plover	1999	Oahe	1104 Mission	3	flooded-other	Y	5/15/1999	5/23/1999	flooded out b	O	Rising pool
996003	plover	1999	Oahe	1158.5 Swiftbird	4	collected	N	5/25/1999			C	
996004	plover	1999	Oahe	1158.1 Swiftbird South	3	collected	N	5/25/1999			C	
996005	plover	1999	Oahe	1157 Swiftbird	4	flooded-other	Y	5/15/1999	5/22/1999	flooded by lal	O	Rising pool
996007	plover	1999	Oahe	1108 Mission North	2	collected	Y	5/25/1999			C	
996010	plover	1999	Oahe	1090 Plum Creek	4	flooded-other	N	5/28/1999	6/4/1999	nest flooded l	O	Rising pool
996011	plover	1999	Oahe	1108.9 Little Bend	4	flooded-other	Y	6/4/1999	6/9/1999	flooded by lal	O	Rising pool
996015	plover	1999	Oahe	1090 Plum Creek	1	flooded-other	Y	6/4/1999	6/9/1999	flooded by lal	O	Rising pool

Historical_Record

996016	plover	1999	Oahe	1104	Mission	2	flooded-other	Y	6/4/1999	6/9/1999	flooded by tal	O	Rising pool
996017	tern	1999	Oahe	1104	Mission	1	flooded-other	Y	6/4/1999	6/9/1999	flooded by tal	O	Rising pool
996018	tern	1999	Oahe	1104	Mission	3	flooded-other	Y	6/4/1999	6/9/1999	flooded by tal	O	Rising pool
996021	plover	1999	Oahe	1160	Swiftbird North	4	flooded-eggs washed out	N	6/24/1999	7/1/1999	nest in about	O	Rising pool
996022	plover	1999	Oahe	1160	Swiftbird North	1	flooded-other	N	6/5/1999	6/10/1999		O	Rising pool
996023	tern	1999	Oahe	1104	Mission	3	flooded-eggs washed out	Y	6/9/1999	6/14/1999	flooded by ris	O	Rising pool
996034	plover	1999	Oahe	1108	Mission North	1	flooded-eggs washed out	N	6/14/1999	6/21/1999		O	Rising pool
996035	plover	1999	Oahe	1108	Mission North	4	flooded-nest filled	N	6/29/1999	7/6/1999		O	Rising pool
996041	plover	1999	Oahe	1108.9	Little Bend	2	flooded-nest filled	N	6/21/1999	6/29/1999		O	Rising pool
996042	tern	1999	Oahe	1109	Cheyenne River	3	flooded-nest filled	N	7/6/1999	7/12/1999		O	Likely wind-wave - steady/rising pool
996043	tern	1999	Oahe	1108.9	Little Bend	2	flooded-nest filled	Y	7/6/1999	7/12/1999		O	Likely wind-wave - steady/rising pool
996100	plover	1999	Oahe	1227.5	Fort Manuel	4	collected	N	5/25/1999			C	
996101	plover	1999	Oahe	1228	Fort Manuel	4	flooded-other	Y	6/1/1999	6/9/1999		O	Rising pool
996200	plover	1999	Oahe	1293	Rifle Range	1	flooded-other	N	5/24/1999	6/9/1999	nest complete	U	
996201	plover	1999	Oahe	1294	Granger South	4	unknown	Y	5/24/1999	6/4/1999		U	
996203	plover	1999	Oahe	1270	Dredge Island	1	flooded-nest filled	N	5/26/1999	6/1/1999		O	Rising pool
996204	plover	1999	Oahe	1270	Dredge Island	4	flooded-nest filled	N	6/1/1999	6/11/1999	water level ro	O	Rising pool
996206	plover	1999	Oahe	1270	Dredge Island	3	unknown	Y	6/1/1999	6/11/1999	no evidence t	U	
996208	plover	1999	Oahe	1270	Dredge Island	4	flooded-nest filled	N	6/1/1999	6/11/1999	water rose to	O	Rising pool
996209	plover	1999	Oahe	1270	Dredge Island	4	unknown	Y	6/1/1999	6/11/1999	no evidence t	U	
996220	plover	1999	Oahe	1295.5	Graners	4	flooded-other	N	6/14/1999	6/22/1999	nest is under	O	Rising pool
996232	plover	1999	Oahe	1270	Dredge Island	1	flooded-flood debris	N	6/15/1999	6/24/1999	flood material	O	Rising pool
996235	plover	1999	Oahe	1248.9	Porcupine Island	2	unknown	Y	6/23/1999	7/1/1999		U	
996236	tern	1999	Oahe	1248.9	Porcupine Island	3	flooded-flood debris	Y	6/15/1999	6/23/1999		O	Rising pool
996238	plover	1999	Oahe	1248.9	Porcupine Island	3	unknown	Y	6/23/1999	7/1/1999		U	
996249	tern	1999	Oahe	1248.9	Porcupine Island	1	unknown	Y	6/23/1999	7/1/1999		U	
996256	plover	1999	Oahe	1295.5	Graners	1	unknown	Y	7/8/1999	7/12/1999		U	
996281	tern	1999	Oahe	1248.9	Porcupine Island	2	unknown	Y	7/19/1999	7/26/1999		U	
997001	plover	1999	Randall	851.7		1	unknown	N	5/21/1999	5/25/1999	area around r	U	
997003	plover	1999	Randall	851.7		1	collected	N	5/25/1999			C	
997037	plover	1999	Randall	851.9		4	unknown	Y	6/28/1999	7/7/1999		U	
997038	plover	1999	Randall	851.6		2	flooded-eggs washed out	Y	7/20/1999	7/28/1999		NO	Rainfall near Verdet
997045	tern	1999	Randall	851.7		2	flooded-flood debris	Y	6/21/1999	6/28/1999		O	Increase in FTRA peak & dty avg
997060	plover	1999	Randall	866.7		3	unknown	Y	6/28/1999	7/7/1999		U	
997082	tern	1999	Randall	852		2	unknown	Y	7/7/1999	7/13/1999		U	
997091	plover	1999	Randall	866.7		3	flooded-nest filled	Y	7/7/1999	7/13/1999		NO	No peak stage change.
998001	plover	1999	Lewis & Clark	842		1	unknown	Y	5/12/1999	5/18/1999	unknown cau:	U	
998002	plover	1999	Lewis & Clark	842		1	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998003	plover	1999	Lewis & Clark	842		1	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998004	plover	1999	Lewis & Clark	842		2	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998005	plover	1999	Lewis & Clark	842.2		1	unknown	N	5/18/1999	5/26/1999	no signs of flc	U	
998006	plover	1999	Lewis & Clark	842.2		1	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998007	plover	1999	Lewis & Clark	842.2		1	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998008	plover	1999	Lewis & Clark	842.2		1	unknown	Y	5/18/1999	5/26/1999	no signs of flc	U	
998009	plover	1999	Lewis & Clark	838		1	unknown	N	5/24/1999	6/2/1999	no egg shell,	U	
998011	plover	1999	Lewis & Clark	837		1	unknown	Y	5/24/1999	6/2/1999	flattened bow	U	
998012	plover	1999	Lewis & Clark	836		3	unknown	N	5/24/1999	6/2/1999		U	
998013	plover	1999	Lewis & Clark	832.2		2	unknown	Y	5/24/1999	6/2/1999		U	
998014	plover	1999	Lewis & Clark	832.2		2	unknown	Y	5/24/1999	6/2/1999	bowl intact, n	U	
998015	plover	1999	Lewis & Clark	832.2		4	unknown	Y	5/24/1999	6/2/1999		U	
998016	plover	1999	Lewis & Clark	842.2		1	collected	N	5/26/1999			C	
998024	tern	1999	Lewis & Clark	838		3	unknown	N	6/8/1999	6/16/1999		U	
998029	tern	1999	Lewis & Clark	838		3	unknown	N	6/8/1999	6/16/1999		U	
998035	plover	1999	Lewis & Clark	837		4	unknown	Y	6/2/1999	6/8/1999		U	
998036	plover	1999	Lewis & Clark	843		2	unknown	N	6/3/1999	6/9/1999	empty bowl, r	U	
998037	tern	1999	Lewis & Clark	842.2		1	unknown	N	6/3/1999	6/9/1999	dog tracks in	U	
998038	plover	1999	Lewis & Clark	842.2		1	unknown	Y	6/3/1999	6/9/1999	egg missing,	U	
998039	tern	1999	Lewis & Clark	842.2		1	unknown	Y	6/3/1999	6/9/1999	no signs, no t	U	
998040	plover	1999	Lewis & Clark	842.2		1	unknown	Y	6/3/1999	6/9/1999	no signs or e	U	
998041	tern	1999	Lewis & Clark	838		3	unknown	N	6/8/1999	6/16/1999		U	
998042	tern	1999	Lewis & Clark	838		3	unknown	N	6/8/1999	6/16/1999		U	
998043	tern	1999	Lewis & Clark	838		2	unknown	N	6/8/1999	6/16/1999		U	
998061	plover	1999	Lewis & Clark	838		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998062	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998067	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998070	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998071	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998075	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998079	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998080	tern	1999	Lewis & Clark	839.2		3	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998082	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998084	plover	1999	Lewis & Clark	839.2		4	unknown	N	7/9/1999	7/15/1999		U	
998086	plover	1999	Lewis & Clark	839.2		4	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1
998091	tern	1999	Lewis & Clark	842.2		3	flooded-nest filled	N	7/15/1999	7/21/1999		NO	Rainfall - Niobrara - see VEN1

H-24

Historical_Record

998093	plover	1999	Lewis & Clark	842.2	4	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998094	tern	1999	Lewis & Clark	842.2	1	flooded-other	N	7/15/1999	7/9/1999	NO	Rainfall - Niobrara - see VEN1	
998095	plover	1999	Lewis & Clark	842.2	4	unknown	N	7/1/1999	7/9/1999	U		
998096	tern	1999	Lewis & Clark	842.2	1	unknown	N	7/1/1999	7/9/1999	U		
998098	tern	1999	Lewis & Clark	842.2	1	unknown	N	7/1/1999	7/9/1999	U		
998103	plover	1999	Lewis & Clark	842.2	4	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998107	tern	1999	Lewis & Clark	842.2	3	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998108	plover	1999	Lewis & Clark	842.2	2	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998109	tern	1999	Lewis & Clark	842.2	2	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998111	plover	1999	Lewis & Clark	838	3	flooded-nest filled	Y	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998112	plover	1999	Lewis & Clark	838	4	flooded-nest filled	Y	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998113	plover	1999	Lewis & Clark	838	4	flooded-nest filled	Y	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998115	plover	1999	Lewis & Clark	838.5	4	flooded-nest filled	N	7/21/1999	7/27/1999	eggs out of box	NO	Rainfall - Niobrara - see VEN1
998116	plover	1999	Lewis & Clark	842.2	3	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998117	tern	1999	Lewis & Clark	842.2	2	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998118	tern	1999	Lewis & Clark	842.2	2	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998119	tern	1999	Lewis & Clark	842.2	2	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
998121	plover	1999	Lewis & Clark	839.5	4	flooded-nest filled	N	7/15/1999	7/21/1999	NO	Rainfall - Niobrara - see VEN1	
999002	plover	1999	Gavins	807.4	4	collected	N	5/26/1999		C		
999003	plover	1999	Gavins	790.1	3	collected	N	5/27/1999		C		
999006	plover	1999	Gavins	804.4	4	unknown	N	5/26/1999	6/2/1999	U		
999007	plover	1999	Gavins	769.9	4	collected	N	5/28/1999		C		
999008	plover	1999	Gavins	767.7	4	unknown	Y	5/28/1999	6/7/1999	U		
999012	plover	1999	Gavins	803.4	4	unknown	Y	5/26/1999	6/3/1999	U		
999013	plover	1999	Gavins	800.7	1	unknown	Y	5/26/1999	6/4/1999	U		
999014	plover	1999	Gavins	798.8	2	collected	N	5/27/1999		C		
999019	plover	1999	Gavins	796.8	1	collected	N	5/27/1999		C		
999026	plover	1999	Gavins	767.7	4	unknown	N	5/28/1999	6/7/1999	U		
999045	plover	1999	Gavins	804.4	4	unknown	Y	6/11/1999	6/17/1999	U		
999063	plover	1999	Gavins	796.8	4	unknown	N	6/17/1999	6/25/1999	U		
999070	plover	1999	Gavins	781.7	4	flooded-nest filled	N	6/4/1999	6/14/1999	NO	Rainfall - see VRSD	
999104	plover	1999	Gavins	790	4	unknown	N	6/21/1999	6/29/1999	U		
999107	plover	1999	Gavins	804.4	3	unknown	Y	6/11/1999	6/17/1999	U		
999108	plover	1999	Gavins	804.4	4	unknown	Y	6/17/1999	6/25/1999	no sign of egg	U	
999109	plover	1999	Gavins	804.4	4	unknown	Y	6/17/1999	6/25/1999	no sign of egg	U	
999123	plover	1999	Gavins	807.4	4	unknown	N	6/17/1999	6/25/1999	U		
999124	plover	1999	Gavins	804.4	4	unknown	N	6/17/1999	6/25/1999	U		
999129	plover	1999	Gavins	788.5	2	flooded-nest filled	N	6/22/1999	6/29/1999	NO	Rainfall	
999136	plover	1999	Gavins	788.5	4	flooded-nest filled	N	7/14/1999	7/22/1999	NO	Rainfall	
999158	plover	1999	Gavins	788	4	flooded-eggs washed out	N	7/14/1999	7/22/1999	NO	Rainfall	
999171	tern	1999	Gavins	790.1	1	flooded-nest filled	N	7/14/1999	7/22/1999	NO		
999173	plover	1999	Gavins	790.1	3	flooded-nest filled	N	7/14/1999	7/22/1999	NO	Rainfall	
999180	tern	1999	Gavins	781.5	1	flooded-other	N	7/14/1999	7/22/1999	egg buried in	NO	Rainfall - Yankton
999187	plover	1999	Gavins	790.1	1	flooded-nest filled	N	7/14/1999	7/22/1999	NO	Rainfall	
999182	plover	1999	Gavins	778.1	4	flooded-eggs washed out	N	7/19/1999	7/28/1999	NO	Rainfall	